Unemployment Compensation: Studies and Research

Volume 2

National Commission
on Unemployment Compensation
July 1980

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Preface

These volumes are a compilation of research studies by experts in their fields. They are being made available in order to provide policymakers and administrators with some recent thinking on policy issues and to stimulate the research community's interest in unemployment insurance.

No attempt was made to survey all the important topics in unemployment insurance because time was limited and data were not always available. Some of these reports break new ground, while others revisit old issues. The reports vary greatly in terms of empirical methods and the amount of quantitative analysis used.

Most of the reports were prepared by authors under contract with the National Commission on Unemployment Compensation or by Commission staff members. Some were prepared under other auspices and made available to the Commission. The opinions expressed and conclusions drawn are those of the individual authors and do not necessarily represent the views of the Commission.

The reports are grouped into 13 sections according to the major issue addressed. Some overlap occurs since a single report may include discussion on several topics. In some cases, reports are not presented in their entirety; when this is the case, it is indicated in the author's note on the first page of each report. The complete versions of such reports, plus additional reports prepared for the Commission but not published in these volumes, are available from the microfiche collection of Government Depository Libraries.

A Research Advisory Committee was established to assist in deciding which of the many proposals received by the Commission should be funded. The members of that Committee were Joseph Becker, S.J., Research Professor, Jesuit Center for Social Studies, Georgetown University, Washington, D.C.; Saul Blaustein, Senior Economist, W. E. Upjohn Institute for Employment Research, Kalamazoo, Michigan; Daniel Hamermesh, Professor of Economics, Michigan State University, East Lansing, Michigan; Joseph Hight, Senior Labor Economist, Office of the Assistant Secretary for Policy, Evaluation and Research, U.S. Department of Labor, Washington, D.C.; Thomas Joyce, Research Analyst, Office of Policy, Evaluation and Research, Employment and Training Administration, U.S. Department of Labor, Washington, D.C.; Arnold Katz, Assistant Professor of Economics, University of Pittsburgh, Pittsburgh, Pennsylvania; and Stephen Wandner, Deputy Director, Office of Research, Legislation, and Program Policies, Unemployment Insurance Service, Employment and Training Administration, U.S. Department of Labor, Washington, D.C. In addition to evaluating proposals, these individuals gave guidance on areas for research and on the organization of these volumes. Their knowledge has been invaluable, and their willingness to assist is greatly appreciated. They are not responsible for any shortcomings.

The scope of this collection is attributable to the vision of the Commission Chairman, Wilbur J. Cohen. James M. Rosbrow, Executive Director, gave day-to-day encouragement. Mamoru Ishikawa got the project launched, and Robert Crosslin helped in midstream. James Van Erden gave continuing assistance. These reports would never have been published without the willingness and expertise of Roger Webb, Lynne Neorr, and Judy Wall, all of whom oversaw the details of publication.

RAYMOND MUNTS
Director of Research and Evaluation

Financing, Experience Rating, and Solvency

Specific Tax Formulas for Experience Rating

Eleanor Brown

The United States finances its unemployment insurance (UI) program by levying payroll taxes at rates that vary across firms according to each firm's past experience with unemployment. This use of experience-rated taxes has not won universal favor, and is a topic for ongoing debate. Disagreement over experience rating is not limited to the question of whether such payroll taxes should be used: even given the mandate that UI will be financed by the taxes, there is no consensus on the appropriate measure of a firm's performance. While the 50 States and the District of Columbia all used experience-rated taxes, there are striking differences in the formulas they have chosen for calculating tax rates.

This report contrasts the two most popular formulas for experience rating. Any attempt to say which formula is better needs to be built on some basic notion of the merits of experience rating. To this end, the arguments for experience rating are reviewed, and one section suggests how these theoretical notions of "good" experience rating might be translated into criteria that can be applied to the tax schedules currently in use.

A major finding of the subsequent analysis of the experience-rating rules is that the more popular tax formula, known as the reserve ratio, may not be as good an approach as originally hoped. While adjustments to the formula can improve its performance, these adjustments may be politically unattractive.

The Economics of Experience Rating

"Experience rating" refers to a UI tax law in which a firm's tax rate changes as its layoff policies change, or when other aspects of its labor market behavior affect the UI system. "Complete" or "perfect" experience rating refers to a system in which the firm is responsible for the financial burden of UI benefits paid to workers fired or laid off by the firm. Proponents and opponents of experience rating probably differ from each other in their views of the incidence of the experience-rated tax. One line of thought supporting experience rating views the tax as falling primarily on the labor groups likely to be recipients of UI benefits. Opponents seem to view the tax as a burden on the firm or industry itself.

The idea that the UI tax burden, wherever it rests, can become too large is a pervasive one. All States impose maximums on the tax rates that can be assigned. No matter how much a firm's employees collect in UI benefits, that firm's taxes will not rise beyond a certain level. The result of such a system is well known: high-layoff industries, such as construction, are recipients of UI benefits paid for by taxes on low-layoff industries, such as banking.

The alternative to this sort of interindustry cross-subsidization is to allow tax rates on (for example) construction payrolls to rise. The relevant question is whether the UI system is placing an unjustifiable burden on high-layoff industries by imposing high tax rates on those enterprises.

Consider, for example, the construction industry. Construction workers know they risk frequent layoffs. It seems reasonable to expect this knowledge to affect what wages they deem acceptable. It is also reasonable to assume construction workers are aware of the UI benefits they can receive when out of work, and that this information also affects their wage demands. It follows that UI taxes are not necessarily a burden on the firm, since the tax dollars reappear as UI benefits that make the workers demand less in wages. To the extent that UI taxes are perceived as payments for a useful service to the firm's workers, the tax may be non-distortionary. This view leads to the prescription of a highly experience-rated tax system: bank tellers are not likely to accept the burden of UI taxes through reduced wages in exchange for knowing that their bank's taxes will pay UI benefits to construction workers.

It is easy to model a situation in which a firm

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benefits from the existence of a UI system, even with perfect experience rating and possible high UI tax rates. Assume that workers dislike fluctuations in their income, preferring a steady source of income. (In other words, workers are risk-averse.) This preference implies that the workers will be willing to accept less income, on average, in exchange for a more secure income profile. It is cheaper, therefore, for a firm to smooth labor income over the business cycle by paying UI benefits than it would be for the firm to compete for workers who know their chances of becoming unemployed with no UI on which to fall back. True, it would be cheaper still to let other industries pay for a firm's workers' UI benefits, but it is not clear why such distortive subsidization would be required.

This argument has been formalized in a model showing that UI can exactly compensate for the absence of a market in which workers could insure themselves. If it can be agreed that the function of UI is to insure workers against drastic income loss, then this model shows how the tax rule might look in an optimally designed UI program. It is from this derived tax rule that this report takes its criteria for judging different approaches to experience rating.

The model is too involved to be reproduced here, but its approach is straightforward. It begins by looking at a world with no UI program. Instead, workers can trade claims to future wages. Suppose, for example, that there are only two possible states of demand for a firm's output: in state one, demand is strong and the firm retains all of its workers at a wage w_1; in state two, there will be some wage w_2 and some positive probability that any given worker will be laid off. Workers do not know ahead of time which state will occur. Nevertheless, they can insure themselves through the following type of arrangement: if state one occurs, workers pay part of their wages to the insurance company. If state two occurs and the firm offers employment, the worker again will pay some amount. But if the workers are unemployed, the insurance company must pay some amount in benefits.

No such insurance market exists. But the model shows that if a perfectly experience-rated UI system is introduced, one gets exactly the same results (expected profits, expected utility for workers, employment in each state of nature) one would get with the insurance market. The tax rule giving this result sets the payroll tax rate so that expected tax payments just equal expected claims going to workers the firm lays off.

Regardless of the experience-rating formula a State chooses, there will not be this degree of experience rating because of the maximum imposed on tax rates: some firms' tax rates will never be high enough to raise revenues to cover the benefit payments resulting from their employment policies. On the other hand, how well would the different formulas perform in the absence of constraints on the range of allowable tax rates?

Ex Ante Versus Ex Post Experience Rating

The biggest problem in interpreting the criterion previously given for experience rating is that it is couched in terms of expected tax payments and expected benefit claims. Any affordable measure of expectations, given that every year a tax rate is computed for every establishment, will probably be some simple function of data on past experience. One interpretation of the call for ex ante equality of taxes and benefits is that in the long run a tax rule should give equality between realized tax payments and realized benefit claims for each firm. Since any systematic divergence between the benefits going to a firm's employees and the cost of those benefits to the firm, through taxes, is likely to give the firm incentives to distort its behavior to exploit that divergence (as argued by Feldstein for the case of temporary layoffs), this seems a reasonable ex post criterion for good experience rating.[1] The insurance nature of the argument supporting the use of experience rating suggests that tax payments should not adjust immediately to changes in benefit claims.

The criteria that a tax rule should give slow adjustment of taxes to benefit flows, and complete adjustment in the long run, do not replicate the conditions of a world with ex ante rules for experience rating, but they do reflect some basic elements of that world. They are also rules that appeal to common sense: all States, for example, have rules that adjust taxes gradually to changes in benefit claims. The rest of this report considers these rules to be the relevant criteria for judging tax formulas that are necessarily ex post in nature.

These criteria are now applied to the most popular forms of experience rating, the benefit ratio and the reserve ratio. The analysis will show that the reserve ratio, with no limits to the tax rates that could be assigned, would yield a system with patterns of industry cross-subsidization much like the patterns observed under current tax laws, benefiting firms with high turnover rates at the expense of firms with low turnover rates.

Specific Rules for Experience Rating

The benefit ratio

The benefit ratio is the second most popular approach to experience rating. It is used by 11 States, the largest of which are Texas, Pennsylvania, and Michigan. Under this type of tax rule, contributions vary with the ratio of benefits collected to taxable payroll. The straightforward rationalization of this approach is that a tax rate that averages the ratio of benefits paid to payroll is the rate at which the firm is just paying the costs of benefits going to its ex-employees. The numerator of a firm's benefit ratio is the yearly average over the last

3 years (5 years in Michigan) of the amount of benefits charged against the firm. The denominator is the firm's taxable payroll over the same period. This gives a tax rule that sets t_i, the tax rate year i as

$$t_i = t^*_b + s_b \frac{\sum_{k=i-3}^{i-1} bF_k}{\sum_{k=i-3}^{i-1} \bar{w}L_k} \quad (1)$$

where F_k is the number of persons fired in year k, b is the average amount of benefits claimed, $\bar{w}L_k$ (taxable wages times labor force) is taxable payroll in year k, and t^*_b and s_b are respectively the intercept and slope of the tax function (t^*_b is small and s_b is close to 1).

Setting t^*_b equal to 0 and s_b equal to 1, the benefit ratio gives an estimator for the tax rate that would, in the absence of systematic movements in layoffs or employment, on average yield tax revenues from each firm that would just pay for the benefit claims resulting from the firm's employment strategy. This is the long-run quality of experience rating called for by the ex ante tax rule. (Use of several years' experience satisfies the short-run criterion of gradual tax response to changes in benefit flows.)

The problem with this estimator is that there can be systematic movements in employment, and in such cases the benefit ratio is not a perfect estimator for the "break-even" tax rate. Consider, for example, a growing firm: past payroll will underestimate future payroll, and the tax rate that would have been appropriate to a smaller tax base will raise more in revenues. The opposite holds true for a declining firm: tax revenues will be smaller than benefits collected. Business cycle fluctuations also affect the performance of the benefit ratio: consider, for example, two firms that each regularly experience a 4-year cycle. One firm employs 100 workers in each of three periods, and in the fourth period, employment slips to 90 workers. The other firm employs 110 workers in all but one period, in which it hires only 60. Taxable wages are $6,000 and each worker laid off collects $1,000 in UI benefits. Turnover in good years is two workers in each firm. If the tax rate is set equal to the benefit ratio ($t^*_b = 0$ and $s_b = 1$), then over the 4-year cycle the firm with the small change in employment would pay taxes slightly greater (over 2 percent) than the benefits collected by its ex-employees. The firm with the wide swing in employment levels would pay taxes that exceed by 16 percent the benefits claimed by its workers. To the extent that firms can manipulate their employment cycles, say, through changes in inventories, these quirks in the tax rule can be manipulated and so can serve to distort behavior.

The reserve ratio

The most popular form of UI law bases the employer's tax rate on what is known as a reserve ratio. In this system, all UI tax contributions ever made by a firm are recorded, as are all benefit payments charged against it. The excess of contributions over benefits ("reserves") relative to the firm's taxable payroll, determines the firm's tax rate.

If all employment decisions are made at the beginning of a year, and if everyone who is laid off collects an amount b of benefits, the firm's reserve ratio at the end of the year will be

$$RR_i = \frac{R_{i-1} + t_i\bar{w}L_i - bF_i}{\bar{w}L_i} \quad (2)$$

where RR_i is the reserve ratio at the end of year i, t_i the tax rate during year i, R_{i-1} the reserves accumulated at the end of period $i - 1$, $\bar{w}$ the taxable wage per employee, and L_i and F_i are the numbers of workers employed and laid off, respectively, at the beginning of period i. (As in the case of the benefit ratio, the measure of payroll used in the denominator of this ratio is often an average over a few recent years.)

A firm's tax rate responds negatively to changes in its reserve ratio. The tax schedules can be approximated as linear

$$\begin{aligned} t_{i+1} &= t^* - s(RR_i) \\ &= t^* - s\left[\frac{R_{i-1}}{wL_i} + t_i - \frac{bF_i}{wL_i}\right] \end{aligned} \quad (3)$$

where t^* and s are positive constants representing the intercept and slope, respectively, of the tax function. If tax receipts are greater than benefit payments, the reserve ratio rises and the tax rate falls. Conversely, when benefits exceed taxes, tax rates rise automatically, pushing tax receipts up until they equal benefit outflows.

The benefit ratio was seen to be weak in estimating appropriate tax rates when there were systematic variations in employment. One advantage of the reserve ratio is that past imbalances are kept track of, so that the reserve ratio can constantly revise its tax rate and thus can equate taxes to benefits over the long run (subject to one quirk to be discussed shortly).

Under steady state behavior, the reserve ratio converges to a unique value determined by parameters of the tax law and the firm's layoff rate. Consider a firm whose behavior is constant so that for all periods, $L_i = L$ and $F_i = F$. As has been noted by Brechling and by Topel and Welch,[2] for values of s between 0 and 2 (a range that brackets the values chosen by the States with reserve ratio systems), the tax rate will converge to the value t_s:

$$t_s = \frac{bF}{\bar{w}L}$$

This is the value for the tax rate that sets benefit outflows bF equal to tax inflows twL, and hence keeps the reserve ratio unchanging. The steady state reserve ratio is given by

$$\frac{R_s}{\overline{w}L} = \frac{t^* - bF/\overline{w}L}{s};$$

$$R_s = \frac{1}{s}\,[t^*\overline{w}L - bF] \qquad (4)$$

Besides depending on the tax parameters t^* and s, the steady state level of reserves depends on such endogenous quantities as the firm's turnover rate (F/L) (also the worker's probability of being laid off), and on L, the number of workers employed.

Because tax rates adjust to equalize tax inflows and benefit outflows, the reserve ratio approach to experience rating is often thought of as cost accounting.[3] Cost accounting is essentially perfect experience rating (ignoring, as the discussion of experience rating has so far, the question of discounting). The reserve ratio, however, is more accurately described as a combination of cost accounting with a system that accumulates precautionary balances. As mentioned earlier, the dynamics of the tax are such that, if a firm's behavior is constant over time, the tax moves toward a steady state in which tax inflows just equal benefit outflows. This is the sense in which the tax formula represents cost accounting. However, this steady state is also one in which the firm has a nonzero reserve (unless the firm happens to have a layoff rate exactly equal to $[w/b]t^*$). Only after a firm has accumulated a given level (possibly negative) of reserves do benefits and taxes tend toward equalization.

This reserve accumulation is important because no interest is paid on the amount of reserves credited to a firm. Firms with negative balances receive essentially interest-free loans, while firms with positive balances lose the return that money could have earned elsewhere. As in the current tax laws whose ceilings prevent high-turnover firms from paying taxes as large as the benefits charged against them, the reserve ratio tends to favor these firms by failing to charge interest on negative balances at their level of equilibrium.

However inequitable, accumulated reserves do not necessarily distort firm behavior, since firms will respond to incentives at the margin. If, for example, each firm were required to post a security deposit of $\$X$, each would be worse off each year by rX, the opportunity cost of the reserve, but there would be no way to distort behavior to avoid this cost. If the size of the required reserve is affected by firm policy, as in the reserve ratio case, then the tax will hold other incentives for firms than those of pure cost accounting.

The interpretation of the accumulated reserve as "precautionary" is in part a charitable one. The steady state reserve ratio is given by equation 4, which shows that an increase in the layoff rate F/L reduces the size of the equilibrium reserve. The firms that create little unemployment (relative to payroll) are the ones that accumulate large balances, while firms with high turnover may have negative equilibrium reserves. These reserves are not precautionary in the sense that firms creating large liabilities for the system are required to post a large security balance. Of course, if the average steady state balance for all firms is positive, then this total balance could be viewed as precautionary for the UI program as a whole.

Equation 4 shows that equilibrium reserves are affected by labor turnover and the number of employees. The effect of reserve ratio taxation on labor turnover has been investigated in a series of articles by Brechling.[4] His results suggest that turnover has been reduced, in general, by the tax. While the dominant effect on turnover of an experience-rated payroll tax is likely to be to reduce turnover, the steady state reserve feature of the tax works in the opposite direction. From equation 4,

$$\frac{dR_s}{dF} = -\frac{1}{s}\frac{b}{\overline{w}} < 0 \qquad (5)$$

An increase in turnover (more separations from a given labor force) reduces the size of the reserves that need to be held in a steady state. Similarly, while a decrease in turnover will reduce the average taxable payroll per worker and reduce the amount of benefits charged against the firm, it will also increase the size of the reserve balance to be accumulated and on which the firm earns no return. In the optimal insurance story, the tax burden increases with the probability of layoff; the incentive effect of the accumulation of reserves is not even in the right direction, giving firms an advantage if they increase the probability of layoff they offer.

Equation 4 also says that the size of steady state reserves grows with the number of employees:

$$\frac{dR_s}{dL} = \frac{t^*}{s}\overline{w} > 0 \qquad (6)$$

This is the additional amount (undiscounted) of tax that must be paid each time the firm's workforce is expanded by one worker, with no change in the number of layoffs.

To measure the importance of this effect, typical values of the parameters of the tax law can be plugged into (6). A reasonable value for t^*, the tax rate that applies to firms with 0 reserves, is 0.03; a common approximation of the slope of the tax function is 0.3 (see, for example, Brechling).[5] Recall that s is subtracted from t^* so that as reserve ratio (RR) rises, the tax rate declines. The taxable wage per employee in most States is $6,000. These values suggest that, in equilibrium, reserves will have increased $600 for every additional hire. The firm is not paid interest on these funds; the importance of the lack of interest payments will depend on prevailing interest rates, which in turn should depend on inflation and the real rate of return on investment. As of April 1980, inflation was at an annual rate of 18 percent; if a firm could earn a 2 percent real rate of return, then the opportunity cost of having these reserves held against the firm is $120 per worker per year. This is not a large number relative to the firm's wage bill, but it is large on the scale of UI taxes: it is equivalent to the amount paid in taxes by a firm with a UI tax rate of 2 percent. Even if inflation were more moderate, say, 13 percent, the cost of having these funds held against a firm would be equivalent to the revenue raised by a UI tax rate of 0.015, a plausible rate for a fairly low-turnover establishment.

The moral of the story is this: if a firm is expected to modify its behavior in response to the presence of an experience-rated UI payroll tax, the firm is likely to act to avoid the accumulation of reserves as well, since these reserves carry penalties often as large as the tax itself. As shown in equations 5 and 6, the two ways in which a firm decreases the equilibrium level of reserves to be collected from it are to increase the layoff rate and to reduce the number of employees. These are not incentives one would normally expect from a UI program.

Summary

Experience rating is limited by floors and ceilings that restrict the range of assignable tax rates, regardless of the UI tax formulas a State chooses. There are arguments for increasing the degree of experience rating in the tax schedules. To understand the possible effects of raising or eliminating the ceilings on tax rates, it is important to know how the different experience-rating formulas would perform in the absence of these constraints.

If experience-rating rules are judged against the standard of how closely a firm's tax liabilities approximate the benefits claimed against it in the long run, then neither of the most popular experience-rating schemes achieves perfect experience rating. The benefit ratio rule will fail to set taxes equal to benefit claims when there are systematic movements in employment levels; these distortions are small—a few percent of the tax burden—except in cases of dramatic swings in firm size.

The reserve ratio will converge to a state in which tax liabilities at the margin are set equal to benefit claims. This equality occurs around a nonzero level of reserves, however, and no interest is paid on, or charged against, those reserves. The size of this distortion can be as large as the tax itself.

The distortions that follow from the less common benefit ratio approach appear to be smaller than those associated with the reserve ratio. In particular, the reserve ratio contains some unexpected incentives that operate contrary to the general goals of UI (e.g., employment stability) and that introduce distortions because interest is not paid on firms' positive accounts nor charged to firms' negative accounts.

Thus, while reserve ratio taxation would provide complete experience rating if interest were imputed to accounts, reserve ratio taxation without interest imputation is subject to serious distortion. In particular, the current pattern of cross-subsidization of high-turnover industries would persist in reserve ratio regimes, even if ceilings were removed from the tax schedules.

The distortions introduced by failure to pay and to charge interest are strong, and add significantly to cross-subsidization of industries. This type of cross-subsidy could be eliminated by introducing interest payments, but this solution is not likely to be politically acceptable.

Notes

1. Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* October 1976.

2. Frank Brechling, "The Incentive Effects of the U.S. Unemployment Insurance Tax," *Research in Labor Economics,* vol. 1, 1977; and Robert Topel and Finis Welch, "Unemployment Insurance: What the Theory Predicts and What the Numbers (May) Show, Survey and Extensions," UCLA Discussion Paper, September 1979.

3. *Comparison of State Unemployment Insurance Laws* (Washington, D.C., U.S. Department of Labor, January 1978, revised through January 1979).

4. Frank Brechling, "The Incentive Effects"; "Unemployment Insurance Taxes and Labor Turnover: Summary of Theoretical Findings," *Industrial and Labor Relations Review,* July 1977; "Layoffs and Unemployment Insurance," mimeographed, 1978.

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Measuring Experience Rating

Stephen A. Wandner
Robert L. Crosslin

Experience rating is an integral part of the unemployment insurance (UI) system. Generally the taxes paid by employers should reflect benefit payment amounts that their former employees receive.

In fact, however, the degree of experience rating is quite limited in most States. Although all States except Puerto Rico and the Virgin Islands have experience rating systems, the system varies greatly, and most States impose substantial limitations on the operation of experience rating. Among these restrictions are noncharging, ineffective charging, low maximum tax rates, and low taxable wage bases.

History of Experience Rating

Legislation

The nature of the UI financing system has been determined by both Federal legislation (the Social Security Act of 1935, as amended) and individual State laws. The Social Security Act and related Federal legislation set up the framework for the entire system. State laws have continued to evolve and gradually have resulted in the experience-rating approach being accepted as a way to finance the UI system.

Social Security Act of 1935. Experience rating became part of the U.S. system of UI because President Franklin D. Roosevelt wanted to ensure that UI would contribute to economic stabilization. In January 1935, the Committee on Economic Security recommended that economic stabilization be achieved through experience rating. The Committee recommended that lower State unemployment taxes be permitted by allowing employers to receive additional credit against the Federal unemployment tax. Such an additional credit would be the difference between the State tax paid and 90 percent of the Federal tax—or 2.7 percent of taxable payrolls. The Committee also recommended a minimum tax of 1 percent.

As enacted, the Social Security Act of 1935 required only 3 years of experience under a pooled State plan before an employer could qualify for a reduced tax rate. The minimum tax rate of 1 percent was rejected. Amendments to the Social Security Act in 1954 and 1970 further eased the experience-rating provisions.

State legislation. Historically, under the original State UI laws, all States except 11 had experience-rating provisions. Of these 11 States, 9 had provisions for conducting a study of experience rating. Seven States followed the Wisconsin model of providing for individual reserve accounts. Originally no State provided for more than one schedule of tax rates, and no schedule provided more than five tax rates.

Since the enactment of the original UI laws, experience rating has become almost universal. The experience-rating plans have become more varied and complex. All States have opted for pooled accounts, abandoning the individual reserve accounts.

Goal of experience rating

The goal of experience rating is to influence the behavior of employers so that the operation of labor markets is improved or a sound UI program is provided.

Stabilize employment. The primary economic goal of experience rating is to stabilize employment by providing employers an incentive to reduce turnover. Employers pay lower UI taxes if they reduce the number of workers they lay off. Experience rating is designed to encourage employers to reduce the variation in employment both over the business cycle and seasonally. Employers are also encouraged to have existing employees work longer hours (through the use of overtime) rather than hiring extra staff at peak work periods, only to have to lay off during slack periods.[1]

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Equitable distribution of UI costs. Experience rating can affect the equity of the distribution of the burden of paying for the UI system among employers. From the perspective of the UI system, employers are considered to be responsible for their own employees. Since employers pay the tax, a "fair" allocation of the cost of the program is one that charges benefit payments back to the previous employer. If this type of charging back is not done, other employers are forced to pay for part of the cost that the previous employer has been relieved of.

Encourage employer participation. Experience rating encourages employers' participation in the monitoring of the benefit-payment procedure by encouraging employers to challenge unjustified payments. The net effect of employer participation, however, is to reduce the extent of experience rating.

Employers challenge benefit payments, because if they are successful, the benefits are either not paid or not charged to them, the previous employer. This encourages the employer to reduce unwarranted payments or to limit the unfettered operation of the experience-rating system. If benefits are not charged to the previous employer, then these benefit payments are not experience-rated.

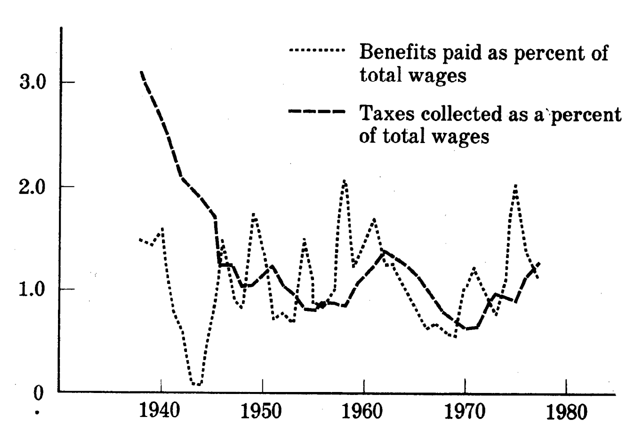
Historical movement of tax rates

Experience rating deals with the charging of benefit payments to individual employers. But increasing reliance on experience rating has been due to the high level of UI tax collections relative to the level of benefit payments during the first 10 years of the program (see Figure 1 and Table 1). Tax rates began at over 3 percent in 1938 and declined steadily to 1.04 percent by 1948.

Benefit payments as a percentage of total wages never reached the expected high levels during the 1938 through 1948 period. They were never greater than 1.6 percent and only jumped up to 1.49 percent in 1946 during the much-feared postwar demobilization. Experience rating was the vehicle by which tax rates were cut during this period. Tax rates were varied by experience, but since overall benefit payments were low, tax rates for individual employers generally declined sharply.

Beginning in 1949 a more stable but cyclical pattern emerged, and this pattern has not had the strong downward trend of the earlier period. Average tax rates have moved cyclically, following benefit payment rates with a 1- to 2-year lag. With each recession, benefit payment rates moved up and then down. Higher payment rates trigger tax rate increases, while subsequent benefit-payment rate declines are again followed by taxes.

FIGURE 1. Taxes collected and benefits paid as a percent of total wages, 1938 - 1978



SOURCE: U.S. Department of Labor, *Handbook of Unemployment Insurance Financial Data 1938–76*, and annual supplements.

TABLE 1. Taxes collected and benefits paid as a percentage of total wages, 1938–1978

Years	Percentage of total wages	
	Taxes collected	Benefits paid
1938	3.11	1.50
1939	2.83	1.47
1940	2.63	1.60
1941	2.39	.82
1942	2.08	.63
1943	2.00	.12
1944	1.91	.09
1945	1.74	.67
1946	1.24	1.49
1947	1.27	.90
1948	1.04	.82
1949	1.05	1.85
1950	1.16	1.33
1951	1.26	.71
1952	1.07	.78
1953	.97	.69
1954	.83	1.48
1955	.81	.91
1956	.89	.84
1957	.89	1.00
1958	.86	2.05
1959	1.05	1.22
1960	1.17	1.40
1961	1.23	1.72
1962	1.39	1.26
1963	1.35	1.24
1964	1.27	1.05
1965	1.18	.84
1966	1.07	.62
1967	.89	.69
1968	.77	.61
1969	.70	.58
1970	.65	1.01
1971	.65	1.23
1972	.85	.98
1973	.98	.79
1974	.94	1.07
1975	.90	2.03
1976	1.16	1.39
1977	1.27	1.16

SOURCE: U.S. Department of Labor, *Handbook of Unemployment Insurance Financial Data*, 1938–1976, and annual supplements.

The Present Experience-Rating System

At present all State UI systems except Puerto Rico and the Virgin Islands use experience rating for the regular UI program.

States have developed experience-rating systems in response to additional tax credit provisions contained in the Federal Unemployment Tax Act (FUTA). Federal law allows employers additional credit for a lowered tax rate if States allow a reduced tax on "a reasonable basis," and no lower than 1 percent.[2]

States have their own requirements for experience rating, and the requirements are highly diverse. Almost all States require 3 or more years of experience with unemployment, meaning that employers must have been covered and paying taxes for that period. The formulas used for rate determination after this initial period differ greatly because different factors are used to establish the relative incidence of unemployment among workers of different employers. The difference in incidence of compensable unemployment is the main justification for permitting differences in tax rates.

There are four major systems of experience rating, and some States combine more than one system. These systems all have certain characteristics in common. All of the formulas establish the relative experience of individual employers with benefit payments or unemployment. An employer's experience is measured by unemployment or benefit payments compared with the potential liability for UI payments, generally measured by total payroll. This determines the relative experience of large and small firms.[3]

Reserve ratio

Reserve ratio formulas were the earliest methods of experience rating, and are still the most frequently used approach.[4] Presently, 32 States use reserve ratio formulas. In essence, the system is a form of cost accounting. For each employer, benefits payments are subtracted from taxes collected representing an employer's total balance or reserve. This reserve is divided by total payroll, yielding the reserve ratio:

$$\frac{\text{benefits paid} - \text{taxes collected}}{\text{total payroll}}$$

In this case, both benefits paid and taxes collected are generally counted over the entire life of the firm or since the beginning of the State's UI program, although some States use a more limited period. Usually, payroll is only for the most recent 3 years, but again some State variation occurs.

Employers must generally achieve a certain level of reserves before they can receive a tax reduction. Once eligible for a reduced rate, they are assigned a tax rate according to a tax schedule related to ranges of reserve ratios. As the reserve ratio of a firm increases, its tax rate decreases.

As a result, employers' tax rates cannot decline unless the taxes paid exceed the benefits paid to their former employees. For any level of individual employer reserves, the employer's tax rate can change as the State's trust fund balance changes. Conversely, for any level of State trust fund balance, an employer's tax rate can vary as its reserves vary.

Benefit ratio

Benefit ratio formulas measure the ratio of benefit payments to total payroll. Employer contributions are not counted in the formula. Thus,

$$\frac{\text{benefits paid}}{\text{total payroll}}$$

Each employer's tax rate depends on this ratio. The theory is that funding will be adequate if employers pay rates that approximate the benefit to payroll ratio. Unlike the reserve ratio approach, the benefit ratio approach uses short-run experience only, as generally only benefits paid in the last 3 years are included in the numerator. There are 11 benefit-ratio States.

Benefit-wage ratio

The benefit-wage ratio system ignores the level of benefits paid. Under this method relative experience is measured by those separations that result in benefit payments. Thus, the duration of benefits is not a factor; the only factor that matters is the incidence of a first payment in a benefit year. For an employer, only one separation per beneficiary per benefit year is recorded. Benefit wages are not charged until benefits are actually paid. The resulting benefit-wage ratio is:

$$\frac{\text{total wages paid to separated employees}}{\text{total payroll}}$$

Thus benefit-wages for a year are divided by total wages, usually for a 3-year period. This is the employer's "experience factor."

Then a "State experience factor" is determined by the ratio of total benefit payments to total wages in the State in the preceding 3 years. Employers' tax rates are determined by multiplying their experience factor by the State experience factor, according to a table. The rate table is designed to assess variable tax rates that approximately raise the total amount of benefits paid. There are five benefit-wage-ratio States.

Payroll variation

The payroll variation approach is also independent of the level of benefits paid to unemployed workers.

Neither benefits paid nor any related measure is used. Instead experience is measured by percentage declines in employers' payrolls, either by quarter or by year. Declines are measured as a percentage of the payroll in the preceding period so that the relative measure of experience is comparable for large and small employers. The measure of payroll decline is:

$$\frac{\text{payroll decline}}{\text{total payroll}}$$

Total payroll is generally measured over 3 years. Under this system, the greater the decline in payroll, the greater the tax level. Employers experiencing little or no payroll decline should receive the greatest tax rate reductions. There are three payroll variation States.

Previous Research on the Effects of Experience Rating

Only recently has meaningful research been done on the effects of experience rating on the layoff behavior of employers. The requisite data for examining this issue are very difficult and expensive to obtain. The two completed studies are very thorough and reach similar conclusions.

One study by Professor Frank Brechling utilized aggregate U.S. data on all employers, categorizing into 17 industry groupings.[5] Annual average UI tax rates and layoff rates for each industry over the years 1962 to 1977 were correlated with each other. After the influence of factors such as average wages and size of employment were discounted, industry layoff rates were found to be significantly correlated with minimum and maximum tax rates.

The other recent study used data on individual employers in one industry in one State and obtained similar results. Gilbert Suzawa and Michael Patch of the University of Rhode Island studied the jewelry industry in that State, because most of the firms in the industry are similar in size, have similar production techniques, are concentrated in one geographical area, and are extremely competitive.[6] The homogeneous nature of this sample allowed them to measure more accurately the effects of experience rating on employers, free of extraneous influences. Probably this is the closest one could come to a "laboratory experiment."

Suzawa and Patch estimated that the variation in experience rating accounted for 41 percent of the variation in seasonality of employment in the industry.

Although continuing research on this issue is needed, the evidence indicates that experience rating does influence employers' layoff behavior. This unique method of UI financing appears to partially achieve the goal of employment stabilization.

An Experience-Rating Index for UI

Given that stabilization of employment through experience rating is to be a goal of the system, it would be desirable to have an objective, quantifiable measure of the *degree* of experience rating in each State and in the overall system to judge how well the program achieves this goal. For 45 years the UI program has lacked such a measure.

At one extreme, total absence of experience rating exists when all employers pay an identical tax rate on total wages without any reference to experience. Then employers with below-average benefit experience pay more taxes into the system than their former employees receive in benefits, and vice versa for employers with above-average benefit experience.

Perfect experience rating of benefits (excluding costs of administration) exists when each employer pays 100 percent of the benefits received by *all* former employees, regardless of the reason for separation. This is equivalent to all employers being on a *reimbursable* system of financing, with no noncharging of any benefits for any reason.

From this concept of perfect experience rating is derived an experience rating index (ERI). As a UI system (State or Federal) moves away from total reimbursement with no noncharging or ineffective charging of any kind, the degree of experience rating decreases. What is needed to compute the ERI is definition and measurement of the deviation from total reimbursement. Higher or lower values of such an index carry no normative meaning. That is, higher values are not necessarily preferred to lower values. Such judgments depend on one's point of view and the attainment of other, possibly competing, goals.

The proposed ERI is defined as the proportion of benefits that are totally paid for by recipients' former employers during a given time period, which may be more than 1 year. Benefits that are not fully paid for by a recipient's former employer are a socialized cost to other employers and unrelated to their benefit experience. Some amount of nonexperience-rated financing is inevitable, and probably desirable. The particular level that States and the overall system should attempt to attain is certainly open to debate.

What factors lead to lesser degrees of experience rating (lower ERI values)? The main contributors are noncharging, ineffective charging, and charges to inactive accounts.

Noncharging of benefits is the practice of not holding employers liable for the benefits of former employees who were separated from employment except by layoff, benefits to claimants who quit with good cause, and benefits received after serving a disqualification period. All State laws have some noncharging provisions.

Ineffective charging results from limits on the maximum tax rate. Employers at the maximum rate pay a fixed amount of taxes (as a proportion of taxable wages) irrespective of the amount of benefits received by their former employers. Some portion of the benefit charges against these employers cannot be paid for by increasing their tax contributions due to the maximum tax rate limitation, and must be paid for by employers below the maximum.

Benefit charges to inactive employer accounts are also paid for by employers below the maximum tax rate. These are benefit charges against employers no longer doing business in the State.

All States currently have the data and capability to calculate this proposed index on a prospective basis. In most cases, only the reserve ratio States can go back more than a couple of years to compute the index. For a given time period a State can derive the index by: (1) calculating the difference between taxes paid and *all* benefits paid to former employees for each employer; (2) summing up the amount of benefits in all cases where more benefits than taxes are paid, so that the difference is negative (these negative differences result from noncharging, and from charges to maximum tax rate employers and inactive accounts that are made up by "positive difference" employers); and dividing the sum of these unreimbursed benefits by the total of regular benefits and the State's share of extended benefits, to obtain the proportion of nonexperience-rated benefits; and subtracting the result from one (1.0).

The ERI can be calculated either for 1 year, or a range of years such as a business cycle. If a single year is used, it would be preferable to use taxes paid in the year following payment of benefits, since the response of tax rates to changing benefit payouts generally occurs 12 to 18 months later.

In the fall of 1979 the authors surveyed all States on tax revenue and benefit payments for tax years 1971 through 1978. Since aggregate data instead of individual employer data were gathered, only the reserve ratio States were able to supply the information needed to calculate the index, since they alone maintain records of charges to employers with negative reserves (benefit payments to whose former employees exceed taxes paid) for tax rate purposes. Other States do have the ability to calculate such charges, however.

Table 2 shows the value of the index for the nine States that provided sufficient data for all years.[7] The average value of the index varied from 47.5 in 1975 to 62.6 in 1978, reflecting the influence of the business cycle. The 8-year average for the States was 57.1. On average, less than three-fifths of total benefits were experience rated.

Of the factors that caused the ERI to fall below 100, the largest in all but 2 years was net negative balances, followed by noncharging and then by inactive accounts. Thus, the largest factor causing the ERI to fall is that many firms have unemployment experience that would push their tax rate far above the maximum tax rate if the rate were not legally constrained. The smallest factor is inactive accounts, which are generally dissolutions and bankruptcies. Inactive accounts, while small, are also the most sensitive to the business cycle, doubling and then halving before and after 1975.

Table 3 shows how the index varied among States during the period, varying from a low of 49.7 for New Mexico to a high of 69.9 for Arizona. It is interesting to note the relative importance of factors lowering the ERI. In New York the amount of benefits unrecouped from negative-balance (maximum tax rate) firms represented 40.8 percent of total benefits for the period. On the other hand, Arizona, Nebraska, New Mexico, and Idaho noncharged about one-fourth of their total benefits between 1971 and 1978.[8]

TABLE 2. Average value of total benefits, experience-rating index (ERI), and components for nine States, 1971–1978 [1]

			Nonexperience-rated components, by percent		
	Total benefits ($ millions)	ERI	Inactive accounts	Non-charged net	Negative balances
1971	158.9	59.2	6.4	12.7	21.7
1972	139.7	57.2	6.4	17.0	19.4
1973	122.0	58.1	6.3	18.2	17.4
1974	192.3	56.4	6.9	15.3	21.4
1975	322.3	47.5	13.0	15.7	23.8
1976	254.7	53.8	6.1	15.9	24.1
1977	232.5	62.3	5.4	14.6	17.7
1978	212.9	62.6	5.8	17.5	14.2

[1] The nine States are New York, New Jersey, North Dakota, Kentucky, Arizona, Nebraska, New Mexico, Idaho, and North Carolina.
SOURCE: Financial data provided by State employment security agencies.

TABLE 3. Average value of total benefits, experience rating index (ERI), and components for years 1971–1978

			Nonexperience-rated components, by percent		
	Total benefits ($ millions)	ERI	Inactive accounts	Non-charged	Net negative balance
N.Y.	880.8	50.8	7.1	1.3	40.8
N.J.	533.8	60.0	6.8	10.1	23.1
N.C.	117.8	68.0	8.3	15.7	8.0
Ky.	77.9	58.6	6.4	11.1	23.9
Ariz.	44.7	69.9	4.3	27.8	−2.0
Nebr.	25.8	53.3	1.2	25.6	14.3
N. Mex.	20.1	49.7	10.1	24.8	14.9
Idaho	18.9	54.5	2.7	26.4	16.4
N. Dak.	11.5	57.3	6.7	3.1	32.9

SOURCE: Financial data provided by State employment security agencies.

Several other States submitted complete data for only 5 of the years. Among them were California, which had an average index value of 60.1, Hawaii (50.2), and South Carolina (43.6).

The data are not intended to provide a comprehensive picture of the degree of experience rating in the U.S. They do serve, however, to illustrate: the feasibility of constructing an experience-rating index; the components that influence the level of the index; and the values of the index that indicate its variability over time and between States. With additional research, the index could be calculated for all States to measure the degree of experience rating in the overall UI system.

Conclusions

The current status of experience rating in all States can be determined by using the ERI. If it is judged that a greater or lesser degree of experience rating is desirable, the ERI can be a tool to monitor what happens and how well the goal of the system is achieved. Such a goal could be stated as a recommendation for a desirable State law provision or as a Federal standard.

If a system is to be considered "experience rated," more benefits should be experience rated than are not, which means that the ERI should be greater than 50.

At the same time there are programmatic reasons why a UI system may not and cannot be totally experience rated, that is, have an ERI of 100. Most students of the UI system are likely to maintain that the ERI should be less than 100.

An experience-rated UI system, thus, will have an ERI value between 50 and 100, but what that value should be depends on individual judgment, just as whether a system should be experience rated in the first place is a matter of judgment.

Notes

1. Employers are also encouraged to use overtime by low UI taxable wage bases; they pay UI taxes on an employee's wages only until a certain fixed amount is reached.

2. Originally, lowered tax rates were only allowed if the rates were based on no less than 3 years of experience with unemployment or other factors bearing a direct relation to the unemployment risk. The 1954 amendments revised this requirement to allow States to extend reduced tax rates to new or newly covered employers after they had 1 year of such experience. The present provisions are contained in the 1970 amendments. See U.S. Department of Labor, *Comparison of Unemployment Insurance Laws,* October 1979, pp. 2–4.

3. See U.S. Department of Labor, *Comparison of Unemployment Insurance State Laws,* October 1979, pp. 2–5.

4. For a further discussion of the four major types of experience rating see William Hales and Merrill Murray, *Unemployment Insurance in the American Economy* (Homewood, Ill., Richard D. Irwin, Inc., 1966), pp. 334–336.

5. Frank Brechling, "The Unemployment Insurance Tax and Labor Turnover: Further Empirical Results," The Public Research Institute, November 1979.

6. Gilbert Suzawa and Michael Patch, "Experience Rating Unemployment Tax and the Seasonality of Employment in the Rhode Island Jewelry Industry," University of Rhode Island, September 1978.

7. Not all States replied; and not all reserve ratio States supplied data for each of the years.

8. Arizona tended to recoup almost all of the benefit charges from negative balance employers in the aggregate during this time period, probably through solvency and other surcharges levied on all employers.

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Cross-Subsidies Among Industries From 1969 to 1978

Raymond C. Munts
Ephraim Asher

One of the major outcomes of the current experience-rating system in the U.S. unemployment insurance (UI) program is a proliferated and vastly complex network of inter-industry transfer of funds for the financing of unemployment benefits. In essence, part of the benefits paid to employees of some industries are borne by the contributions of other industries. This outcome is inherent in the limited-range type of experience-based tax rates as adopted and applied in the Federal-State UI program.

Inter-industry cross-subsidies, as these financial transfers are called, are not the result of a predetermined design or calculation. They are instead the result of a tax rate structure which is misaligned with the unemployment "risk" structure of industries. In particular, they stem from the imposition by the various States of limits on the range of the tax rates, with non-zero minimums and with maximums at something less than any firm's highest benefit cost rates. Those industries that pay the maximum rates and at the same time are characterized by relatively high rates of unemployment are most likely to be subsidized by those whose unemployment record is relatively more stable. One would expect, therefore, to find a positive correlation between the existence of positive subsidies and those industries whose output demand is more volatile due to such factors as seasonability, price or cost variations, income changes, and technological or other business conditions. Conversely, employers paying the minimum rates and having no unemployment benefits charged against them will most likely be paying a subsidy to those who have reached the maximum rate and cannot go beyond.

What about the impact of business location? Would differences in State statutes, or differences among States with regard to comparative advantage, market size, or market structure give rise to variations in the magnitudes of inter-industry cross-subsidies? Could the same industry be positively subsidized in one State and negatively in another? Can States be ranked according to the magnitude of subsidies received by a given industry? These are some of the issues that this report will attempt to quantify.

The objective is to directly estimate the differences between what employers actually pay and what their employees receive under UI.

In this report, employees are defined in the context of the 2-digit Standard Industrial Code (SIC) industry classification system.[1] Thus, industries rather than individual employees are the subject of the study, and all pertinent data items used in the study relate to these industries.

Since the measurement of subsidies will be affected by the length of time under study, it is imperative that the period of time be sufficiently long to include at least one business cycle but not too long to render data gathering or data-base formation unbearably difficult. This report covers the period 1968–69 through 1977–78, which covers the recession years of 1974–75 and, at the same time, covers the continuity in business activity which is necessary for meaningful statistical inferences.

The measurement of subsidies can also be affected by the relative size of the industries themselves. This will affect the ranking of industries according to subsidy size. An adjustment must also be made for differences in industrial outputs, or inputs utilized in production. It is especially appropriate to use labor inputs as proxies for industry size. This report utilizes three such variables: the average number of employees, the total wage bill, and the taxable wages. Thus, subsidies are measured not just in terms of absolute dollars but also as dollars per employee, percentage of total wages, and percentage of taxable wages for each industry. These will be the only adjustments made in measuring the relative magnitudes of industrial subsidies.

The data base was obtained directly from the States. Out of an initial positive response of twenty-eight States

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to a request for data, only twenty-one sent information complete enough for inclusion in the report.[2] The remaining States either sent partial data, had nothing to offer, or simply refused to cooperate. However, these twenty-one States offer a sufficiently diverse range of locations, economic activities, and conditions to serve as a representative sample of the U.S. economy.

Measures of Subsidies

Very simply stated, UI subsidy for a given industry is defined as the difference between benefits and contributions during a given period of time. For a more precise definition, we use the following notation:

$$S^i = \sum_{t=1}^{T} s^i_t = \sum_{t=1}^{T} (B^i_t - C^i_t) \qquad (1)$$

where

S = total subsidy for the period
s = yearly subsidy
B = yearly benefits
C = yearly contributions
i = a specific industry
t = a given year
T = the final year in the period

Formula (1) defines the total dollar subsidy, and depending on its sign ($\pm$) it would measure either positive or negative subsidy.

Adjusting the total subsidy for the number of employees, taxable wages, and total wages renders the next three measures respectively, as follows:

$$S^i_E \equiv \frac{1}{N^i}\sum_{t=1}^{T} s^i_t = \frac{1}{N^i}\sum_{t=1}^{T} (B^i_t - C^i_t) \qquad (2)$$

$$S^i_X \equiv \sum_{t=1}^{T} s^i_t \Big/ \sum_{t=1}^{T} X^i_t = \sum_{t=1}^{T} (B^i_t - C^i_t) \Big/ \sum_{t=1}^{T} X^i_t \qquad (3)$$

$$S^i_T \equiv \sum_{t=1}^{T} s^i_t \Big/ \sum_{t=1}^{T} W^i_t = \sum_{t=1}^{T} (B^i_t - C^i_t) \Big/ \sum_{t=1}^{T} W^i_t \qquad (4)$$

where

S_E = dollar subsidy per employee
N = the period's average number of covered employees
S_X = dollar subsidy per dollar of taxable wages, or the subsidy as a percentage of taxable wages
X = the period's taxable wages
S_T = dollar subsidy per dollar of total wages, or the subsidy as a percentage of taxable wages
W = the period's total wages

Formula (2), the dollar subsidy per employee, provides an accurate measure of the magnitude of inter-industry average transfer to the individual employee. This measure, however, is not refined enough to take into account inter-industry differences in the average number of hours (or weeks) worked during the year. This adjustment is made through the average number of covered "heads" regardless of whether they were part-time or full-time employees or whether they worked one day or a full year.

A movement in the direction of refinement is given by measure (3), the subsidy as a percentage of taxable wages. Here, the adjustment is made only on that portion of the industry's wage-bill that was covered and taxed under the UI program.

The final measure, (4), adjusts each industry's subsidy to its total wage-bill. Although nontaxable wages are added to this adjustment, its usefulness is justified on the ground that total wages are a good proxy for the total output of each industry since they are directly related to the value of the final product. The sign ($\pm$) of each of these measures will indicate whether the industry was a net receiver or a net transferor of subsidies during the relevant time span.

The subsidies have been quantified through the use of measures (1) through (4) for the States in the data base: Arkansas, California, Florida, Georgia, Iowa, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Nebraska, New York, Oregon, South Carolina, South Dakota, Tennessee, Vermont, Washington, and Wisconsin.

Each of the measures, as indicated in Appendix A, quantifies that portion of the transfer resulting from the UI State programs only. It excludes Federal Extended Benefits or other special benefits (with the exception of California and Vermont). For the period as a whole (1968–69 to 1977–78), the inclusion of Federal benefits would not have changed the ranking of industries in any significant fashion because they would have been limited primarily to the recession years of 1974–75.

Finally, all the relevant data utilized in formulas (1) through (4) are defined for all employers covered. The data base of five States—California, Kansas, Oregon, Vermont, and Washington—excludes employers with reimbursible accounts.

Statistical Estimates of Cross-Subsidies Among Industries

We have utilized formulas (1) through (4) to estimate two broad categories of statistical relationships.

The first category deals with the ranking of States according to the estimated subsidies of their individual industries. States whose industry exhibits positive subsidy were ranked in an ascending order, and those with a negative subsidy were given a descending order.

The second category of statistical relationship deals with the actual estimates of subsidies for each individual State, and relative to the three labor inputs: number of employees, total wages, and taxable wages. All subsidies are calculated for the period as a whole (typically 1969–1978). They are also given for two subperiods, pre-1974 and post-1974, in order to amplify the impact of the business cycle on the estimates. The industry subsidies relative to taxable payroll by State are presented in tables in Appendix A. A careful study of the data reveals several systematic relationships between subsidies and industries, and subsidies and States.

First, let us examine the estimates for the total dollar subsidy according to industry and State. The statistical inferences can be first stated verbally, and then redefined more accurately and summarized in a table. These estimates reveal that in most States positive subsidy predominates in five of the eight sectors, while in two more—Trade and Finance, and Insurance and Real Estate (6S and 7S)—negative subsidy is exhibited in most States. In the Transportation, Communications, and Utilities sector, there is no clear pattern. The clearest and most explicit pattern is demonstrated for the Construction industries. Here, almost with no exception, employers are subsidized.

An accurate measurement of these statements is given in Table 1. The last column shows that we call a "Measure for the Likelihood of Net Dollar Subsidy." Technically, it is defined as the ratio between the difference in the positive subsidy (S_P) and the negative subsidy (S_N), that is to say, the net subsidy, and their sum (in absolute terms). In other words, it is defined as

$$(S_P - S_N) \;/\; (S_P + S_N) \qquad (5)$$

It can readily be seen that (5) will measure $+1$ when a given industry exhibits positive subsidy in all States. It will measure -1 if the subsidy is negative in all States. And it will register 0 if the sum of positive subsidies is exactly equal to the sum of the negative subsidies. When none of these situations exists, the resulting magnitude will lie between $+1$ and -1 (excluding 0). We would expect that the typical case will fall into the last category. In light of these examples, it would be appropriate to interpret (5) as a measure of the likelihood of the incidence of net subsidy's *sign*. A measure of $+1$, therefore, would indicate a 100 percent likelihood (or a full certainty) that the industry receives a positive net subsidy when all States are taken into account. That does not mean that in each and every State the industry receives a subsidy, but rather that there is not even a single State in which the industry receives a negative subsidy. Stated differently, if subsidies exist in the industry, there is complete certainty that their magnitude will be positive.

TABLE 1. Measures for the likelihood of net dollar subsidy of industries

Industry	Total positive subsidy (S_P) (000's)	Total negative subsidy (S_N) (000's)	Measure for the likelihood of net dollar subsidy $(S_P - S_N)/(S_P + S_N)$
Agriculture, Forestry, and Fisheries	$ 63,212	$ 9,217	+0.745
Mining and Quarrying	50,900	33,238	+0.210
Construction	2,663,657	1,427	+0.999
Manufacturing	3,182,936	331,806	+0.811
Transportation, Communications, and Utilities	288,844	285,519	+0.006
Trade	511,608	847,060	−0.247
Finance, Insurance, and Real Estate	96,336	415,390	−0.623
Service	$585,305	$388,562	+0.202

The last column in Table 1 reveals that the Construction sector leads all industries in its likelihood for a positive net subsidy—99.9 percent. It is followed by the Manufacturing sector with 81.1 percent, Agriculture with 74.5 percent, Mining with 21.0 percent, Services with 20.2 percent, and Transportation, Communications, and Utilities with 0.6 percent. When, as in this last sector, there are almost as many positive dollar subsidies as negative ones, the likelihood of a net positive subsidy is close to zero.

The two net subsidizers are (1) Trade and (2) Finance, Insurance, and Real Estate, with negative subsidy likelihoods of 24.7 percent and 62.3 percent. Two other results are worth noting. The Agricultural sector comes in third in the ranking for likelihood of positive subsidy after Construction and Manufacturing. Given the relatively high variability rates in its output, a higher ranking might have been expected. Services were found likely to receive a positive subsidy. This result is surprising since economists conceive employment variability in this sector as relatively small.

In the individual States there is a great deal of variability in the magnitudes of subsidies for a given industry. Apparently the location of the State affects both the sign and the magnitude of subsidies for a particular industry. This is suggested by the fact that there is no single industry that exhibits identical signs or similar magnitudes in all States, not even in the case of the 2-digit Construction industries.

The impact of the individual State on the likelihood of its industries to have either positive or negative subsidies can be quantified in a fashion similar to that used for Table 1. Since the aggregate subsidies for each State can be calculated separately, the likelihood of net dollar subsidies in a particular State can be estimated as either positive or negative. The resulting estimates are summarized in Table 2.

Of the twenty-one States, two-thirds (14) show positive net subsidy, while the remaining third have a negative net subsidy. The State of Michigan leads in the likelihood for a positive subsidy (96.5 percent). Ranked at the bottom of this category is the State of Kentucky (8.0 percent). Ranked by likelihood of negative subsidy, the State of Kansas is first (81.1 percent) and Nebraska last (0.5 percent).

There is a definite link between the industrial makeup of each State's economy and the likelihood for that State's net subsidy to be either positive or negative. States with a higher concentration of manufacturing sectors will more likely exhibit a high positive net subsidy than those with more agriculture (e.g., Michigan vs. Nebraska, respectively).

Finally, the ranking of States according to such statistical measure is not only dependent on the differences in States' statutes and regulations, but also on the period of study. Inter-temporal financial imbalances in each State's UI program may contribute significantly to such ranking.

Notes

1. See Appendix B for the all-inclusive list of these industries. The 2-digit SIC code categorizes all economic activities into a theoretical maximum of 99 moderately aggregative economic sectors. The typical State, however, is represented by approximately 70 industries.

2. See Appendix A for the list of States by years along with the type of information included.

TABLE 2. Measures for the likelihood of net dollar subsidy in each State

State	Total positive subsidy (S_P) (000s)	Total negative subsidy (S_N) (000s)	Measure for the likelihood of net dollar subsidy $(S_P - S_N)/(S_P + S_N)$
Arkansas	$ 83,118	$ 22,046	+0.581
California	1,262,083	1,004,845	+0.113
Florida	118,564	126,433	−0.032
Georgia	91,784	75,824	+0.095
Iowa	91,915	31,109	+0.494
Kansas	12,716	121,850	−0.811
Kentucky	138,515	117,949	+0.080
Louisiana	112,822	137,551	−0.099
Maine	66,187	42,726	+0.215
Michigan	901,161	16,171	+0.965
Mississippi	18,613	89,470	−0.656
Minnesota	195,615	62,170	+0.518
Nebraska	37,004	37,390	−0.005
New York	3,206,759	232,433	+0.865
Oregon	80,214	170,593	−0.360
South Carolina	96,750	60,805	+0.228
South Dakota	12,644	28,195	−0.301
Tennessee	150,882	52,754	+0.482
Vermont	39,206	7,342	+0.685
Washington	325,439	93,449	+0.554
Wisconsin	$ 270,603	$ 136,435	+0.330

Appendix A: The Data Base

The data base includes information supplied directly by each individual State. Records for each State are organized around the 2-digit SIC industry code, and each industry has five items of information:

1. contributions
2. benefits
3. taxable wages
4. total wages
5. number of employees.

The information requested initially was supposed to contain all the affected firms—both of contributing employers and of benefits-receiving employees—of each industry and for each of the years 1968 (or 1969) through 1977 (or 1978). It was specified that the information should include the total benefits and contributions for each industry.

Not unexpectedly, the data received contained some deviations. The States of California, Kansas, Oregon, Vermont, and Washington excluded reimbursing (or nonchargeable) employers. All but the States of California and Vermont have excluded Federal benefits from their benefits data.

A small number of industries were reported in the form of a combined 1-digit code. In these cases the statistical analysis was adjusted accordingly.

The employment data refer to the respective industry's annual averages.

Taxable wages and total wages are the total annual figures reported for each industry.

Finally, the periods covered by the data for each State are as follows:

- Arkansas, 1968–1978
- California, 1969–1977
- Florida, 1968–1977
- Georgia, 1972–1978
- Iowa, 1969–1978
- Kansas, 1968–1978
- Kentucky, 1968–1978
- Louisiana, 1973–1977
- Maine, 1969–1978
- Michigan, 1969–1976
- Minnesota, 1969–1977
- Mississippi, 1969–1978

- Nebraska, 1969–1978
- New York, 1970–1978
- Oregon, 1969–1978
- South Carolina, 1968–1978
- South Dakota, 1969–1978
- Tennessee, 1969–1978
- Vermont, 1969–1978
- Washington, 1969–1977
- Wisconsin, 1969–1978

Appendix B: SIC Industry Titles and Codes

Agriculture, Forestry, & Fisheries

01 Agricultural Production—Crops
02 Agricultural Production—Livestock
07 Agriculture Services
08 Forestry
09 Fishing, Hunting & Trapping

Mining & Quarrying

10 Metal Mining
12 Coal Mining
13 Oil, Gas Extraction
14 Non-metallic Minerals

Construction

15 General Building Construction
16 Heavy Construction
17 Special Trade Contractors

Manufacturing

19 Ordnance
20 Food & Kindred Products
21 Tobacco
22 Textile Mill Products
23 Apparel, Other Textiles
24 Lumber & Wood Products
25 Furniture & Fixtures
26 Paper, Allied Products
27 Printing & Publishing
28 Chemicals
29 Petroleum, Coal Products
30 Rubber & Plastics
31 Leather Products
32 Stone, Clay & Glass Products
33 Primary Metals
34 Fabricated Metal Products
35 Machinery (excluding electrical)
36 Electrical Equipment
37 Transportation Equipment
38 Instruments and Related Products
39 Miscellaneous Manufacturing Industries

Transportation, Communications, & Utilities

40 Railroad Transportation
41 Local Passenger Transit
42 Trucking & Warehousing
44 Water Transportation
45 Air Transportation
46 Pipeline Transport
47 Transportation Services
48 Communication
49 Electricity, Gas, and Sanitation Services

Trade

Wholesale Trade

50 Durable Goods
51 Nondurable Goods

Retail Trade

52 Building Materials, Hardware, Gardening Supplies
53 General Merchandise Stores
54 Food Stores
55 Auto Dealers & Service Stations
56 Apparel & Accessories
57 Furniture, Home Furnishings
58 Eating & Drinking Places
59 Miscellaneous Retail

Finance, Insurance, & Real Estate

60 Banking
61 Credit Agencies
62 Securities Commodity Brokers
63 Insurance Carriers
64 Insurance Agents & Brokers
65 Real Estate
66 Combined Real Estate & Insurance
67 Holding Companies, Other Investments

Services

70 Hotels, Other Lodging
72 Personal Services
73 Business Services
75 Auto Repair, Garages
76 Miscellaneous Repair Services
78 Motion Pictures
79 Amusement Services
80 Medical, Health Services
81 Legal Services
82 Educational Services
83 Social Services
84 Museums, Botanical & Zoological Gardens
86 Membership Organizations
88 Private Households
89 Miscellaneous Services
90 Government
99 Unclassified

Appendix C: Disaggregated Data, by States

TABLE C–1. UI subsidies as a percentage of taxable wages of industries in Arkansas, 1968–1978

Industry group and code	1968–73 (pct)	1974–78 (pct)	1968–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	– .36	– .44	– .41
Mining & Quarrying (10–14)	– .09	.05	– .01
Construction (15–17)	.69	2.50	1.76
Manufacturing			
Food & kindred products (20)	– .25	.98	.45
Textile mill products (22)	– .37	1.71	.79
Apparel & other textiles (23)	.30	1.75	1.08
Lumber & wood products (24)	.03	1.09	.61
Furniture & fixtures (25)	– .04	1.35	.70
Paper & allied products (26)	– .30	– .20	– .24
Printing & publishing (27)	– .25	.07	– .06
Chemicals (28)	– .68	.84	.29
Petroleum, coal products (29)	– .01	.45	.25
Rubber & plastics (30)	– .64	.44	.05
Leather products (31)	.96	3.03	2.06
Stone, clay & glass (32)	– .41	1.18	.49
Primary metals (33)	– .84	.28	– .15
Fabricated metal products (34)	– .56	.55	.16
Machinery (exc. electrical) (35)	– .57	.95	.37
Transportation equipment (37)	– .35	2.52	1.35
Miscellaneous manufacturing industries (39)	.05	1.79	1.07
Transportation, Communications & Utilities (40–49)	– .30	.04	– .10
Trade (50–59)	– .40	.01	– .16
Finance, Insurance & Real Estate(60–67)	– .56	– .30	– .41
Services (70–89)	– .50	– .15	– .33

SOURCE: Arkansas Department of Labor, Employment and Security Division.

TABLE C–2. UI subsidies as a percentage of taxable wages of industries in California, 1968–1977

Industry group and code	1968–73 (pct)	1974–77 (pct)	1968–77 (pct)
Agriculture, Forestry & Fisheries			
Agricultural production (01–02)	1.49	– .25	.04
Forestry (08)	2.56	8.73	5.64
Fishing, hunting & trapping (09)	12.79	14.18	13.49
Mining & Quarrying			
Metal mining (10)	– .30	– 1.95	– .50
Oil, gas extraction (13)	.17	– .52	– .20
Non-metallic minerals (14)	– .81	– 1.22	– 1.01

TABLE C–2. California (*continued*)

Industry group and code	1968–73 (pct)	1974–77 (pct)	1968–77 (pct)
Construction			
General building construction (15)	1.83	4.67	3.15
Heavy construction (16)	3.98	3.95	3.97
Special trade contractors (17)	.52	2.68	1.58
Manufacturing			
Food & kindred products (20)	2.75	3.68	3.20
Textile mill products (22)	– .60	.20	– .18
Apparel, other textiles (23)	1.08	1.40	1.25
Lumber & wood products (24)	2.10	3.11	2.62
Furniture & fixtures (25)	– .43	.35	– .04
Paper, allied products (26)	– .51	– .77	– .63
Printing & publishing (27)	– .48	– .31	– .40
Chemicals (28)	– .16	– .56	– .36
Petroleum, coal products (29)	– .16	.17	– .03
Rubber & plastics (30)	– .88	– .46	.17
Leather products (31)	– .65	– .37	– .54
Stone, clay & glass products (32)	– .21	.39	.08
Primary metals (33)	.32	.57	.43
Fabricated metal products (34)	– .08	.12	.02
Machinery (exc. electrical) (35)	– .41	– .41	– .41
Electrical equipment (36)	.35	– .85	– .23
Transportation equipment (37)	– .91	1.11	1.01
Instruments & related products (38)	– .56	1.18	– .94
Miscellaneous manufacturing industries (39)	.25	.01	.13
Transportation, Communications, & Utilities			
Railroad transportation (40)	– .41	2.79	– .38
Local passenger transit (41)	– .23	1.18	.47
Trucking & warehousing (42)	.30	1.07	.68
Water transportation (44)	.63	2.59	1.40
Air transportation (45)	– 1.12	– 1.13	– 1.13
Pipeline transport (46)	– .95	– 1.69	– 1.30
Transportation services (47)	– .17	– .59	– .40
Communication (48)	– .88	– .96	– .92
Electricity, gas & sanitation services (49)	– .93	– 1.08	– 1.01
Trade			
Wholesale trade (50,51)	– .33	– .66	– .47
Retail trade			
Building materials, hardware, gardening supplies (52)	– .72	– .64	– .68
General merchandise stores (53)	– .80	– .83	– .82
Food stores (54)	– .70	– .87	– .79
Auto dealers & service stations (55)	– .68	– .13	– .43
Apparel & accessories (56)	– .12	– .34	– .23

TABLE C–2. California (*continued*)

Industry group and code	1968–73 (pct)	1974–77 (pct)	1968–77 (pct)
Furniture, home furnishings (57)	— .23	— .10	— .17
Miscellaneous retail (59)	— .63	— .52	— .57
Finance, Real Estate, & Insurance			
Banking (60)	— 1.15	— 1.52	— 1.35
Credit agencies (61)	— 1.02	— 1.32	— 1.19
Securities commodity brokers (62)	— .62	— .79	— .69
Insurance carriers (63)	— .87	— 1.10	— .99
Insurance agents & brokers (64)	— 1.13	— 1.19	— 1.16
Real estate (65)	— .65	.00	— .29
Combined real estate & insurance (66)	— .38	— .37	— .38
Holding companies, other investments (67)	— .71	.94	.24
Services			
Hotels, other lodging (70)	.10	.46	.28
Personal services (72)	— .42	— .49	— .45
Business services (73)	— .05	.02	— .01
Auto repair, garages (75)	— .50	— .20	— .35
Miscellaneous repair services (76)	— .54	— .60	— .58
Motion pictures (78)	3.28	2.14	2.70
Amusement services (79)	.09	.93	.53
Medical, health services (80)	— 1.31	— 1.38	— 1.35
Legal services (81)	— 1.27	— 1.48	— 1.39
Educational services (82)	— .22	.38	.08
Social services (83)	.00	.13	.13
Museums, botanical & zoological gardens (84)	— 2.10	— 1.59	— 1.74
Membership organizations (86)	— .07	.36	.14
Private households (87)	— .98	.44	— .27
Miscellaneous services (89)	— .42	— .20	— .31

SOURCE: California Employment Development Department.

TABLE C–3. UI subsidies as a percentage of taxal wages of industries in Florida, 1968 1977

Industry group and code	1968–73 (pct)	1974–77 (pct)	1968–77 (pct)
Agriculture, Forestry & Fisheries			
Agricultural production (01,02)	— .39	— .51	— .47
Agriculture services (07)	— .36	.65	.24
Forestry (08)	— .33	—1.59	—1.34
Fishing, hunting & trapping (09)	— .47	— .57	— .53
Mining & Quarrying			
Metal mining (10)	— .18	— .59	— .41
Coal mining (12)	— .30	— .46	— .43
Oil, gas extraction (13)	— .25	— .21	— .23
Non-metallic minerals (14)	— .09	— .32	— .20
Construction			
General building construction (15)	— .46	2.51	.89

TABLE C–3. Florida (*continued*)

Industry group and code	1968–73 (pct)	1974–77 (pct)	1968–77 (pct)
Heavy construction (16)	— .21	1.54	.59
Special trade contractors (17)	— .45	1.99	.67
Manufacturing			
Food & kindred products (20)	.71	.28	.51
Tobacco (21)	.39	1.17	.67
Textile mill products (22)	— .14	1.85	.86
Apparel, other textiles (23)	.26	1.09	.67
Lumber & wood products (24)	— .16	— .47	— .33
Furniture & fixtures (25)	.04	1.53	.72
Paper, allied products (26)	.03	— .37	— .14
Printing & publishing (27)	— .02	— .42	— .22
Chemicals (28)	— .01	— .46	— .23
Petroleum, coal products (29)	— .12	— .58	— .35
Rubber & plastics (30)	— .32	— .33	— .33
Leather products (31)	.94	.56	.74
Stone, clay & glass products (32)	— .12	.45	.10
Primary metals (33)	— .05	1.33	.60
Fabricated metal products (34)	— .07	.27	.09
Machinery (exc. electrical) (35)	.20	— .28	— .04
Electrical equipment (36)	— .12	—1.07	— .63
Transportation equipment (37)	.09	— .17	— .02
Instruments & related products (38)	.09	— .78	— .40
Miscellaneous manufacturing industries (39)	.12	1.18	.57
Transportation, Communications & Utilities			
Local passenger transit (41)	— .09	— .02	— .06
Trucking & warehousing (42)	— .17	— .18	— .18
Water transportation (44)	— .17	— .13	— .15
Air transportation (45)	.06	— .28	— .09
Pipeline transport (46)	— .10	— .74	— .36
Transportation services (47)	— .37	— .33	— .35
Communication (48)	— .03	— .58	— .30
Electrical, gas, & sanitation services (49)	— .06	— .37	— .22
Trade			
Wholesale trade			
Durable goods (50)	.10	.12	.11
Nondurable goods (51)	.00	— .39	— .39
Retail trade			
Building materials, hardware, gardening supplies (52)	— .14	.11	— .02
General merchandise stores (53)	.03	— .42	— .17
Food stores (54)	.07	— .33	— .15
Auto dealers & service stations (55)	— .28	— .30	— .29
Apparel & accessories (56)	.03	— .54	— .29
Furniture, home furnishings (57)	— .21	.35	.08
Eating & drinking places (58)	— .31	— .46	— .40

TABLE C–3. Florida (*continued*)

Industry group and code	1968–73 (pct)	1974–77 (pct)	1968–77 (pct)
Miscellaneous retail (59)	– .19	– .27	– .23
Finance, Insurance & Real Estate			
Banking (60)	– .06	– .55	– .32
Credit agencies (61)	– .08	– .42	– .27
Securities commodity brokers (62)	– .16	– .60	– .39
Insurance carriers (63)	– .02	– .49	– .26
Insurance agents & brokers (64)	– .25	– .34	– .31
Real estate (65)	– .26	.86	.32
Combined real estate & insurance (66)	– .23	– .23	– .23
Holding companies, other investments (67)	– .55	– .10	– .25
Services			
Hotels, other lodging (70)	.00	.38	.20
Personal services (72)	– .16	– .35	– .25
Business services (73)	– .24	– .07	– .15
Auto repair, garages (75)	– .42	– .32	– .36
Miscellaneous repair services (76)	– .32	– .31	– .32
Motion pictures (78)	.20	.51	.34
Amusement services (79)	– .04	– .13	– .09
Medical, health services (80)	– .60	– .35	– .43
Legal services (81)	– .55	.12	– .13
Social services (83)	.00	– .71	– .71
Museums, botanical & zoological gardens (84)	– .18	– .12	– .15
Membership organizations (86)	– .36	– .10	– .21
Private households (88)	– .72	– .31	– .35
Miscellaneous services (89)	– .24	.14	– .06

SOURCE: Florida Department of Commerce, Office of Research and Statistics.

TABLE C–4. UI subsidies as a percentage of taxable wages of industries in Georgia, 1972–1978

Industry group and code	1972–73 (pct)	1974–78 (pct)	1972–78 (pct)
Agriculture, Forestry & Fisheries			
Agricultural production, crops (01)	– .83	– .52	– .59
Agricultural production, livestock (02)	.00	–1.53	–1.53
Agricultural services (07)	– .81	.78	.38
Forestry (08)	– .29	– .54	– .52
Fishing, hunting & trapping (09)	– .84	3.51	2.49
Mining & Quarrying			
Metal mining (10)	.08	1.30	.94
Coal mining (12)	.00	–2.25	–2.25
Oil, gas extraction (13)	–1.23	– .16	– .49
Non-metallic minerals (14)	– .20	– .22	– .22
Construction			
General building construction (15)	– .66	1.76	1.08

TABLE C–4. Georgia (*continued*)

Industry group and code	1972–73 (pct)	1974–78 (pct)	1972–78 (pct)
Heavy construction (16)	– .48	1.42	.89
Special trade contractors (17)	– .64	1.59	1.00
Manufacturing			
Food & kindred products (20)	– .07	– .05	– .06
Tobacco (21)	.22	1.72	1.26
Textile mill products (22)	– .01	.50	.37
Apparel, other textiles (23)	.08	.57	.45
Lumber & wood products (24)	– .38	.15	.02
Furniture & fixtures (25)	.15	1.17	.88
Paper, allied products (26)	– .10	– .20	– .18
Printing & publishing (27)	– .42	– .17	– .22
Chemicals (28)	– .27	.02	– .05
Petroleum, coal products (29)	– .60	– .45	– .49
Rubber & plastics (30)	– .42	– .11	– .17
Leather products (31)	.07	2.14	1.32
Stone, clay, glass (32)	– .25	– .01	– .07
Primary metals (33)	– .04	– .59	– .48
Fabricated metal products (34)	– .35	.31	.13
Machinery (exc. electrical) (35)	– .36	– .09	– .15
Electrical equipment (36)	– .31	– .30	– .31
Transportation equipment (37)	.30	.65	.55
Instruments & related products (38)	– .13	– .20	– .19
Miscellaneous manufacturing industries (39)	– .27	.87	.57
Transportation, Communication & Utilities			
Local passenger transit (41)	– .06	– .37	– .31
Trucking & warehousing (42)	– .41	.21	.06
Water transportation (44)	– .09	– .07	– .08
Air transportation (45)	– .47	– .62	– .59
Pipeline transport (46)	.11	– .29	– .19
Transportation services (47)	– .57	– .06	– .16
Communication (48)	– .29	– .11	– .16
Electricity, gas & sanitation services (49)	– .26	– .64	– .56
Trade			
Wholesale trade			
Durable goods (50)	– .35	.06	– .06
Nondurable goods (51)	.00	–1.33	–1.33
Retail trade			
Building materials, hardware, gardening supplies (52)	– .51	.07	– .07
General merchandise stores (53)	– .26	– .08	– .12
Food stores (54)	– .37	– .14	– .20
Auto dealers & service stations (55)	– .63	.21	.00
Apparel & accessories (56)	– .28	.28	.14
Furniture, home furnishings (57)	– .56	.25	.40
Eating & drinking places (58)	– .43	.35	.18
Miscellaneous retail (59)	– .49	.04	– .07

TABLE C–4. Georgia (*continued*)

Industry group and code	1972–73 (pct)	1974–78 (pct)	1972–78 (pct)
Finance, Real Estate & Insurance			
Banking (60)	–.42	–.46	–.45
Credit agencies (61)	–.41	–.16	–.21
Securities, commodity brokers (62)	–.67	–.31	–.41
Insurance carriers (63)	–.21	–.39	–.35
Insurance agents & brokers (64)	–.74	–.46	–.51
Real estate (65)	–.83	.37	.09
Combined real estate & insurance (66)	–.96	.28	–.14
Holding companies, other investments (67)	–.60	–.09	–.19
Services			
Hotels, other lodging (70)	–.32	.32	.19
Personal services (72)	–.17	.46	.29
Business services (73)	–.52	.47	.27
Auto repair, garages (75)	–.83	.17	–.06
Miscellaneous repair services (76)	–.90	.12	–.10
Motion pictures (78)	.10	.51	.35
Amusement services (79)	–.34	.32	.17
Medical, health services (80)	–.85	–.34	–.43
Legal services (81)	–1.08	–.55	–.65
Educational services (82)	–.94	–1.51	–1.47
Social services (83)	.00	–1.77	–1.77
Museums, botanical & zoological gardens (84)	–1.79	–.01	–.27
Membership organizations (86)	.90	1.02	.45
Miscellaneous services (89)	–.85	–.08	–.26

SOURCE: Georgia Department of Labor, Employment Security Agency, Georgia State Employment Service.

TABLE C–5. UI subsidies as a percentage of taxable wages of industries in Iowa, 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	.40	.41	.41
Mining & Quarrying			
Coal mining (12)	.74	2.40	1.71
Oil, gas extraction (13)	1.43	3.03	2.32
Non-metallic minerals (14)	1.22	1.39	1.32
Construction			
General building construction (15)	.82	1.04	.97
Heavy construction (16)	4.44	7.14	6.04
Special trade contractors (17)	.69	.87	.82
Manufacturing			
Ordnance (19)	2.04	4.01	2.30
Food & kindred products (20)	.51	.30	.39
Tobacco (21)	.00	–1.60	–1.60
Textile mill products (22)	.15	–1.65	–.92
Apparel, other textiles (23)	.41	.74	.60
Lumber & wood products (24)	.19	1.77	1.19
Furniture & fixtures (25)	.14	–.43	–.20

TABLE C–5. Iowa (*continued*)

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Paper, allied products (26)	.23	–.38	–.13
Printing & publishing (27)	.26	–.28	–.09
Chemicals (28)	.16	–.08	.01
Petroleum, coal products (29)	2.16	1.92	2.01
Rubber & plastics (30)	–.04	–.56	–.37
Leather products (31)	.24	.76	.55
Stone, clay & glass products (32)	.74	1.08	.96
Primary metals (33)	.55	–.21	.09
Fabricated metal products (34)	.25	–.23	–.08
Machinery (exc. electrical (35)	.69	–.16	.07
Electrical equipment (36)	.50	.33	.40
Transportation equipment (37)	.33	–.23	–.04
Instruments & related products (38)	.28	–.81	–.43
Miscellaneous manufacturing industries (39)	.29	–.52	–.25
Transportation, Communications & Utilities			
Local passenger transit (41)	.54	.87	.71
Trucking & warehousing (42)	.19	–.03	.05
United States Postal Services (43)	.00	–.47	–.47
Transportation services (44)	.03	.42	.29
Air transportation (45)	.61	–.78	–.34
Pipeline transport (46)	.04	–.35	–.22
Transportation services (47)	–.26	.11	.00
Communication (48)	.14	–.33	–.15
Electricity, gas, & sanitation services (49)	.24	–.41	–.18
Trade			
Wholesale Trade (50,51)	.41	–.41	–.16
Retail Trade			
Building materials, hardware, gardening supplies (52)	.04	–.27	–.14
General merchandise stores (53)	.25	–.34	–.10
Food stores (54)	.12	–.20	–.09
Auto dealers & service stations (55)	.09	–.01	.03
Apparel & accessories (56)	.08	–.24	–.12
Furniture, home furnishings (57)	.02	–.25	–.16
Eating & drinking places (58)	.06	.24	.18
Miscellaneous retail (59)	–.07	–.27	–.18
Finance, Insurance & Real Estate			
Banking (60)	.06	–.61	–.37
Credit agencies (61)	.04	–.65	–.42
Securities commodity brokers (62)	–.24	–.71	–.54
Insurance carriers (63)	.06	–.58	–.35
Insurance agents & brokers (64)	–.41	–.82	–.70
Real estate (65)	–.02	–.36	–.25
Combined real estate & insurance (66)	–.26	–.71	–.53
Holding companies, other investments (67)	–.85	–.31	–.46

TABLE C–5. Iowa (*continued*)

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Services			
Hotels, other lodging (70)	.05	.13	.10
Personal services (72)	– .02	– .17	– .11
Business services (73)	– .03	.01	.00
Auto repair, garages (75)	1.15	.02	.44
Miscellaneous repair services (76)	– .28	– .24	– .25
Motion pictures (78)	.33	.56	.46
Amusement services (79)	.36	.55	.49
Medical, health services (80)	– .25	– .34	– .32
Legal services (81)	– .68	– .88	– .83
Educational services (82)	1.21	1.96	1.80
Social services (83)	.00	–1.11	–1.11
Museums, botanical & zoological gardens (84)	–1.22	– .44	– .51
Membership organizations (86)	.07	.54	.37
Private households (88)	–1.90	– .89	– .90
Miscellaneous services (89)	– .07	– .73	– .51

SOURCE: Iowa Department of Job Service.

TABLE C–6. UI subsidies as a percentage of taxable wages of industries in Kansas, 1971–1978

Industry group and code	1971–73 (pct)	1974–78 (pct)	1971–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	– .75	– .79	– .78
Mining & Quarrying (10–14)	– .19	–1.19	– .92
Construction			
General building construction (15)	– .50	1.40	.84
Heavy construction (16)	2.39	.60	1.03
Special trade contractors (17)	.24	.30	.29
Manufacturing			
Ordnance (19)	.05	– .19	– .11
Food & kindred products (20)	– .77	.26	– .05
Tobacco (21)	.00	.76	.76
Textile mill products (22)	.29	1.39	1.01
Lumber & wood products (24)	– .45	–1.04	– .95
Furniture & fixtures (25)	– .62	.26	– .05
Paper, allied products (26)	– .58	.24	– .03
Printing & publishing (27)	– .24	.13	.02
Chemicals (28)	1.88	– .76	.07
Petroleum, coal products (29)	.32	– .32	– .13
Rubber & plastics (30)	– .94	– .93	– .93
Leather products (31)	.12	.20	.18
Stone, clay & glass products (32)	– .45	– .03	– .16
Primary metals (33)	.01	.39	.27
Machinery (exc. electrical) (35)	–1.00	– .74	– .81
Electrical equipment (36)	–1.16	– .64	– .77
Transportation equipment (37)	– .44	– .03	– .14
Miscellaneous manufacturing industries (39)	– .79	.27	– .01

TABLE C–6. Kansas (*continued*)

Industry group and code	1971–73 (pct)	1974–78 (pct)	1971–78 (pct)
Transportation, Communications & Utilities			
Local passenger transit (41)	– .09	.20	.11
Trucking & warehousing (42)	– .67	– .54	– .57
Water transportation (44)	– .26	– .57	– .49
Pipeline transport (46)	.18	– .35	– .23
Transportation services (47)	– .44	– .35	– .37
Communication (48)	– .43	– .63	– .57
Electricity, gas & sanitation services (49)	– .28	– .54	– .47
Trade			
Wholesale Trade (50,51)	– .52	– .75	– .70
Retail Trade			
Building materials, hardware, gardening supplies (52)	– .80	– .71	– .74
General merchandise stores (53)	– .82	– .74	– .76
Food stores (54)	– .50	– .73	– .66
Auto dealers & service stations (55)	– .67	– .56	– .59
Apparel & accessories (56)	– .68	– .92	– .85
Furniture, home furnishings (57)	– .67	– .65	– .66
Eating & drinking places (58)	– .97	–1.06	–1.04
Miscellaneous retail (59)	– .76	– .80	– .78
Finance, Real Estate & Insurance			
Banking (60)	– .70	–1.06	– .96
Credit agencies (61)	– .64	– .91	– .83
Securities commodity brokers (62)	– .58	– .54	– .55
Insurance carriers (63)	– .70	– .89	– .84
Insurance agents & brokers (64)	–1.02	–1.29	–1.22
Real estate (65)	–1.06	– .88	– .93
Combined real estate & insurance (66)	– .94	– .75	– .81
Holding companies, other investments (67)	–1.32	–1.23	–1.25
Services			
Hotels, other lodging (70)	– .27	– .86	– .70
Personal services (72)	– .43	– .85	– .72
Business services (73)	–1.01	–1.04	–1.03
Auto repair, garages (75)	– .93	– .97	– .96
Miscellaneous repair services (76)	–1.13	–1.29	–1.25
Motion pictures (78)	– .83	– .52	– .62
Amusement services (79)	– .70	– .95	– .88
Medical, health services (80)	–1.44	– .78	– .89
Legal services (81)	–1.37	–1.47	–1.45
Educational services (82)	–1.24	– .51	– .53
Social services (83)	.00	–2.07	–2.07
Museums, botanical & zoological gardens (84)	– .98	–1.12	–1.09
Membership organizations (86)	– .90	– .40	– .54
Private households (88)	–1.90	–1.53	–1.53

SOURCE: Kansas Department of Human Resources, Division of Employment.

TABLE C–7. UI subsidy as a percentage of taxable wages of industries in Kentucky, 1968–1978

Industry group and code	1968–73 (pct)	1974–78 (pct)	1968–78 (pct)
Mining & Quarrying			
Coal mining (12)	.57	.37	.43
Other mining & quarrying (10,11,14)	.81	1.42	1.14
Petroleum & natural gas (13)	.88	.01	.41
Construction			
General building construction (15)	2.49	3.49	2.99
Heavy construction (16)	3.42	4.26	3.89
Special trade contractors (17)	.63	.60	.61
Manufacturing			
Food & beverages (20)	.75	.70	.73
Tobacco (21)	.25	.61	.44
Textile mill products (22)	.30	.63	.49
Apparel, other textiles (23)	.30	1.50	.93
Lumber, wood products (24)	.33	1.95	1.22
Furniture & fixtures (25)	.53	2.34	1.44
Paper, allied products (26)	– .49	– .38	– .42
Printing & publishing (27)	NA	– .34	– .19
Chemicals (28)	– .07	– .63	– .38
Petroleum refining, coal products (29)	– .13	–1.10	– .81
Rubber & plastic (30)	– .67	NA	– .32
Leather products (31)	.10	2.44	1.29
Stone, clay & glass (32)	.33	1.01	.60
Primary metal industries (33)	– .38	– .55	– .47
Fabricated metal products (34)	– .19	.47	.18
Machinery (exc. electrical) (35)	– .53	– .46	– .49
Electrical machinery (36)	– .18	1.93	1.00
Transportation equipment (37)	– .64	.62	.12
Instruments & related products (38)	– .23	.47	.17
Miscellaneous manufacturing industries (39)	– .16	.80	.37
Transportation, Communication & Utilities			
Local passenger transit (41)	.30	.05	.18
Trucking (42)	.30	.01	.08
Other transportation (44–47)	– .41	– .88	– .68
Communications (48)	– .38	–1.55	–1.07
Electricity, gas, and sanitation services (49)	– .25	–1.46	– .92
Trade			
Wholesale trade (50,51)	– .31	– .66	– .53
Retail Trade			
Building materials, hardware, gardening supply (52)	– .22	– .23	– .23
General merchandise stores (53)	– .47	– .75	– .62
Food stores (54)	– .57	– .82	– .72
Auto dealers, service stations (55)	– .59	– .36	– .46
Apparel, accessories (56)	– .40	– .80	– .64
Furniture, home furnishings (57)	– .49	– .34	– .40
Eating and drinking places (58)	– .65	– .63	– .64
Miscellaneous retail trade (59)	– .56	– .73	– .66
Finance, Insurance & Real Estate			
Banking (60)	– .49	–1.39	–1.04
Credit agencies (61)	– .36	– .81	– .62
Insurance (63,64)	– .48	–1.37	– .98
Real estate (65,66)	– .74	– .26	– .44
Other insurance, finance, & real estate (62,67)	– .96	–1.19	–1.10
Services			
Hotels, lodging places (70)	– .17	– .26	– .22
Personal services (72)	– .24	– .43	– .34
Business services (73)	– .75	– .38	– .53
Auto repair, garages (75)	– .76	– .75	– .76
Motion pictures (78)	2.76	– .10	1.14
Amusement services (79)	– .70	–2.24	–1.64
Miscellaneous services (80–95)	–1.07	– .90	– .95

SOURCE: Kentucky Department for Human Resources, Bureau for Social Insurance, Division of Unemployment Insurance.

TABLE C–8. UI subsidies as a percentage of taxable wages of industries in Louisiana, 1973–1977

Industry group and code	1973 (pct)	1974–77 (pct)	1973–77 (pct)
Agriculture, Forestry & Fisheries			
Agriculture services (07)	.19	3.06	2.49
Forestry (08)	2.31	8.12	7.24
Fishing, hunting & trapping (09)	3.75	8.38	7.46
Mining & Quarrying			
Metal mining (10)	5.41	17.35	15.31
Oil, gas extraction (13)	– .55	– 1.15	– 1.05
Non-metallic minerals (14)	– .53	– .98	– .91
Construction			
General building construction (15)	1.23	1.97	1.85
Heavy construction (16)	1.88	6.26	5.48
Manufacturing			
Ordnance (19)	.37	16.99	6.54
Food & kindred products (20)	1.74	1.27	1.36
Textile mill products (22)	– .60	– .23	– .26
Apparel, other textiles (23)	– .41	2.45	1.93
Lumber & wood products (24)	– .35	.35	.22
Furniture & fixtures (25)	.20	1.73	1.41
Paper, allied products (26)	– .59	– .26	– .33
Printing & publishing (27)	– .61	– .86	– .82
Chemicals (28)	– .38	– .84	– .76

TABLE C–8. Louisiana (*continued*)

Industry group and code	1973 (pct)	1974–77 (pct)	1973–77 (pct)
Petroleum, coal products (29)	– .04	.08	.05
Rubber & plastics (30)	.22	2.39	2.06
Leather products (31)	– .94	– .71	– .76
Stone, clay & glass products (32)	.33	– .52	– .37
Primary metals (33)	–1.11	– .60	– .69
Fabricated metal products (34)	– .36	– .60	– .56
Machinery (exc. electrical) (35)	–1.11	– .96	– .98
Electrical equipment (36)	– .90	– .26	– .37
Transportation equipment (37)	– .53	– .40	– .42
Instruments & related products (38)	– .07	– .88	– .77
Miscellaneous manufacturing industries (39)	1.17	5.05	4.37
Transportation, Communications & Utilities			
Local passenger transit (41)	– .44	– .59	– .56
Trucking & warehousing (42)	– .65	– .41	– .46
Water transportation (44)	– .49	– .54	– .53
Air transportation (45)	– .77	– .16	– .28
Pipeline transport (46)	.64	1.95	1.71
Transportation services (47)	–1.15	.00	– .18
Communication (48)	– .28	– 1.17	– 1.00
Electricity, gas, & sanitation services (49)	– .39	– .85	– .76
Trade			
Wholesale trade (50,51)	–1.13	– 1.53	– 1.46
Retail trade			
Building materials, hardware, gardening supplies (52)	– .78	– .93	– .90
General merchandise stores (53)	– .42	– 1.00	– .89
Food stores (54)	– .31	– .94	– .84
Auto dealers & service stations (55)	– .65	– .80	– .77
Apparel & accessories (56)	– .40	– .50	– .48
Furniture, home furnishings (57)	– .78	– .80	– .79
Eating & drinking places (58)	– .58	– .96	– .91
Miscellaneous retail (59)	– .75	– .54	– .58
Finance, Insurance & Real Estate			
Banking (60)	– .71	– 1.34	– 1.23
Credit agencies (61)	– .81	– 1.02	– .98
Securities commodity brokers (62)	.35	– .48	– .31
Insurance carriers (63)	1.03	– 1.06	– .63
Insurance agents & brokers (64)	– .52	– 1.03	– .96
Real estate (65)	–1.40	– 1.36	– 1.37
Combined real estate & insurance (66)	2.95	1.05	1.34
Holding companies, other investments (67)	–1.09	– 1.51	– 1.48
Services			
Hotels, other lodging (70)	– .33	– .33	– .33
Personal services (72)	– .43	– .66	– .62
Business services (73)	– .84	– .98	– .96
Auto repair, garages (75)	–1.46	– 1.10	– 1.23
Miscellaneous repair services (76)	–1.33	– 1.11	– 1.15
Motion pictures (78)	– .64	– 1.14	– 1.05
Amusement services (79)	1.42	2.62	2.43
Medical, health services (80)	– .88	– .39	– .48
Legal services (81)	–1.25	– 1.10	– 1.12
Educational services (82)	3.64	19.06	15.90
Social services (83)	.00	– 1.44	– 1.44
Museums, botanical & zoological gardens (84)	–1.60	1.82	1.23
Membership organizations (86)	– .48	– .48	– .48
Miscellaneous services (89)	– .30	.72	.54
Unclassified Industries (99)	.00	6.77	8.33

SOURCE: Louisiana Department of Employment Security.

TABLE C–9. UI subsidies as a percentage of taxable wages of industries in Maine, 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	1.71	1.97	1.90
Mining & Quarrying (10–14)	3.91	3.47	3.65
Construction (15–17)	1.90	3.08	2.62
Manufacturing			
Food & kindred products (20)	2.92	1.64	2.22
Textile mill products (22)	1.52	– .18	.60
Apparel, other textiles (23)	.35	.40	.38
Lumber & wood products (24)	.12	1.12	.70
Furniture & fixtures (25)	.33	– .42	– .10
Paper, allied products (26)	– .60	– 1.08	– .87
Printing & publishing (27)	– .67	– 1.13	– .94
Chemicals (28)	.87	– .03	.37
Petroleum, coal products (29)	6.45	7.43	7.32
Rubber & plastics (30)	– .15	1.08	.61
Leather products (31)	3.69	1.08	2.27
Stone, clay & glass products (32)	.57	.82	.71
Primary metals (33)	– .47	.26	– .20
Fabricated metal products (34)	– .69	– 1.02	– .89
Machinery (exc. electrical) (35)	.85	– .92	– .28
Electrical equipment (36)	– .38	.27	.00
Transportation equipment (37)	.73	– .61	– .09
Instruments & related products (38)	– .56	– .73	– .68

TABLE C–9. Maine (*continued*)

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Miscellaneous manufacturing industries (39)	.08	1.29	.88
Transportation, Communications & Utilities (40–49)	−.54	−.79	−.68
Trade (50–59)	−.55	−.78	−.69
Finance, Real Estate & Insurance (60–67)	−.92	−1.45	−1.25
Services (70–89)	−.63	−.24	−.37

SOURCE: Maine Department of Manpower Affairs, Employment Security.

TABLE C–10. UI subsidies as a percentage of taxable wages of industries in Michigan, 1969–1976

Industry group and code	1969–73 (pct)	1974–76 (pct)	1969–76 (pct)
Agriculture, Forestry & Fisheries			
Agricultural production–crops (01)	2.15	5.41	3.75
Agricultural production–livestock (02)	.00	2.62	2.62
Agricultural services (07)	2.81	5.44	4.04
Forestry (08)	14.01	12.12	12.58
Fishing, hunting & trapping (09)	15.59	16.30	15.92
Mining & Quarrying			
Metal mining (10)	.05	2.63	1.16
Coal mining (12)	.00	9.29	9.29
Oil, gas extraction (13)	.31	1.57	1.10
Non-metallic minerals (14)	2.67	5.80	3.97
Construction			
General building construction (15)	2.74	7.06	4.35
Heavy construction (16)	2.16	10.67	3.93
Special trade contractors (17)	2.29	5.78	3.65
Manufacturing			
Ordnance (19)	1.35	−3.13	.57
Food & kindred products (20)	.85	1.44	1.09
Tobacco (21)	2.82	−2.39	2.08
Textile mill products (22)	2.08	3.28	2.47
Apparel, other textiles (23)	1.69	2.25	1.90
Lumber & wood products (24)	1.68	7.89	4.43
Furniture & fixtures (25)	.38	1.88	.98
Paper, allied products (26)	.33	1.64	.84
Printing & publishing (27)	.13	1.05	.49
Chemicals (28)	.11	.26	.17
Petroleum, coal products (29)	1.35	2.63	1.95
Rubber & plastics (30)	.03	3.09	1.30
Leather products (31)	.28	1.45	.74
Stone, clay & glass products (32)	.69	4.04	2.07
Primary metals (33)	.48	1.55	1.02
Fabricated metal products (34)	.62	3.06	1.66
Machinery (exc. electrical) (35)	1.12	2.29	1.57
Electrical equipment (36)	.68	3.56	1.79
Transportation equipment (37)	−.15	3.03	1.21
Instruments and related products (38)	.09	1.00	.50
Miscellaneous manufacturing industries (39)	1.05	2.96	1.80
Transportation, Communications & Utilities			
Railroad transportation (40)	.00	1.58	1.58
Local passenger transit (41)	.27	1.36	.66
Trucking & warehousing (42)	.52	2.46	1.31
Water transportation (44)	4.94	7.66	6.03
Air transportation (45)	.15	1.22	.58
Pipeline transport (46)	−.10	−.34	−.23
Transportation services (47)	.63	1.35	.97
Communication (48)	−.03	.19	.06
Electrical, gas & sanitation services (49)	.00	.28	.11
Trade			
Wholesale trade			
Durable goods (50)	.02	1.21	.36
Nondurable goods (51)	.00	1.21	1.21
Retail trade			
Building materials, hardware, gardening supplies (52)	.17	1.60	.78
General merchandise stores (53)	−.08	.70	.23
Food stores (54)	−.26	.81	.21
Auto dealers & service stations (55)	−.18	1.18	.38
Apparel & accessories (56)	−.22	.42	.05
Furniture, home furnishings (57)	−.18	.88	.29
Eating & drinking places (58)	.02	.74	.35
Miscellaneous retail (59)	−.13	.68	.22
Finance, Insurance, & Real Estate			
Banking (60)	−.57	−.08	−.35
Credit agencies (61)	−.26	.34	.00
Securities commodity brokers (62)	−.03	.47	.13
Insurance carriers (63)	−.26	.53	.06
Insurance agents & brokers (64)	−.33	.15	−.10
Real estate (65)	−.09	1.21	.49
Combined real estate & insurance (66)	−.17	1.07	.22
Holding companies, other investments (67)	−.75	1.92	.42
Services			
Hotels, other lodging (70)	.60	1.51	1.00
Personal services (72)	.13	.75	.37
Business services (73)	−.12	1.02	.40
Auto repair, garages (75)	−.23	1.22	.44
Miscellaneous repair services (76)	.00	1.64	.72
Motion pictures (78)	−.09	.82	.29
Amusement services (79)	1.25	3.13	2.11
Medical, health services (80)	.79	−.26	−.52

TABLE C–10. Michigan (*continued*)

Industry group and code	1969–73 (pct)	1974–76 (pct)	1969–76 (pct)
Legal services (81)	– .65	– .30	– .48
Educational services (82)	– .61	.57	.01
Museums, botanical & zoological gardens (84)	–1.45	– .29	– .86

SOURCE: Michigan Employment Security Commission.

TABLE C–11. UI subsidies as a percentage of taxable wages of industries in Minnesota, 1969–1977

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Agriculture, Forestry & Fisheries (01–09)	1.74	1.76	1.75
Mining & Quarrying (10–14)	.41	.38	.39
Construction			
General building construction (15)	.92	3.58	2.24
Heavy construction (16)	5.13	11.19	8.01
Special trade contractors (17)	.74	2.57	1.70
Manufacturing			
Ordnance (19)	1.47	.76	1.39
Food & kindred products (20)	.23	.51	.36
Textile mills products (22)	– .11	.53	.21
Apparel, other textiles (23)	.42	1.24	.82
Lumber & wood products (24)	.31	.71	.54
Furniture & fixtures (25)	– .02	1.29	.58
Paper, allied products (26)	– .28	– .26	– .27
Printing & publishing (27)	– .34	– .30	– .32
Chemicals (28)	.11	.06	.09
Petroleum refining, coal products (29)	.11	.81	.43
Rubber & plastics (30)	.02	.64	.38
Leather products (31)	– .38	.86	.28
Stone, clay & glass products (32)	.84	3.04	1.99
Primary metals (33)	1.20	1.28	1.23
Fabricated metal products (34)	.07	– .07	– .01
Machinery (exc. electrical) (35)	– .14	.06	– .04
Electrical machinery (36)	.06	.70	.36
Transportation equipment (37)	1.41	2.67	2.02
Instruments & related products (38)	– .15	– .55	– .36
Miscellaneous manufacturing industries (39)	– .14	1.54	.71
Transportation, Communications & Utilities			
Local passenger transit (41)	.25	.18	.21

TABLE C–11. Minnesota (*continued*)

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Trucking & warehousing (42)	– .20	.85	.22
Water transport (44)	.83	6.09	3.84
Air transport (45)	– .27	– .82	– .58
Pipeline transport (46)	– .24	– .24	– .24
Transportation services (47)	– .18	.17	.03
Communication (48)	– .47	– .55	– .51
Electricity, gas & sanitation (49)	– .37	– .65	– .51
Trade			
Wholesale trade (50–51)	– .28	– .08	– .17
Retail trade			
Building materials, hardware, gardening supplies (52)	– .10	.13	.02
General merchandise stores (53)	– .38	– .19	– .24
Food stores (54)	– .31	– .34	– .33
Auto dealers, service stations (55)	– .23	– .01	– .12
Apparel, accessories (56)	– .33	– .30	– .31
Furniture, home furnishings (57)	– .19	– .03	– .11
Eating & drinking places (58)	– .19	– .04	– .10
Miscellaneous retail trade (59)	– .32	– .10	– .25
Finance, Insurance & Real Estate			
Banking (60)	– .53	– .55	– .54
Credit agencies (61)	– .38	– .21	– .29
Securities, commodity brokers (62)	– .43	– .52	– .47
Insurance carriers (63)	– .46	– .42	– .44
Insurance agents (64)	– .58	– .55	– .56
Real estate (65)	– .29	.26	.03
Combined real estate & insurance (66)	– .38	.34	– .23
Holding companies, & other investments (67)	– .46	.11	– .16
Services			
Hotels, other lodging (70)	.13	.30	.23
Personal services (72)	.00	.33	.17
Business services (73)	– .17	.12	.00
Auto repair, garages (75)	– .17	.19	.03
Miscellaneous repair services (76)	– .07	.49	.24
Motion pictures (78)	– .59	– .19	– .37
Amusement services (79)	– .02	.39	.22
Medical services (80)	– .53	– .52	– .52
Legal services (81)	– .64	– .38	– .45
Education services (82)	– .41	– .12	– .23
Social services (83)	.00	.61	.61
Museums, botanical & zoological gardens (84)	.50	–1.11	– .77
Membership organizations (86)	– .30	.27	.00
Miscellaneous services (89)	– .43	– .14	– .28

SOURCE: Minnesota Department of Economic Security.

TABLE C–12. UI subsidies as a percentage of taxable wages of industries in Mississippi, 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Agriculture, Forestry & Fisheries			
Agricultural production—crops (01)	.76	−.91	−.77
Agricultural production—livestock (02)	.00	−1.02	−1.02
Agriculture services (07)	−.09	−.26	−.21
Forestry (08)	1.13	−.32	.05
Fishing, hunting & trapping (09)	.00	1.02	1.02
Mining & Quarrying			
Oil, gas extraction (13)	−.09	−1.30	−.82
Non-metallic minerals (14)	−.20	.01	−.08
Construction			
General building construction (15)	−.11	.00	.00
Heavy construction (16)	.83	.51	.62
Special trade contractors (17)	−.08	−.29	−.21
Manufacturing			
Food & kindred products (20)	.01	−.43	−.25
Textile mill products (22)	.60	−.15	.23
Apparel, other textiles (23)	.07	.38	.25
Lumber & wood products (24)	−.06	−.42	−.27
Furniture & fixtures (25)	−.20	.24	.06
Paper, allied products (26)	−.23	−1.01	−.67
Printing & publishing (27)	−.04	−1.03	−.69
Chemicals (28)	−.01	−1.15	−.71
Petroleum, coal products (29)	−.17	−1.39	−.92
Rubber & plastics (30)	−.24	−.28	−.26
Leather products (31)	−.18	.20	.03
Stone, clay & glass products (32)	−.18	−.56	−.41
Primary metals (33)	−1.31	−.97	−1.10
Fabricated metal products (34)	−.15	−.23	−.20
Machinery (exc. electrical) (35)	−.02	−.58	−.38
Electrical equipment (36)	.21	.43	.36
Transportation equipment (37)	−.16	−.71	−.51
Instruments & related products (38)	−.63	1.12	.45
Miscellaneous manufacturing industries (39)	.16	.66	.44
Transportation, Communications & Utilities			
Local passenger transit (41)	−.16	−.91	−.61
Trucking & warehousing (42)	−.27	−.58	−.46
Air transportation (45)	−.42	−1.14	−.85
Pipeline transport (46)	.00	−1.01	−1.01

TABLE C–12. Mississippi (*continued*)

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Transportation services (47)	−.75	−1.02	−.96
Communication (48)	−.23	−1.38	−.93
Electricity, gas & sanitation services (49)	−.25	−1.47	−.91
Trade			
Wholesale trade			
Durable goods (50)	−.12	−.76	−.46
Nondurable goods (51)	.00	−1.19	−1.19
Retail trade			
Building materials, hardware, gardening supplies (52)	−.17	−.69	−.45
General merchandise stores (53)	−.25	−.92	−.64
Food stores (54)	−.22	−.92	−.68
Auto dealers & service stations (55)	−.23	−1.01	−.70
Apparel & accessories (56)	−.36	−.94	−.77
Furniture, home furnishings (57)	−.32	−.95	−.73
Eating & drinking places (58)	−.36	−1.09	−.80
Miscellaneous retail (59)	−.32	.00	.00
Finance, Insurance & Real Estate			
Banking (69)	−.21	−1.47	−1.02
Credit agencies (61)	−.27	−1.11	−.80
Securities commodity brokers (62)	−.61	−1.30	−.97
Insurance carriers (63)	−.19	−1.39	−.96
Insurance agents & brokers (64)	−.40	−1.28	−.95
Real estate (65)	−.60	−.72	−.68
Combined real estate & insurance (66)	−.43	−1.06	−.79
Holding companies, other investments (67)	−.53	−.60	−.58
Services			
Hotels, other lodging (70)	−.12	−.77	−.54
Personal services (72)	.28	−.59	−.21
Business services (73)	−.39	−.92	−.74
Auto repair, garages (75)	−.52	−.96	−.82
Miscellaneous repair services (76)	−.43	−.76	−.66
Motion pictures (78)	−.31	−.33	−.32
Amusement services (79)	−.39	−.88	−.71
Medical, health services (80)	−.61	−1.03	−.92
Legal services (81)	−.69	−1.28	−1.13
Educational services (82)	−.66	.01	−.04
Social services (83)	.00	3.38	3.38
Membership organizations (86)	.31	1.33	.90
Miscellaneous services (89)	.01	−.50	−.32

SOURCE: Mississippi Employment Security Commission.

TABLE C–13. UI subsidy as a percentage of taxable wages of industries in Nebraska, 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	− .11	− .39	− .30
Mining & Quarrying (10–14)	1.58	3.16	2.51
Construction (15–17)	1.01	1.87	1.54
Manufacturing (20–39)	.36	.29	.32
Transportation, Communication & Utilities (40–49)	− .12	− .45	− .32
Wholesale & Retail Trade (50–59)	− .18	− .60	− .45
Finance, Insurance, Real Estate (60–69)	− .17	− .60	− .44
Services (70–95)	− .41	− .30	− .34

SOURCE: Nebraska Department of Labor, Division of Employment.

TABLE C–14. UI subsidies as a percentage of taxable wages of industries in New York, 1970–1978

Industry group and code	1970–73 (pct)	1974–78 (pct)	1970–78 (pct)
Construction			
General building construction (15)	8.40	10.02	9.23
Heavy construction (16)	8.25	13.76	11.27
Special trade contractors (17)	2.65	9.67	6.45
Manufacturing			
Food & kindred products (20)	1.38	1.76	1.59
Tobacco (21)	.33	.36	.35
Textile mill products (22)	3.31	6.67	5.23
Apparel, other textiles (23)	5.78	6.74	6.31
Lumber & wood products (24)	1.12	2.55	1.95
Furniture & fixtures (25)	1.32	2.47	1.95
Paper, allied products (26)	.93	1.13	1.05
Printing & publishing (27)	.90	1.32	1.15
Chemicals (28)	.84	.50	.64
Petroleum, coal products (29)	.73	1.12	.97
Rubber & plastics (30)	.80	1.78	1.40
Leather products (31)	2.93	3.18	3.07
Stone, clay & glass products (32)	1.21	2.60	2.04
Primary metals (33)	2.33	2.88	2.65
Fabricated metal products (34)	.82	1.86	1.43
Machinery (exc. electrical) (35)	.65	.37	.48
Electrical equipment (36)	1.29	1.21	1.24
Transportation equipment (37)	1.37	1.54	1.48
Instruments & related products (38)	.69	.36	.49
Miscellaneous manufacturing industries (39)	1.48	2.74	1.19
Transportation, Communications & Utilities			
Rail transportation & local passenger transit (40,41)	.73	2.46	1.75

TABLE C–14. New York (*continued*)

Industry group and code	1970–73 (pct)	1974–78 (pct)	1970–78 (pct)
Trucking & warehousing (42)	.86	2.46	1.78
Water transportation (44)	3.11	2.56	2.81
Air transportation (45)	.37	.34	.35
Pipeline transport (46)	− .23	.69	.30
Transportation services (47)	.74	1.15	1.00
Communication (48)	1.01	− .56	.11
Electricity, gas, & sanitation services (49)	− .33	.00	− .13
Trade			
Wholesale trade (50,51)	.68	.97	.85
Retail trade			
Building materials, hardware, gardening supplies (52)	.53	1.62	1.16
General merchandise stores (53)	.11	.61	.40
Food stores (54)	− .07	.97	.56
Auto dealers & service stations (55)	.09	1.20	.75
Apparel & accessories (56)	.95	1.66	1.36
Furniture, home furnishings (57)	.54	1.88	1.35
Eating & drinking places (58)	.67	1.31	1.06
Miscellaneous retail (59)	.48	1.40	1.07
Finance, Insurance & Real Estate			
Banking (60)	− .33	− .12	− .20
Credit agencies (61)	.18	.08	.11
Securities commodity brokers (62)	.62	.37	.49
Insurance carriers (63)	.03	.37	.23
Insurance agents & brokers (64)	− .04	.21	.11
Real estate (65)	.45	1.62	1.16
Combined real estate & insurance (66)	− .09	.60	.31
Holding companies, other investments (67)	.36	.63	.53
Services			
Hotels, other lodging (70)	1.59	2.28	1.98
Personal services (72)	.85	1.31	1.10
Business services (73)	.58	1.07	.89
Auto repair, garages (75)	.15	1.05	.72
Miscellaneous repair services (76)	.85	2.02	1.59
Motion pictures (78)	1.44	3.84	2.84
Amusement services (79)	3.55	4.72	4.29
Medical, health services (80)	− .47	.26	.02
Legal services (81)	− .20	.11	.01
Educational services (82)	.43	1.47	1.08
Social services (83)	.00	1.66	1.66
Museums, botanical & zoological gardens (84)	1.11	2.41	1.90
Membership organizations (86)	.23	1.18	.76
Private households (88)	− .24	.89	.39
Miscellaneous services (89)	.64	.89	.79

SOURCE: New York Department of Labor, Division of Employment.

TABLE C–15. UI subsidies as a percentage of taxable wages of industries in Oregon during 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	.15	−4.69	−2.96
Mining & Quarrying			
Metal mining (10)	.75	.00	.22
Extraction of fuels (11,12,13)	1.01	−1.61	−1.47
Other mining & quarrying (14)	1.43	1.35	1.38
Construction			
General building construction (15)	1.53	1.23	1.34
Heavy construction (16)	3.67	3.84	3.77
Special trade contractors (17)	.64	.43	.50
Manufacturing			
Food & kindred products (20)	1.60	.64	1.01
Textile mill products (22)	.13	− .41	− .19
Apparel, other textiles (23)	.35	− .81	− .37
Lumber & wood products (24)	.68	.53	.58
Furniture & fixtures (25)	.52	.49	.50
Paper, allied products (26)	− .02	−1.12	− .72
Printing, publishing (27)	− .32	−1.21	− .90
Chemicals (28)	− .16	−1.30	− .88
Petroleum refining, coal products (29)	.11	− .11	− .02
Rubber & plastics (30)	.28	− .74	− .48
Leather products (31)	.43	− .62	− .28
Stone, clay & glass products (32)	.36	.30	.32
Primary metals (33)	.32	− .75	− .40
Fabricated metal products (34)	.83	.31	.48
Machinery (exc. electricity) (35)	.37	− .53	− .24
Electrical machinery (36)	− .01	− .23	− .11
Transportation equipment (37)	.59	− .06	.19
Instruments & related products (38)	− .20	−1.77	−1.59
Miscellaneous manufacturing industries (39)	.42	.22	.30
Transportation, Communications, & Utilities			
Local passenger transit (41)	− .13	− .85	− .58
Trucking & warehousing (42)	.13	− .29	− .14
Water transport (44)	− .42	− .87	− .67
Air & pipeline transport, transportation services (45,46,47)	− .35	−2.70	−1.77
Communication (48)	− .62	−1.66	−1.30
Electricity, gas & sanitation services (49)	− .66	−1.78	−1.38
Trade			
Wholesale trade (50,51)	− .20	−2.07	−1.33
Retail trade			
Building materials, hardware, gardening supplies (52)	− .38	−1.22	− .94
General merchandise stores (53)	− .30	−1.21	− .87
Food stores (54)	− .07	− .93	− .64
Auto dealers, service stations (55)	− .27	− .85	− .64
Apparel, accessories (56)	− .15	−1.00	− .70
Furniture, home furnishings (57)	− .17	−1.09	− .79
Eating & drinking places (58)	.36	− .87	− .47
Miscellaneous retail trade (59)	− .18	−1.00	− .72
Finance, Insurance & Real Estate			
Banking (60)	− .50	−1.60	−1.22
Credit agencies (61)	− .47	−1.55	−1.23
Securities commodity brokers (62)	− .20	−1.72	−1.12
Insurance carriers (63)	− .31	−1.50	−1.11
Insurance agents (64)	− .34	−1.56	−1.17
Real estate (65)	− .16	−1.01	− .74
Combined real estate & insurance (66)	− .65	−8.57	−4.40
Services			
Hotel, other lodging (70)	.37	− .70	− .31
Personal services (72)	.06	−1.01	− .58
Business services (73)	− .24	− .98	− .76
Auto repair, garages (75)	− .18	− .86	− .64
Miscellaneous repair services (76)	− .23	− .76	− .59
Motion pictures (78)	.24	− .99	− .53
Amusement services (79)	− .06	− .66	− .45
Medical services (80)	− .38	− .29	− .30
Legal services (81)	− .65	−1.70	−1.39
Membership organizations (86)	− .27	−1.36	− .96
Miscellaneous services (89)	− .69	−2.96	−2.24

SOURCE: Oregon Department of Human Resources, Employment Division.

TABLE C–16. UI subsidies as a percentage of taxable wages of industries in South Carolina, 1968–1978

Industry group	1968–73 (pct)	1974–78 (pct)	1968–78 (pct)
Agriculture, Forestry and Fisheries	− .82	− .37	− .51
Mining & Quarrying	− .30	.45	.12
Construction	− .85	1.72	.64
Manufacturing			
Food & kindred products	− .25	.49	.14
Textile mill products	.15	1.31	.76
Apparel & other textiles	.31	.56	.45
Lumber & wood products	− .40	.28	− .02
Furniture & fixtures	− .65	1.25	.31
Paper, allied products	− .35	.47	.10
Chemicals	− .55	.58	.08
Stone, clay & glass products	− .30	.61	.18
Fabricated metal products	− .63	.09	− .18
Machinery (exc. electrical)	− .49	.20	− .06
Electrical machinery	− .18	1.05	.53
Miscellaneous manufacturing industries	.09	.81	.52

TABLE C–16. South Carolina (*continued*)

Industry group	1968–73 (pct)	1974–78 (pct)	1968–78 (pct)
Transportation, Communication & Utilities	— .66	— .29	— .45
Trade	— .64	— .39	— .49
Finance, Insurance & Real Estate	— .69	— .45	— .55
Services	— .77	— .19	— .39

SOURCE: South Carolina Employment Security Commission.

TABLE C–17. UI subsidies as a percentage of taxable wages of industries in South Dakota, 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Agriculture, Forestry & Fisheries (01–09)	— .34	— .27	— .30
Mining & Quarrying (10–14)	.03	.33	.20
Construction			
General building construction (15)	— .45	.37	.10
Other general contractors (16)	2.63	4.31	3.59
Special trade contractors (17)	— .13	.57	.35
Manufacturing (19–39)	— .02	.12	.07
Food & kindred products (20)	.31	.20	.25
Transportation, Communications & Utilities (40–49)	— .20	— .09	— .13
Trade			
Wholesale trade (50–51)	— .16	— .18	— .17
Retail trade (52–59)	— .26	— .22	— .24
Finance, Insurance, & Real Estate (60–69)	— .20	— .28	— .25
Services (70–89)	— .38	— .16	— .22

SOURCE: South Dakota Department of Labor, Office of Administrative Services.

TABLE C–18. UI subsidies as a percentage of taxable wages of industries in Tennessee, 1969–1978

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Mining & Quarrying (10–14)	.39	6.55	3.72
Construction (15–17)	.10	.19	.14
Manufacturing			
Lumber & wood products (24)	.30	1.72	.96
Furniture & fixtures (25)	— .26	1.13	.40
Paper, allied products (26)	— .42	.99	.28
Printing & publishing (27)	— .37	.49	.07
Chemicals (28)	.17	.96	.54
Rubber & plastics (30)	— .95	.57	.00
Stone, clay & glass products (32)	— .23	.01	.01

TABLE C–18. Tennessee (*continued*)

Industry group and code	1969–73 (pct)	1974–78 (pct)	1969–78 (pct)
Primary metal industries (33)	.94	1.12	1.06
Fabricated metal products (34)	— .24	1.24	.53
Machinery (exc. electrical) (35)	3.97	10.30	8.26
Electrical machinery (36)	.44	5.40	2.23
Transportation equipment (37)	.07	2.85	1.35
Instruments & related products (38)	—1.61	—1.76	—1.68
Miscellaneous manufacturing industries (39)	— .14	1.81	.76
Transportation, Communications & Utilities (40–49)	— .49	.67	.11
Trade			
Wholesale trade (50,51)	.23	.12	.14
Retail trade (52–59)	— .36	.06	— .25
Finance, Insurance & Real Estate (60–69)	— .04	— .64	— .08
Services (70–89)	— .05	.18	— .03

SOURCE: Tennessee Department of Employment Security.

TABLE C–19. UI subsidies as a percentage of taxable wages of industries in Vermont, 1973–1978

Industry group and code	1973 (pct)	1974–78 (pct)	1973–78 (pct)
Agriculture, Forestry and Fisheries (01–09)	.48	2.03	1.51
Mining & Quarrying (10–14)	.30	1.08	.70
Construction (15–17)	1.07	7.70	4.36
Manufacturing			
Food & kindred products (20)	.07	.32	.21
Textile mill products (22)	.27	3.95	2.26
Apparel, other textiles (23)	.12	3.52	2.05
Lumber & wood products (24)	— .02	1.29	.79
Furniture & fixtures (25)	.34	.55	.46
Paper, allied products (26)	— .04	.37	.19
Printing & publishing (27)	— .12	— .12	— .12
Chemicals (28)	.06	.05	.05
Rubber & plastics (30)	— .25	— .47	— .37
Leather products (31)	.23	1.02	.63
Stone, clay & glass products (32)	.28	2.45	1.44
Primary metals (33)	— .16	1.77	.69
Fabricated metal products (34)	— .16	— .22	— .20
Machinery (exc. electrical) (35)	— .54	— .28	— .40
Electrical equipment (36)	— .13	— .41	— .30
Transportation equipment (37)	— .67	.09	— .19
Instruments & related products (38)	— .26	— .96	— .67
Miscellaneous manufacturing industries (39)	— .18	1.15	.71

TABLE C-19. Vermont (*continued*)

Industry group and code	1973 (pct)	1974–78 (pct)	1973–78 (pct)
Transportation, Communications & Utilities			
Local passenger transit (41)	− .03	.41	.21
Communication (48)	− .44	− .23	− .26
Electricity, gas, & sanitation services (49)	− .31	− .61	− .57
Trade			
Wholesale trade			
Durable goods (50)	.00	− .37	− .01
Nondurable goods (51)	.00	−1.05	−1.05
Retail trade			
Building materials, hardware, gardening supplies (52)	− .07	.20	.15
General merchandise stores (53)	.04	.34	.29
Food stores (54)	− .40	− .21	− .24
Auto dealers & service stations (55)	.07	.28	.24
Apparel & accessories (56)	− .19	.37	.30
Furniture, home furnishings (57)	−. 11	.51	.41
Eating & drinking places (58)	.90	.94	.94
Miscellaneous retail (59)	.00	.27	.23
Finance, Real Estate & Insurance			
Banking (60)	− .06	− .98	− .46
Credit agencies (61)	− .40	− .80	− .74
Securities commodity brokers (62)	− .24	−1.14	−1.01
Insurance carriers (63)	− .28	− .82	− .74
Insurance agents & brokers (64)	− .68	− .74	− .73
Real estate (65)	1.30	1.01	1.06
Holding companies, other investments (67)	− .75	− .97	− .95
Services			
Hotels, other lodging (70)	.05	2.89	.42
Personal services (72)	− .12	.05	.02
Business services (73)	.13	.57	.51
Auto repair, garages (75)	.12	.37	.35
Miscellaneous repair services (76)	.40	.59	.56
Motion pictures (78)	− .23	.26	.18
Amusement services (79)	3.56	4.07	4.01
Medical, health services (80)	.00	− .45	.00
Legal services (81)	− .83	− .59	− .62
Educational services (82)	.60	2.56	2.27
Social services (83)	.00	2.02	2.02
Museums, botanical & zoological gardens (84)	2.92	8.17	7.16
(85)	2.42	1.94	2.03
Membership organizations (86)	.00	−1.76	−1.76
(87)	.24	.84	.75

SOURCE: Vermont Department of Employment Security.

TABLE C-20. UI subsidies as a percentage of taxable wages of industries in Washington, 1969–1977

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Agriculture, Forestry & Fisheries			
Agriculture (01–07)	2.92	2.56	2.70
Forestry (08)	1.31	1.54	1.46
Fishing, hunting & trapping (09)	7.93	7.76	7.82
Mining & Quarrying			
Metal mining (10)	2.20	.47	1.20
Coal mining (12)	−1.58	−1.26	−1.35
Oil, gas extraction (13)	1.15	3.95	2.67
Non-metallic minerals (14)	1.43	2.09	1.88
Construction			
General building construction (15)	4.40	2.23	3.12
Heavy construction (16)	5.78	4.41	4.99
Special trade contractors (17)	2.95	1.05	1.80
Manufacturing			
Food & kindred products (20)	3.49	1.63	2.28
Textile mill products (22)	1.32	.44	.81
Apparel, other textiles (23)	.75	.52	.62
Lumber & wood products (24)	1.52	1.42	1.46
Furniture & fixtures (25)	1.33	1.64	1.49
Paper, allied products (26)	.30	−1.04	− .47
Printing & publishing (27)	− .46	−1.12	− .84
Chemicals (28)	.35	−1.59	− .83
Petroleum, coal products (29)	−1.00	−2.10	−1.68
Rubber & plastics (30)	1.27	.75	.93
Leather products (31)	1.76	.78	1.20
Stone, clay & glass products (32)	1.95	.95	1.37
Primary metals (33)	− .04	− .44	− .27
Fabricated metal products (34)	1.89	.89	1.25
Machinery (exc. electrical) (35)	1.13	.27	.62
Electrical equipment (36)	.76	− .37	.05
Transportation equipment (37)	6.79	− .59	2.01
Instruments & related products (38)	1.22	−1.26	− .70
Miscellaneous manufacturing industries (39)	.31	.52	.44
Transportation, Communications & Utilities			
Local passenger transit (41)	.73	.74	.74
Trucking & warehousing (42)	.52	.08	.27
Water transportation (44)	.87	− .22	.31
Air transportation (45)	.27	−1.67	− .91
Pipeline transport (46)	−1.80	−2.49	−2.22
Transportation services (47)	.16	− .80	− .45
Communication (48)	−1.09	−1.91	−1.57
Electricity, gas & sanitation services (49)	−1.22	−2.08	−1.79
Trade			
Wholesale trade (50,51)	.72	− .39	− .06

TABLE C–20. Washington (*continued*)

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Retail trade			
Building materials, hardware, gardening supplies (52)	.08	– .66	– .34
General merchandise stores (53)	.66	– .36	.13
Food stores (54)	.47	– .58	– .14
Auto dealers & service stations (55)	.40	– .17	.08
Apparel & accessories (56)	1.62	– .02	.85
Furniture, home furnishings (57)	.61	– .52	– .07
Eating & drinking places (58)	1.78	.36	.99
Miscellaneous retail (59)	.38	– .47	– .12
Finance, Insurance & Real Estate			
Banking (60)	– .71	–1.58	–1.23
Credit agencies (61)	– .22	–1.21	– .81
Securities commodity brokers (62)	– .46	–1.58	–1.08
Insurance carriers (63)	– .51	–1.27	– .96
Insurance agents & brokers (64)	– .71	–1.40	–1.13
Real estate (65)	2.76	.02	.97
Combined real estate & insurance (66)	– .64	–1.47	–1.08
Holding companies, other investments (67)	– .26	–1.31	– .87
Services			
Hotels, other lodging (70)	1.45	.26	.77
Personal services (72)	1.16	– .23	.42
Business services (73)	.64	– .89	– .38
Auto repair, garages (75)	.55	– .28	.05
Miscellaneous repair services (76)	.67	– .39	– .01
Motion pictures (78)	.08	– .68	– .35
Amusement services (79)	1.16	.84	.97
Medical, health services (80)	– .49	–1.17	– .91
Legal services (81)	– .81	–1.58	–1.33
Educational services (82)	.64	.52	.57
Social services (83)	.00	– .54	– .54
Museums, botanical & zoological gardens (84)	– .46	–1.03	– .80
Membership organizations (86)	.13	.33	.25

SOURCE: Washington Employment Security Department and Department of Labor.

TABLE C–21. UI subsidies as a percentage of taxable wages of industries in Wisconsin, 1969–1977

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Agriculture, Forestry & Fisheries			
Agricultural production—crops (01)	– .36	1.02	.26

TABLE C–21. Wisconsin (*continued*)

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Agricultural production—livestock (02)	.00	– .07	– .07
Agricultural services (07)	1.35	2.49	2.07
Forestry (08)	– .03	– .01	– .02
Fishing, hunting & trapping (09)	.35	5.12	2.07
Mining & Quarrying			
Metal mining (10)	.98	– .96	– .13
Oil, gas extraction (13)	.80	– .99	.10
Non-metallic minerals (14)	6.08	9.89	8.09
Construction			
General building construction (15)	3.40	7.66	5.63
Heavy construction (16)	10.34	16.85	13.48
Special trade contractors (17)	1.86	3.95	3.02
Manufacturing			
Ordnance (19)	– .37	1.43	– .14
Food & kindred products (20)	.52	– .07	.20
Tobacco (21)	.45	.94	.60
Textile mill products (22)	.29	.84	.55
Apparel, other textiles (23)	1.05	.08	.56
Lumber & wood products (24)	.34	.52	.44
Furniture & fixtures (25)	.24	– .19	.01
Paper, allied products (26)	.00	– .76	.39
Printing & publishing (27)	– .07	– .39	– .24
Chemicals (28)	.92	1.04	.98
Petroleum, coal products (29)	1.71	3.23	2.53
Rubber & plastics (30)	– .30	.00	– .23
Leather products (31)	.45	– .17	.15
Stone, clay & glass products (32)	1.87	2.77	2.35
Primary metals (33)	.48	– .06	.21
Fabricated metal products (34)	– .12	– .18	– .15
Machinery (exc. electrical) (35)	.41	– .01	.19
Electrical equipment (36)	.27	– .46	– .10
Transportation equipment (37)	– .41	3.15	1.51
Instruments and related products (38)	.04	– .29	– .13
Miscellaneous manufacturing industries (39)	.11	.00	.05
Transportation, Communications & Utilities			
Local passenger transit (41)	– .21	– .29	– .25
Trucking & warehousing (42)	.41	.99	.72
Water transportation (44)	7.71	8.78	8.20
Air transportation (45)	.05	– .91	– .47
Pipeline transport (46)	– .52	– .55	– .54
Transportation services (47)	.28	– .97	– .47
Communication (48)	– .52	– .79	– .66
Electricity, gas, & sanitation services (49)	– .26	–1.16	– .73
Trade			
Wholesale trade			
Durable goods (50)	– .22	– .75	– .46
Nondurable goods (51)	.00	– .66	– .66

TABLE C–21. Wisconsin (*continued*)

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Retail trade			
Building materials, hardware, gardening supplies (52)	−.03	−.42	−.23
General merchandise stores (53)	−.38	−.75	−.56
Food stores (54)	−.22	−.43	−.33
Auto dealers & service stations (55)	−.33	−.54	−.44
Apparel & accessories (56)	−.22	−.54	−.39
Furniture, home furnishings (57)	−.28	−.40	−.34
Eating & drinking places (58)	−.22	−.65	−.48
Miscellaneous retail (59)	−.41	−.67	−.56
Finance, Real Estate & Insurance			
Banking (60)	−.56	−1.23	−.93
Credit agencies (61)	−.59	−1.19	−.94
Securities commodity brokers (62)	−.53	−1.00	−.78
Insurance carriers (63)	−.57	−1.21	−.92
Insurance agents & brokers (64)	−.78	−1.18	−1.02

TABLE C–21. Wisconsin (*continued*)

Industry group and code	1969–73 (pct)	1974–77 (pct)	1969–77 (pct)
Real estate (65)	−.27	−.36	−.32
Combined real estate & insurance (66)	−.55	−.90	−.73
Holding companies, other investments (67)	.10	−1.42	−.46
Services			
Hotels, other lodging (70)	.60	.36	.46
Personal services (72)	−.37	−.59	−.49
Business services (73)	−.36	−.54	−.47
Auto repair, garages (75)	−.59	−.45	−.51
Miscellaneous repair services (76)	−.41	−.49	−.46
Motion pictures (78)	−.11	−.63	−.38
Amusement services (79)	.66	.76	.72
Medical, health services (80)	−.65	−.88	−.79
Legal services (81)	−1.23	−1.52	−1.42
Educational services (82)	−.09	−.05	−.06
Membership organizations (86)	−.31	−.56	−.44
Miscellaneous services (89)	−.41	−.84	−.65

SOURCE: Wisconsin Department of Industry, Labor and Human Relations.

State Trust Fund Behavior

Marc Freiman

During the 1973–75 recession and its aftermath, the State unemployment compensation (UC) trust funds were forced to borrow heavily from the general funds of the Federal Government. At the same time, the average State tax rate was increased to repay these loans and restore solvency to the trust funds.

The loans to the State trust funds are interest free.[1] Nominally, they must be repaid in approximately 3 years, but provisions have been enacted to waive this deadline under specific conditions. The question therefore arises: Because these loans were available, did States tend not to raise tax rates as quickly as they would have otherwise?

This proposition was tested by estimating an equation for the State tax rate response with data from 1948 to 1974 before loans became a large part of the system. This equation was then used to predict tax rates in the 1975–77 period, assuming that the relationship between tax rates and fund balances would hold. A comparison of predicted tax rates with actual tax rates shows that, while the average State tax rate increased substantially during the 1970's, it did not increase as much as experience would suggest.

A number of reasons can be offered to explain this shortfall. By 1977, the tax rate had already been increased fairly quickly to historically high levels, and there may well have been serious concerns over fueling inflation, damaging marginal firms, or creating a substantial handicap in interstate competition to attract new industry. Furthermore, States had one other important option for increasing tax revenues—namely, by increasing the State taxable wage base above the Federally mandated (Federal Unemployment Tax Act [FUTA]) level. By the end of 1977, 24 States had taken this step.

A more comprehensive measure of State response to trust fund problems would take into account both the increases in the State taxable wage base and increases in the tax rate. A measure for total "State tax effort" was constructed by taking State tax receipts as a percentage of estimated taxable wages by using the Federal wage base, as opposed to the State's. This measure indicates a stronger response to the recession by the States than did the measure that used tax rates alone. Yet, even this total measure shows a response that falls short of the response predicted by experience.

The 1973–75 recession and its aftermath highlighted a basic problem in the UC system. With benefit payments tied to wage levels, and with a fixed Federal taxable wage base, the UC system has an inherent tendency to become imbalanced over time. At regular intervals, States must adapt their systems in the face of this imbalance, or Federal legislation must adjust some basic part of the system. It is, therefore, worthwhile to determine how soon the UC system will require basic adjustments.

An annual model of the State UC trust funds was constructed to pursue this question. The model assumes no new State or Federal legislation. The results, therefore, suggest when legislation will be needed, not what is actually likely to happen.

Model results project that, if the level of unemployment and the rate of wage increase are low, State trust funds will remain solvent well into the 1990's. If a slightly higher unemployment rate and a substantially higher rate of wage growth exist, the trust funds will probably remain solvent only through the 1980's. And if both the rate of wage growth and the unemployment rate are high, the State trust funds will need assistance again by the mid-1980's.

The Unemployment Compensation Tax System

The UC system is financed by payroll taxes at both the State and Federal levels. They apply to almost every employer in covered industries. The taxable payroll for each employer is defined as the total taxable wages paid to each employee up to, but not exceeding, the "taxable wage base" per employee per year. Federal law currently sets the taxable wage base at $6,000,

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although some State bases are higher. The Federal wage base is called the FUTA wage base.[2]

The FUTA established a Federal tax of 3.2 percent on taxable payrolls. However, the tax is reduced by 2.7 percent for employers in States with approved UC programs, that is, those that have a State payroll tax. Because all States have Federally approved programs, the effective Federal tax rate is only 0.5 percent. Revenues from the Federal payroll serve three purposes:

- They finance the administration of Federal and State UC programs.
- They fund half the extended benefits program.
- They provide interest-free loans to States that cannot meet their benefit costs.

On January 1, 1977, the effective Federal tax rate was raised to 0.7 percent, where it will remain until all loans to the system have been repaid.

A State's payroll taxes feed its UC trust fund. These funds pay for the regular benefits and for half the extended benefits drawn by unemployed persons who previously worked in that State.

Although the Federal tax rate remains at a uniform 0.5 percent or 0.7 percent under temporary legislation, almost all State acts are based on "experience-rating systems." Under these systems, employers' State tax rates vary according to the benefits received by their employees; employers whose workers have high levels of unemployment are penalized with higher tax rates on their taxable payrolls, up to a maximum tax rate established by each State.

To understand State funds, it is important to understand how States can respond to the need for increased revenue. State response can be measured at three levels of increasing scope:

1. The State tax rate. This is the narrowest measure of response, but it is the one States control directly through their experience-rating schedules. This measure is calculated by taking State taxes as a percentage of the State taxable wages.

2. The total State tax effort. This measure of total State tax response includes State tax rates and State taxable wage bases. It is calculated by taking State taxes as a percentage of FUTA taxable wages.

3. The tax response at all levels of government. This measure comprises the combined response of State and Federal governments to changes in State trust funds. The primary Federal response in the past has been to change the FUTA taxable wage base. When benefit payments rise, the Federal Government may raise its wage base to help preserve or restore trust funds, or to promote uniform financing among the States. This most inclusive measure is derived by taking State taxes as a percentage of all wages in covered employment.

In this analysis, the first two measures will be given the greatest attention. If total covered wages rise, the revenue from a given tax rate will be affected only to the degree that State taxable wages increase. At the same time, States will determine their overall effort, including increases in their wage bases, by using the FUTA wage base as a point of departure. In neither case are total covered wages the appropriate measure for estimating State behavior.

Evaluating State Funds During and After the 1973–75 Recession

The 1973–75 recession placed a severe strain on State UC trust funds. Benefit payments under the regular program rose from $4 billion in 1973 to $11.8 billion in 1975. Net reserves in all State funds fell from $10.9 billion at the end of 1973 to only $0.9 billion by the end of 1976. This drastic decline provoked a commensurate increase in Federal loans to the State trust funds. The total of outstanding loans rose from $0.1 billion in 1974 to $4.6 billion in 1977.

In response to this dramatic turn of events, both the Federal and State governments acted to increase revenues. In 1976, Federal legislation increased the FUTA taxable wage base from $4,200 to $6,000, effective in 1978. At the same time, most States increased their tax rates, and some raised their wage bases higher than that of the FUTA base.

Federal loans to State trust funds do not carry interest. And States must consider many factors in managing State trust funds, including potentially destabilizing effects on local businesses of sudden and sharp increases in payroll taxes. It is, therefore, reasonable to ask whether States have responded with normal speed in repaying Federal loans once they became substantial. (Small loans were made to the State trust funds in the late 1950's and early 1960's.)

The State tax rate as measure

Except for Puerto Rico, each State has its own system for determining an employer's tax rate. The tax rate is a percentage of an employer's taxable payroll. Each system involves a formula that relates employers records in laying off workers to the size of their taxable payrolls. An "experience schedule" yields a specific tax rate for every value of the formula. Different schedules may be used depending on the condition of the trust fund. There are four basic formulas:

1. reserve ratio formulas, in which employers' reserves are divided by their taxable payrolls;

2. benefit-ratio formulas, in which employers' benefit payments are divided by their taxable payrolls;

3. benefit-wage ratio formulas, in which the taxable wages of unemployed workers who receive benefits are divided by the employer's total taxable payroll; and,

4. payroll variation formulas, in which the tax rate is a function of the percentage change in an employer's payroll over time.

The reserve-ratio formula is by far the most popular method and is currently used by 33 States. In 1975, these States had 62 percent of all covered workers and collected 69 percent of all State taxes. Even in States that do not use a reserve-ratio formula, a rate schedule is often based on the ratio of State reserves to taxable payrolls.[3]

Although in 1976 and 1977, the tax rate rose to its highest level since World War II, it is still legitimate to ask whether this increase was as fast as past experience would suggest, especially in view of the magnitude of the drain on the trust funds.

To analyze this question, a model was developed to simulate the behavior of State tax rates. However, instead of estimating the average employer tax rate, the model estimates the ratio of State tax receipts to taxable wages, hereafter called the "tax receipts rate." The two series are almost identical, although small differences presumably arise mainly from aggregation problems. The rate modeled was along the lines of a reserve-ratio formula for experience rating. The equation can be viewed as a way to partially adjust for State concerns about raising employer tax rates too sharply. By using annual observations for the 1948–74 period, the following equation was estimated (t-ratios are in parentheses):

$$\begin{aligned}&\text{tax receipts rate}_t\\&\quad = 3.06(6.4) - 50.6(-4.4)\ \text{reserve ratio}_{t-1}\\&\quad + 311.1(3.7)\ (\text{reserve ratio})^2_{t-1} + 195.5(4.5)\ \text{loan ratio}_{t-1}\\&\quad + 0.24(2.3)\ \text{tax receipts rate}_{t-1} \qquad (1)\\&R^2 = 0.940\end{aligned}$$

where tax receipts rate$_t$ is ratio of tax receipts in year t to taxable wages in year t; reserve ratio$_{t-1}$ is net reserves (excluding loans) at end of year t–1 divided by taxable wages for year t–1; and loan ratio$_{t-1}$ is cumulative Federal loans outstanding to State trust funds, end of year t—1, divided by taxable wages for year t—1.

This equation was then used to estimate the tax receipts rate for the years 1975–77 by using the actual values of the independent variables for these years. The results are presented in the following tabulation:

Year	*Actual rate*	*Estimated rate*
1975	1.99	2.11
1976	2.50	4.18
1977	2.83	5.74

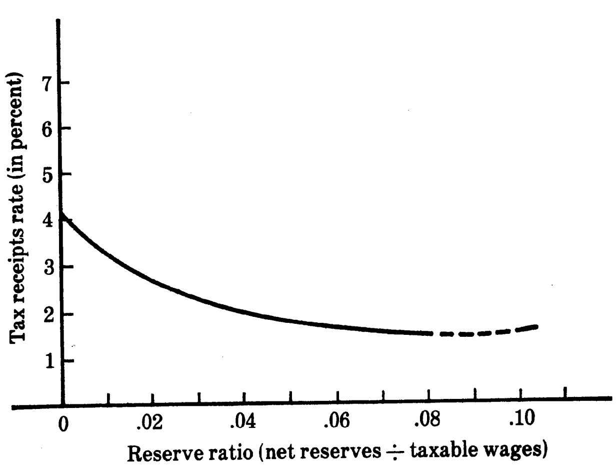
A comparison of the two columns shows that the State tax rate response to the 1973–75 recession was considerably weaker than experience would suggest. One reason for this result may be that, in most States, the maximum tax rate on the least favorable rate schedule was less than 6 percent.[4] Therefore, to obtain a national average tax receipts rate above 4 percent, many States would have to either alter their rate schedules or add surcharges. Few States have taken such steps. And in Wisconsin and New York the amount by which any employer's tax rate can increase annually has been limited.[5]

The relatively weak tax rate response could also have been due to the consequences of dramatic increases in tax rates. Marginal firms might be sorely tested by this additional cost of doing business, and States with high tax rates might be at a competitive disadvantage in attracting and retaining industry. It is also possible that the interest-free nature of the loans made for a less than energetic response.

The actual range of values for the independent variables in 1975–77 were outside those used to estimate equation 1. Therefore, the results of simulations that use this equation for the 1975–77 period must be closely scrutinized, especially when the squared-term for the reserve ratio is extrapolated beyond the range of estimation.

On close examination, the relationship between the tax receipts rate and the reserve ratio appears plausible over the entire range. Equation 1 was used to calculate "equilibrium" tax rates for various levels of the reserve ratio—the tax rate that will repeat itself year after year if the reserve ratio remains constant. It was assumed there are no Federal loans (that is, the loan ratio is zero). The relationship, then, between the tax receipts rate and the reserve ratio is expressed by a U shape, as depicted in Figure 1. The minimum tax rate of 1.32 is reached at a reserve rate of 0.081. A very similar relationship was seen from 1953 to 1955, when tax

FIGURE 1. Equilibrium values of tax receipts rate for constant levels of reserve ratio



rates were at their lowest and reserve ratios were at their highest for the postwar period. Because of the quadratic form of the equation, points on the curve in Figure 1 to the right of the minimum—those with reserve ratios greater than 0.081—show a relationship counter to what would be expected. It is probably no more likely, however, that reserve ratios substantially higher than 0.081 will be seen in the future than they were in the past.

At the other end of the curve in Figure 1, it can be seen that, if the net reserve ratio were 0, then the equilibrium tax rate would be 4.03—not beyond reason for a ratio of 0. The quadratic form then does not lead to exaggerated results when estimates beyond the sample range are used.

As a final check on the results, an alternative equation was estimated for the 1948–74 period. This equation does not have the squared reserve-ratio term (t-ratio in parentheses):

$$\begin{aligned} &\text{tax receipts rate}_t \\ &\quad = 1.52(5.2) - 7.67(-3.6)\ \text{reserve ratio}_{t-1} \\ &\quad + 156.2(2.9)\ \text{loan ratio}_{t-1} \\ &\qquad + 0.35\ (2.7)\ \text{tax receipts rate}_{t-1} \\ &R^2 = 0.900 \end{aligned} \tag{2}$$

where the variables are defined as in equation 1. Most of the statistical tests indicate that this equation is inferior to the first one for the period 1948 to 1974. However, this equation can also be used to estimate the average tax receipts rate for 1975 to 1977. The rates, presented below juxtaposed with those of equation 1, although lower than those from the other equation, remain substantially above the actual rates.

Year	*Actual rate*	*Estimated rate, equation 1*	*Estimated rate, equation 2*
1975	1.99	2.11	1.96
1976	2.50	4.18	3.07
1977	2.83	5.74	4.13

Theoretically, Federal loans must be repaid within 3 years, a constraint that could lead to stiff increases in tax rates. However, the Secretary of Labor can extend the repayment period if it is determined that a State is taking steps to generate funds to repay the loan.

The overall State tax response

The overall State tax response is the combination of an increased tax rate and an increased wage base. In the post–World War II period, the FUTA taxable wage base remained at $3,000 until 1972 when it was raised to $4,200. The FUTA base stayed at $4,200 until 1978 when it was raised to $6,000. State taxable wage bases did not begin to exceed the FUTA base until 1954. With each year after 1954, an increasing number of States raised their wage bases above the FUTA level. By 1972, just before the Federal base was raised, 23 States had taxable wage bases above the FUTA level of $3,000. This pattern was repeated throughout 1972 to 1977. Only five States exceeded the FUTA level in 1972; by 1977, 24 States were above it (see Table 1). Some States may have anticipated an increase in the Federal wage base and raised theirs simply to avoid calling a special legislative session.

To perform an aggregate analysis for all State trust funds, individual State bases were averaged together into a composite taxable wage base. For each year, a State's wage base was weighted by the percentage of total U.S. covered payrolls accounted for.[6] The average State base paralleled the Federal base until 1959 and diverged steadily upward during the period 1960 to 1970 and 1971 to 1973,[7] with a substantial jump in 1976 (see Table 1).

To measure the ratio of increases in both the wage base and the tax rate, one can use a State's total tax receipts to FUTA taxable wages. Unlike the common ratio, which uses State taxable wages as the denominator and shows only an increase in the tax rate, the broader measure, the total State "tax effort rate," shows an increase when States raise either their wage bases or their tax rates.

The data on the States' total taxable wages from the U.S. Department of Labor's (DOL) Unemployment Insurance Service are based on State wage bases. Total taxable wages based on the FUTA taxable wages are not compiled and, therefore, must be estimated.

The first step is to estimate the ratio of taxable to total wages by using the data for State taxable wage bases. It would seem that the proper equation to predict this ratio would show a stable relationship between the variables. The following equation was estimated by using annual data from 1947 to 1977:[8]

$$\begin{aligned} &\text{logit}\left(\frac{\text{taxable wages}}{\text{total wages}}\right) = \\ &\quad -1.56(-54.0) + 2941.1(51.5)\,\frac{WB}{AW} \\ &\quad + 0.052(5.1)\ COV + 37.8(4.1)\ WTURN \\ &R^2 = 0.999\ \ DW = 1.83\ \ \rho = 0.71(5.5) \end{aligned} \tag{3}$$

where:

$$\text{logit}\left(\frac{\text{taxable wages}}{\text{total wages}}\right) = \log\left(\frac{\text{taxable wages/total wages}}{\text{1–taxable wages/total wages}}\right)$$

and AW is the average wage per covered worker; WB is the average effective state taxable wage base; $\frac{WB}{AW}$ is the taxable wage base divided by the average annual covered wage; COV is 1 through 1971 = 0 after 1971

TABLE 1. State taxable wage bases greater than the FUTA base, in dollars, for 1954 through 1977 [1]

State	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
FUTA base	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Alabama	—	—	—	—	—	—	—	—	—	—	—	—
Alaska	—	3,600	3,600	4,200	4,200	4,200	7,200	7,200	7,200	7,200	7,200	7,200
Arizona	—	—	—	—	—	—	—	—	—	—	—	3,600
Arkansas	—	—	—	—	—	—	—	—	—	—	—	—
California	—	—	—	—	—	—	3,600	3,600	3,800	3,800	3,800	3,800
Connecticut	—	—	—	—	—	—	—	—	—	—	—	—
Delaware	—	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
Georgia	—	—	—	—	—	—	—	—	—	—	—	—
Hawaii	—	—	—	—	—	—	—	—	3,600	3,600	3,600	4,200
Idaho	—	—	—	—	—	—	—	—	—	3,600	—	3,600
Iowa	—	—	—	—	—	—	—	—	—	—	3,600	—
Massachusetts	—	—	—	—	—	—	—	—	3,600	3,600	3,600	3,600
Michigan	—	—	—	—	—	—	—	—	—	3,600	3,600	3,600
Minnesota	—	—	—	—	—	—	—	—	—	—	—	—
Missouri	—	—	—	—	—	—	—	—	—	—	—	—
Montana	—	—	—	—	—	—	—	—	—	—	—	—
Nevada	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,800
New Jersey	—	—	—	—	—	—	—	—	—	—	—	—
North Dakota	—	—	—	—	—	—	—	—	—	—	—	—
Oregon	—	—	3,600	3,600	3,600	3,600	3,800	3,800	3,800	3,800	3,800	3,600
Pennsylvania	—	—	—	—	—	—	—	—	—	—	3,600	3,600
Puerto Rico	—	—	—	—	—	—	—	—	—	—	—	—
Rhode Island	—	—	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
Tennessee	—	—	—	—	—	—	—	—	—	3,300	3,300	3,300
Utah	—	—	—	—	—	—	—	—	—	—	4,200	4,200
Vermont	—	—	—	—	—	—	—	—	—	—	3,600	3,600
Washington	—	—	—	—	—	—	—	—	—	—	—	—
West Virginia	—	—	—	—	—	—	—	—	3,600	3,600	3,600	3,600
Wisconsin	—	—	—	—	—	—	—	—	—	—	—	—
Wyoming	—	—	—	—	—	—	—	—	—	—	—	—
State average [2]	3,001	3,004	3,013	3,013	3,013	3,013	3,084	3,086	3,137	3,174	3,221	3,225

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
FUTA base	3,000	3,000	3,000	3,000	3,000	3,000	4,200	4,200	4,200	4,200	4,200	4,200
Alabama	—	—	—	—	—	—	—	—	—	—	—	4,800
Alaska	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	10,000	10,000	10,000	10,000
Arizona	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	6,000	6,000
Arkansas	—	—	—	—	—	—	—	—	—	—	—	5,400
California	4,100	3,800	3,800	3,800	3,800	3,800	—	—	—	—	7,000	7,000
Connecticut	—	—	3,600	3,600	3,600	3,600	—	—	—	6,000	6,000	6,000
Delaware	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	—	—
Georgia	—	—	—	—	—	—	—	—	—	—	—	6,000
Hawaii	4,300	4,600	4,800	5,000	5,500	6,000	6,300	6,500	6,800	7,300	7,800	9,300
Idaho	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	7,800	8,400
Iowa	—	—	—	—	—	—	—	—	—	—	—	6,000
Massachusetts	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	—	—
Michigan	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	5,400	5,400
Minnesota	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	6,200	7,000
Missouri	—	—	—	—	—	—	—	—	—	—	—	4,500
Montana	—	—	—	—	—	—	—	—	—	—	—	4,800
Nevada	3,800	3,800	3,800	3,800	3,800	3,800	—	—	—	5,800	6,100	6,500
New Jersey	—	—	3,600	3,600	3,600	3,600	—	—	—	4,800	5,400	5,800
North Dakota	—	—	3,300	3,400	3,800	4,000	4,400	—	—	—	—	4,300
Oregon	3,600	3,600	3,600	3,600	3,600	3,600	—	—	5,000	5,000	7,000	8,000
Pennsylvania	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	—	—
Puerto Rico	—	—	—	—	—	—	—	—	AW[3]	AW[3]	AW[3]	AW[3]
Rhode Island	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	4,800	4,800	4,800
Tennessee	3,300	3,300	3,300	3,300	3,300	3,600	—	—	—	—	—	—
Utah	4,200	4,200	4,200	4,200	4,200	4,200	—	—	—	—	6,000	8,800
Vermont	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	—	6,000
Washington	—	—	—	—	—	4,200	4,800	5,400	5,400	6,600	7,200	7,800
West Virginia	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	—	—
Wisconsin	3,600	3,600	3,600	3,600	3,600	3,600	—	—	—	—	—	6,000
Wyoming	—	—	3,600	3,600	3,600	3,600	—	—	—	—	—	—
State average [2]	3,301	3,267	3,304	3,307	3,308	3,332	4,232	4,242	4,313	4,400	5,002	5,088

[1] Before 1954, no States had taxable wage bases above the FUTA base. States include all U.S. States plus Puerto Rico and the District of Columbia.
[2] Average derived by weighting States by their covered payrolls for each year. Equal to $3,000 before 1954.
[3] All wages.
NOTE: Dashes indicate State base is same as FUTA base.
SOURCE: *Handbook of Unemployment Insurance Financial Data, 1938–1976* (U.S. Department of Labor, Employment and Training Administration, 1978).

representing the effect of a 1972 change in coverage; WTURN is $\frac{WB}{AW} \times TURN$; and $TURN$ is turnover rate equal to average of accession and separation rates.

Equation 3 was then used to estimate the ratio of taxable to total wages by using the FUTA wage base for the variable WB. This estimated ratio was then multiplied by actual covered wages to obtain an estimate for total taxable wages in these years by using the FUTA wage base. The FUTA base is in the second column of Table 2, and the taxable wages under the State bases are in the first column.

Actual tax receipts can then be divided by the estimated FUTA taxable wage for each year to obtain a total tax effort rate. Comparison of the tax receipts rate in the third column and the total tax effort rate in the fourth column of Table 2 is quite illuminating. Throughout most of the period, the total tax effort rate only exceeded the tax receipts rate by about 0.1 percentage point. In 1976, however, the rates diverge by 0.3 percentage point, and, by 1977, they diverge by almost 0.4, with the total tax effort rate reaching 3.21 percent. Apparently, a substantial part of the States' response to the severe drain on the trust funds came in increases in their taxable wage bases. The 1976–77 increase in the total tax effort rate shows that the tax receipts rate leads to serious underestimation of the degree to which States responded during and following the 1973–75 recession. Nevertheless, the data still show a response less than that dictated by past behavior.

TABLE 2. Taxable wages, in billions of dollars, and measures of State tax efforts, in percent, from 1960 to 1977

Year	Taxable wages under State wage base [1]	Estimated taxable wages under FUTA base	State tax receipts rate [2]	Total State tax effort rate [3]
1960	119.2	116.8	1.92	1.96
1961	119.3	117.0	2.05	2.09
1962	125.5	121.7	2.35	2.43
1963	129.6	124.4	2.33	2.43
1964	136.3	129.3	2.24	2.36
1965	144.0	136.3	2.12	2.24
1966	157.0	146.3	1.93	2.07
1967	161.1	150.7	1.66	1.78
1968	171.4	158.0	1.49	1.62
1969	181.8	167.2	1.40	1.52
1970	182.7	168.3	1.37	1.49
1971	182.8	170.3	1.44	1.55
1972	236.4	234.4	1.65	1.66
1973	254.9	251.8	1.96	1.98
1974	265.4	259.8	1.97	2.01
1975	261.9	253.4	1.99	2.06
1976	301.0	269.0	2.50	2.80
1977	324.2	285.6	2.83	3.21

[1] From U.S. Department of Labor's Unemployment Insurance Service.
[2] The ratio of State tax receipts to total State taxable wages.
[3] The ratio of State tax receipts to total FUTA taxable wages.

This point can be clarified by estimating a total State tax effort equation for the years from 1947 to 1974 similar to equation 1 but using FUTA taxable wages as the denominator:

$$\begin{aligned}\text{tax effort}_t &= 2.31(5.9) - 26.8(-2.6)\ \text{reserve ratio}_{t-1} \\ &+ 119.5(1.6)\ (\text{reserve ratio})^2_{t-1} + 162.6(4.3)\ \text{loan ratio}_{t-1} \\ &+ 0.32(3.9)\ \text{tax effort}_{t-1}\end{aligned} \tag{4}$$

where all variables are defined similarly to equation 1 except that estimated FUTA taxable wages are substituted for State taxable wages.

The following tabulation presents the actual tax effort rates for 1975 to 1977 and the rates predicted by equation 4:

Year	*Actual rate*	*Estimated rate*
1975	2.06	2.14
1976	2.80	3.69
1977	3.21	5.20

Equation 4 and the generated estimates are quite similar to those for the State tax rate (which is not surprising since differences could only result from different taxable wage patterns, and these are very close for the period under study). In addition, the FUTA taxable wage base could only be approximately estimated, so that the coefficients in equation 4 are probably biased downward because of errors in the variables. This fact would explain why the estimated rate for the total State tax effort for 1975 to 1977 are somewhat lower than the estimated State tax receipts rates.

Actual and simulated measures of total State tax efforts show that tax rates alone do not fully indicate the States' response to the 1973–75 recession; but a more inclusive measure indicates a weaker response than would be predicted by past behavior.

Systemwide response

A final tax measure would combine State and Federal responses into a comprehensive system response rate. This rate is constructed by taking the ratio of State tax receipts to total covered wages, not just taxable wages. Accurately estimating the determinants of the system response rate is quite difficult. The Federal component is completely discretionary and probably operates with a greater lag than the two State elements of increasing the State tax rate or tax base.

In the entire period under study, from 1947 to 1977, the FUTA taxable wage base has increased only once, in 1972. This fact prevents any estimation yielding insights beyond those already presented. The FUTA wage base was raised again in 1978 and, as data becomes available, estimation of the complete system response would clearly be of interest.

Caveats

In any economic system, variables are interrelated. Some empirical investigations suggest that payroll taxes will affect employment levels, turnover rates, and wage rates at the firm level.[9] If increases in payroll taxes are seen as shifting a greater burden to workers, then the labor supply may also be affected. At the macro level, large econometric models have shown that changes in payroll taxes can affect unemployment, the rate of inflation, and other variables.

It is clearly beyond the scope of this report to attempt to examine all these effects, and, in any case, it is believed these effects are not that telling. A 1978 study by the Congressional Budget Office (CBO) used macroeconometric models to estimate the effects of a $10 billion increase in employer payroll taxes for social security, which are similar to UC taxes. As Table 3 shows, the resulting increase in the unemployment rate is 0.2 percent; in the case of UC, this unemployment rate would imply increased benefit payments, which in turn would imply a need for increased taxes. The $10 billion amount used in the CBO simulations is 109 percent of all State UC payroll taxes collected in 1977. The smaller changes analyzed here would have correspondingly smaller effects.

Simulations

Simulating behavior of State trust funds

In general, benefit payments for UC are calculated as some percentage of a claimant's previous wages. As

TABLE 3. Economic effects of a $10 billion increase in employer social security taxes

Item	Quarter after tax change		
	4th	8th	12th
Real GNP (billions of 1972 dollars)	−7	−9	−5
Current dollar GNP (billions of dollars)	7	1	6
GNP price deflator (percent)	0.7	0.6	0.5
Employment (thousands)	−200	−300	−200
Unemployment rate (percentage points)	0.2	0.2	0.2

NOTE: CBO estimates are based on CBO Multipliers Model and Wharton Econometric Forecasting Associates. The policy changes used as examples in this table begin at the start of 1979. The estimates represent relative to the 1978 CBO 5-year projections.

SOURCE: *Aggregate Economic Effects of Changes in Social Security Taxes*, Technical Analysis Paper (Congressional Budget Office, August 1978), p. 27.

wage levels increase, so do benefit levels. Each State sets a maximum benefit. However, in most States, this maximum is defined as a fixed percentage of the State's average weekly wage, so that the maximum is itself indexed. At any given time, some claimants' benefits may be constrained, but over time the benefit levels of all claimants will tend to rise with increases in wage levels. Thus the benefit side of the system is effectively indexed.

On the other hand, the taxable wage base for each employee remains at a fixed dollar amount until changed by legislation. As an employee's annual wage increases, taxable wages increase only if the employee is earning less than the wage base. Over time, taxable wages account for a smaller and smaller percentage of total wages, for they are not effectively indexed.

The result of this combination of factors is that the system tends to become imbalanced. The addition of new programs to extend benefit duration only exacerbates the inherent problem. To make up for this imbalance, the States had borrowed $4.6 billion from the Federal Government by the end of 1977 to supplement their trust funds. Given the way the system works, the following questions arise: Will the recent increase in the wage base be sufficient to allow the State funds to become self-supporting for a reasonable period of time? Or will another increase in the wage base be necessary as soon as, or even before, the system is balanced? And how will high levels of inflation affect developments?

To answer these questions, a long-term model of State trust funds was developed. It assumes there is no future legislation on either the financing or benefits of UC. For any year t, the long-run model is described in Figure 2; throughout this section, t-ratios appear in equations in parentheses below regression result values.

Exogenous factors and basic variables

The labor force. The labor force figures were taken from the Bureau of Labor Statistics (BLS) labor force projections, moderate growth path.[10] This data series is available through the year 2000.

Taxable wage base. The average effective taxable wage base for 1978, computed according to the method described earlier in this report, is $6,269. Some States have adopted taxable wage bases that are indexed to rise with their average wage levels. These increases are usually rounded off in some fashion and sometimes are initiated only if the trust fund balance falls below a specified level. To simplify the modeling, the rounding-off features and the trust fund balance triggers were ignored. The following States were involved: Hawaii, Idaho, Iowa, Nevada, New Jersey, New Mexico, North Dakota, Oregon, Puerto Rico, Utah, and Washington.

FIGURE 2. The long-run simulation model, exogenous variables

Unemployment rate and labor force

$\text{unemployed}_t = \text{labor force}_t \times \text{unemployment rate}_t$
$\text{employed}_t = \text{labor force}_t - \text{unemployed}_t$

Average covered wage growth factor

$\text{weeks compensated (regular program)}_t = f(\text{unemployed}_t, \text{unemployment rate}_t, \text{weeks compensated}_{t-1}, \text{unemployment rate}_{t-1}$
$\text{average weekly benefit amount}_t(\text{AWBA}) = \text{AWBA}_{t-1} \times \text{growth factor}$
$\text{benefit payments}_t = \text{AWBA}_t \times \text{weeks compensated}_t$
$\text{weeks compensated (extended benefits)} = f(\text{unemployment rate}_t, \text{weeks compensated (reg. program)}_t, \text{weeks compensated (reg. program)}_{t-1})$
$\text{benefit payments (EB program)}_t = \text{weeks compensated (EB program)}_t \times \text{AWBA}_t$
$\text{State share of benefit payments (EB)}_t = \tfrac{1}{2}\ \text{benefit payments (EB)}_t$
$\text{total State benefit payments} = \text{regular program payments} + \text{State share of EB program payments}$

Average weekly benefit amount growth factor

$\text{covered employment}_t = f(\text{total employment}_t)$
$\text{annual average covered wage}_t = \text{annual average covered wage}_{t-1} \times \text{growth factor}$
$\text{total covered wages}_t = \text{covered employment}_t \times \text{average covered wage}_t$

$$\left(\frac{\text{taxable wages}}{\text{covered wages}}\right)_t = f(\text{taxable wage base}_t, \text{average covered wage}_t)$$

$$\text{taxable wages}_t = \left(\frac{\text{taxable wages}}{\text{covered wages}}\right)_t \times \text{covered wages}_t$$

$\text{tax rate}_t = f(\text{tax rate}_{t-1}, \text{net trust fund balance}_{t-1}, \text{cumulative loans}_{t-1}, \text{taxable wages}_{t-1})$
$\text{tax receipts}_t = \text{tax rate}_t \times \text{taxable wages}_t$

Yield on 3-year Treasury securities

$\text{interest}_t = f(\text{gross trust fund balance}_{t-1}, \text{interest rate}_t, \text{tax receipts}_t, \text{total benefit payments}_t)$
$\text{loan repayments}_t = f(\text{tax receipts}_t, \text{total benefit payments}_t, \text{interest}_t, \text{cumulative loans outstanding}_{t-1})$

State taxable wage base and its growth factor

$\text{net trust fund balance (end of year)}_t = \text{net balance}_{t-1} + \text{tax receipts}_t + \text{interest}_t - \text{benefit payments}_t - \text{loan repayments}_t$

$\text{gross trust fund balance (end of year)}_t = \text{gross balance}_{t-1} + \text{tax receipts}_t + \text{interest}_t - \text{benefit payments}_t - 2 \times \text{loan repayments}_t$

These States contained 10.22 percent of all covered wages in 1977.[11]

It was assumed that the wage bases in these States would grow at the same rate as the aggregate average covered wage. Because these States accounted for only 10.22 percent of covered wages, it was assumed that the *aggregate* effective taxable wage base would grow at only 10.22 percent of the aggregate average covered wage, starting at an aggregate wage base of $6,269 in 1978. As noted earlier, this model assumes no legislative action, except possibly those implicit in the State tax rate equations.

Other variables. A variety of variables must be supplied exogenously in a sample model such as this one. For the basic runs of the model, many of these were derived either directly from the average of past values or indirectly by applying growth rates derived from average values in the past. This approach ensures that the values are plausible (because they actually occurred) and that they are internally consistent (because they occurred together).

Average values and average growth rates were calculated for the most recent 20-year period, the most recent 10-year period, and the most recent 5-year period. The variables and their values are shown in Table 4. The 20-year averages are low for all variables. The 10-year averages give a substantially higher rate of wage and benefit growth, and a moderately higher rate of unemployment. The 5-year averages give a rate of wage and benefit growth similar to the 10-year averages rate, but accompanied by a high rate of unemployment. These three sets of values provide some perspective on the effects that different economic environments can have on the trust fund system.

Note that inflation per se is not the factor that over time will cause receipts to fall below benefit payments. Rather it is anything that increases wage levels. All other things being equal, increases in wage levels due to productivity gains will eventually have the same imbalancing effect as wage level increases that are purely inflationary. Therefore, the growth factors used in these simulations were derived from changes in the covered wage, not the Consumer Price Index.

Once values are obtained from actual data for the average weekly benefit amount and the average annual covered wage, the growth rates can be used to generate a series for each of these variables. And, given the labor force series, the unemployment rate can be used to calculate the number of employed and unemployed. A constant unemployment rate was used to obtain a clear picture of trends in the status of the trust funds.

Benefit payments

Weeks compensated under the regular benefit program for each year were calculated by using the following equation estimated with annual data for the years 1947 to 1977:

TABLE 4. 20-year, 10-year, and 5-year values for variables used in the model, in percent

Variable	20-year average (1959–78)	10-year average (1969–78)	5-year average (1973–77)
Unemployment rate	5.47	5.96	6.74
Interest rate, 3-year treasure issue	5.65	6.97	7.14
Average weekly benefit amount compound growth rate	4.85 [1]	6.13 [1]	5.93
Average covered wage	4.72 [1]	5.57 [1]	5.86

[1] 20-year period is 1958–77, and 10-year period is 1968–77.

$$\begin{aligned}\text{weeks compensated}_t = {} & 6035320(0.8) - 4620(-1.6)\ \text{unemployed}_t \\ & + 1609(4.8)\ (\text{unemployed} \times \text{unemployed rate})_t \qquad (5) \\ & + 11850300(7.0)\ \text{unemployed rate}_t \\ & - 0.0237(-6.0)\ (\text{weeks compensated} \times \text{unemployment rate})_{t-1} \\ R^2 = {} & 0.981\end{aligned}$$

The weeks compensated series used in the estimation of this equation and for the simulations differed from the figures found in the tables of the *Handbook of Unemployment Insurance Financial Data,* the source for much of the data used in this study.[12] The *Handbook* gives the weeks compensated for benefits provided on both a taxable and a reimbursable basis.[13] Because reimbursable coverage has been excluded from all other aspects of this report, a weeks compensated series was created that also excluded them. This "clean" version was derived by dividing the series for benefits paid to those covered on a taxable basis by the series for the average weekly benefit amount.

Multiplying weeks compensated by the average weekly benefit amount (AWBA) yields the estimated benefit payments for the regular program.

Weeks compensated under the extended benefits (EB) program were calculated with the following equation, estimated with annual data covering 1971 to 1977, the only years during which the program existed:

$$\begin{aligned}\text{EB weeks}_t = {} & -9881860(-5.0) + 0.024(8.5)\ (\text{unemployment rate}_t \times \text{regular weeks compensated}_t) \qquad (6) \\ & + 0.015(4.8)\ (\text{unemployment rate}_t \times \text{regular weeks compensated}_{t-1}) \\ R^2 = {} & 0.984 \quad DW = 1.31\end{aligned}$$

The triggers used in the EB program have been changed a number of times. This equation, therefore, reflects the combined effect of all the triggers used and, unfortunately, cannot reflect only the current version of the trigger mechanism.

Multiplying EB weeks by the AWBA yields EB payments. Half this amount was taken as the State share. Combining it with regular benefit payments gives the total State benefit payments.

State tax receipts

It was assumed that covered employment will remain a fixed proportion of total employment in the future—75 percent—and it was derived as follows. In 1977 average monthly covered employment was 63.6 million or 70 percent of the total employment of 90.5 million. This percentage does not reflect the extension of UC that began in 1978. It has been estimated that this extension covered some 9 million new workers. Most of these are State and local government workers who have the option of belonging to the UC system on a reimbursable basis. It was arbitrarily assumed that half of them choose this option. Since financing for the "reimbursables" comes into the fund as needed, this group is ignored in the model. That leaves 4.5 million new workers who must be added to the 63.6 million, yielding a ratio of 75 percent. (The remaining 25 percent are primarily Federal employees covered by unemployment compensation for Federal employees and ex-servicemen, workers covered on a reimbursable basis, and the self-employed in both agricultural and non-agricultural industries.)

This adjustment should make the simulation values as accurate as is reasonably possible. The size of the adjustment has little effect on the variables that directly indicate the health of the State trust funds, however, because the adjustment increases both revenues and benefits in roughly the same proportion.

Multiplying covered employment by the average annual covered wage yields total covered wages.

The ratio of taxable to total wages was calculated by using an equation similar to equation 3 but without the turnover variable:

$$\begin{aligned} &\text{logit}\left(\frac{\text{taxable wages}}{\text{total wages}}\right) \\ &= -1.55(-42.9) + 3074(52.2)\,\frac{WB}{AW} \\ &+ 0.050(3.9)COV \qquad (7) \\ &R^2 = 0.999 \quad DW = 1.61 \end{aligned}$$

These variables are defined as in equation 3.

The ratio of taxable to total wages was calculated and then multiplied by total covered wages to yield total taxable wages.

The tax receipts rate (as a percentage of taxable wages) was then calculated by using a reestimated version of equation 2. The reestimation was performed for the entire sample period (1948 to 1977) because it was assumed that the future tax response will reflect it. (Recall that the sample in equation 2 was restricted to the 1948–74 period to test the strength of the response during the 1975–77 period.) The new equation was (t-ratios in parentheses):

$$\begin{aligned} \text{tax receipts rate}_t = {} & 1.31(5.2) - 8.01(-4.3)\ \text{reserve ratio}_{t-1} + 28.39(1.8)\ \text{loan ratio}_{t-1} \qquad (8) \\ & + 0.53(5.4)\ \text{tax receipts rate}_{t-1} \\ & R^2 = 0.920 \end{aligned}$$

with the variables defined as in equation 1.

The tax rate was then multiplied by total taxable wages to yield State tax receipts.

Interest, loan repayments, and balances

Interest earned on State trust fund balances was calculated with the following equation, which was estimated with annual data for the years 1948 to 1977:

$$\begin{aligned} \text{Interest} = {} & 54235(5.0) + 0.0065\ (\text{gross fund balance}_{t-1} \times \text{interest rate}_t) \\ & + 0.0028(5.2)\ (\text{flow}_t \times \text{interest rate}_t) \qquad (9) \\ & R^2 = 0.961 \quad DW = 1.32 \end{aligned}$$

where gross fund balance is balance including cumulative loans, and end-of-year flow is tax receipts minus benefit payments.

Until the impact of the 1973–75 recession, Federal loans to the State trust funds were not characteristic of the system. There were loans outstanding throughout the period 1957 to 1967, but they were small and confined to a very few States. It is difficult to estimate a relationship on the basis of such sparse data, and attempts at doing so have not proven successful.

Loan repayments were, therefore, assumed to be related simply to the net flow of funds. (For this purpose, the net flow of funds is equal to tax receipts plus interest minus benefit payments.) Specifically, they were assumed to constitute one-half of the net flow for any given year, as long as there were outstanding loans at the end of the previous year. Alternative simulations were run assuming repayments were one-third of the net flow.

New loans were not modeled in the simulations. If the output of the model shows very low or even negative net reserves, it will clearly mean that new loans to the State trust funds or legislation is required. Because these simulations do not include business cycles and because the inherent trend for the trust funds is to become imbalanced, they can never suggest recovery.

When values have been calculated for taxes, interest, benefit payments, and loan repayments, it is a reasonably simple matter to calculate the net and gross balances for the end of each year. The gross balance includes the value of cumulative loans outstanding. The net balance does not.

Results

Using 20-year averages as assumptions. Table 5 presents the values for selected variables from the simulations by using 20-year averages for the parameters. Results show loans to the State trust funds repaid by the end of 1979. Tax receipts exceed total benefit payments through the year 1985. Because of the beneficial impact of interest earned on net trust funds, they continue to rise throughout 1988, to peak at $27.5 billion. After 1988, they continually decline but are still at $12.5 billion by the year 2000. These numbers may appear large by today's standards, but it should be kept

TABLE 5. Selected simulation results, using 20-year average values

Year	Total State benefit payments (In millions of dollars)	State tax receipts (In millions of dollars)	State tax rate (percent)	Cumulative loans outstanding, end of year (In millions of dollars)	Net balance, end of year (In millions of dollars)
1978	8,498	13,899	3.19	1,637	3,888
1979	7,916	13,703	3.03	0	8,385
1980	8,547	12,957	2.77	0	13,226
1981	8,986	12,354	2.55	0	17,186
1982	9,470	11,901	2.38	0	20,339
1983	9,974	11,598	2.25	0	22,790
1984	10,500	11,437	2.15	0	24,631
1985	11,052	11,409	2.08	0	25,952
1986	11,633	11,511	2.03	0	26,834
1987	12,242	11,726	2.01	0	27,348
1988	12,876	12,023	2.00	0	27,539
1989	13,538	12,396	2.00	0	27,444
1990	14,227	12,832	2.02	0	27,087
1991	14,951	13,338	2.04	0	26,497
1992	15,704	13,893	2.07	0	25,685
1993	16,485	14,489	2.10	0	24,654
1994	17,304	15,142	2.14	0	23,417
1995	18,166	15,862	2.18	0	21,990
1996	19,073	16,656	2.22	0	20,396
1997	20,018	17,494	2.27	0	18,636
1998	21,017	18,413	2.32	0	16,729
1999	22,068	19,407	2.37	0	14,694
2000	23,173	20,468	2.42	0	12,541

TABLE 6. Selected simulation results, using 10-year average values

Year	Total State benefit payments (In millions of dollars)	State tax receipts (In millions of dollars)	State tax rate (percent)	Cumulative loans outstanding, end of year (In millions of dollars)	Net balance, end of year (In millions of dollars)
1978	8,601	13,923	3.19	1,677	3,848
1979	9,477	13,706	3.04	0	6,785
1980	10,090	13,121	2.80	0	10,236
1981	10,777	12,740	2.62	0	12,754
1982	11,499	12,549	2.49	0	14,456
1983	12,266	12,534	2.40	0	15,437
1984	13,078	12,679	2.35	0	15,783
1985	13,941	12,975	2.32	0	15,568
1986	14,860	13,419	2.32	0	14,859
1987	15,837	13,996	2.33	0	13,710
1988	16,866	14,673	2.36	0	12,148
1989	17,957	15,450	2.41	0	10,198
1990	19,107	16,315	2.46	0	7,868
1991	20,330	17,286	2.52	0	5,176
1992	21,618	18,335	2.59	0	2,118
1993	22,974	19,458	2.66	0	−1,315
1994	24,415	20,683	2.73	0	−5,047
1995	25,947	22,018	2.81	0	−8,976
1996	27,580	23,462	2.89	0	−13,094
1997	29,303	24,970	2.98	0	−17,427
1998	31,146	26,598	3.05	0	−21,975
1999	33,110	28,338	3.13	0	−26,747
2000	35,198	30,181	3.21	0	−31,764

in mind that net funds were as high as $8.9 billion in 1953 and as high as $12.6 billion in 1969.

Using 10-year averages. Table 6 presents selected variables from the simulations by using 10-year averages for the parameters. Again, the loans to the State trust funds are repaid by the end of 1979. Tax receipts exceed benefit payments only through 1983, and the aggregate net trust funds peak at $15.8 billion in 1984; they fall below 0 in 1993, indicating that either substantial loans or legislation will be required before then.

If new loans were modeled in the simulation, the State tax rate would be higher in the 1990's. The tax rate equation does contain the positive effect of outstanding loans on the estimated rate.

Using 5-year averages. Table 7 presents the values for selected variables from the simulation that used 5-year averages for the parameters. All loans to the State trust funds are repaid by the end of 1980. Tax receipts exceed benefits only through 1981, and the net trust fund peaks in the same year at only $6.5 billion. Net funds fall below 0 by 1987, indicating that loans or legislation will be required before that year.

An alternative loan repayment rate. All these simulations assumed that half the amount by which tax receipts and interest earnings exceed benefits each year would go toward loan repayments. At this rate, all loans would be repaid by the end of 1979 or 1980.

The three simulations were also run assuming a less prompt repayment rate: one-third of the net cash flow each year. In the simulations using the 20- and 10-year averages, the slower rate only delays repayment for a year or two. The loans are completely repaid by the end of 1980 with the 20-year assumptions and by the end of 1981 with the 10-year assumptions. In both, this change does not have any lasting effect, and the trust fund balances by the 1990's are also identical to the one-third and the one-half repayment rates.

In the case of the 5-year averages and the one-third repayment rate, the loans are never fully repaid before new loans are needed.

Conclusions. The State UC trust fund system has an inherent tendency to become imbalanced over time. The question is not whether, but when, new loans or legislation will be required.

Assuming a low level of unemployment and a low rate of wage growth, the State trust funds will remain solvent well into the 1990's. Under a less optimistic assumption of a slightly higher unemployment rate and a substantially higher rate of wage growth, the trust funds will probably remain solvent only through the 1980's. And, if in addition to a high rate of wage growth, there is a high unemployment rate, the State trust funds will need assistance again by the mid-1980's.

TABLE 7. Selected simulation results, using 5-year average values

Year	Total State benefit payments (In millions of dollars)	State tax receipts (In millions of dollars)	State tax rate (percent)	Cumulative loans outstanding, end of year (In millions of dollars)	Net balance, end of year (In millions of dollars)
1978	8,585	13,932	3.19	1,664	3,860
1979	11,802	13,607	3.04	589	4,936
1980	12,112	13,365	2.87	0	5,935
1981	12,991	13,208	2.73	0	6,485
1982	13,837	13,309	2.65	0	6,301
1983	14,746	13,618	2.62	0	5,498
1984	15,704	14,098	2.61	0	4,169
1985	16,719	14,727	2.63	0	2,385
1986	17,800	15,498	2.67	0	202
1987	18,947	16,392	2.73	0	−2,339
1988	20,153	17,373	2.79	0	−5,118
1989	21,425	18,437	2.85	0	−8,107
1990	22,764	19,563	2.92	0	−11,308
1991	24,186	20,776	3.00	0	−14,718
1992	25,677	22,040	3.07	0	−18,355
1993	27,242	23,354	3.14	0	−22,242
1994	28,901	24,756	3.22	0	−26,387
1995	30,664	26,260	3.29	0	−30,791
1996	32,540	27,880	3.37	0	−35,450
1997	34,513	29,569	3.44	0	−40,394
1998	36,624	31,402	3.51	0	−45,616
1999	38,869	33,365	3.58	0	−51,120
2000	41,253	35,451	3.65	0	−56,922

The simulations do not assume any fundamental legislative changes. But it would certainly be possible for State and/or Federal Governments to act before the extreme situations depicted in some of the simulations take place.

Caveats

The cautionary remarks brought up in the previous discussion also apply here. Indeed, when projecting 25 years into the future, these remarks carry even greater weight. It is very difficult to determine relationships between variables that will remain stable over such a long period in the future. No attempt has been made to relate the size of the labor force to the unemployment rate. Any relationship between payroll tax levels and employers' demand for labor has been ignored. Demographic trends that will affect the "normal" unemployment rate have also been ignored.[14]

Notes

1. In this report, the term "States" refers to the 50 U.S. States, the District of Columbia, and Puerto Rico.

2. For a detailed description of the unemployment compensation system, see Daniel S. Hamermesh, *Jobless Pay and the Economy* (Baltimore, Md., Johns Hopkins University Press, 1977).

3. *Comparison of State Unemployment Insurance Laws* (U.S. Department of Labor, Unemployment Insurance Service), table 206.

4. *Comparison,* table 205.

5. *Comparison,* section 245.06.

6. Puerto Rico presented a special case because, starting in 1974, all wages were made taxable. From 1974 forward, Puerto Rico's annual wage base was made equal to twice the average annual wage in covered employment there.

7. The State average leap in 1971 followed the increase in the FUTA base from $3,000 to $4,200.

8. This equation is also approximately related to equation 2, which is derived theoretically in Frank Brechling, *The Tax Base of the U.S. Unemployment Insurance Tax: An Empirical Analysis,* paper CRC 353 (Public Research Institute, Center for Naval Analyses, April 1978).

9. See, for example, Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* October 1976, pp. 937–57; and "The Effect of Unemployment Insurance on Temporary Layoff Unemployment," *American Economic Review,* December 1978, pp. 834–46; and Daniel S. Hamermesh, *Jobless.*

10. Paul Flaim and Howard Fullerton, Jr., "Labor Force Projections to 1990: Three Possible Paths," *Monthly Labor Review,* December 1978, pp. 834–46.

11. For a detailed description of flexible wage bases and State wage bases greater than $6,000, see *Comparison,* tables 200 and 201.

12. *Handbook of Unemployment Insurance Financial Data, 1938–1976* (U.S. Department of Labor, Employment and Training Administration, 1978), column 24.

13. Government and nonprofit employers have the option of financing their benefit payments on a reimbursable basis. With this "pay-as-you-go" method, the employer reimburses the State trust fund as benefit payments are made from the fund to former employees, rather than by paying taxes in advance, which will build up a reserve to cover benefit payments.

14. See Michael Wachter, "The Demographic Impact on Unemployment: Past Experience and the Outlook for the Future," in *Demographic Trends and Full Employment,* Special Report No. 12 (National Commission for Manpower Policy, December 1976).

Appendix: The Long-Run Simulation Model of Aggregate State Trust Funds

This appendix presents the Fortran programming used in the long-run simulations described in the preceding report (see Figure A–1). The basic matrix for storing results is *Z(I,J)*. *J* defines the variables and will be discussed in the next paragraph. *I* defines the time period and runs from 1 to 25. This interval corresponds to the years 1976 to 2000. No values are supplied or generated for 1976; therefore, *Z(I,J)* appears as 0.0 on the output for all variables. Actual values are supplied by the program for some variables for 1977 (*I*=2) when these are needed as lagged values in some of the equations. The program generates values starting with 1978 (*I*=3).

The *J* index defines the variable and runs from 1 to 36. The program only uses 1 through 28 in its current form. The following list describes these variables:

J	*Variable description*
1	Year
2	Labor force
3	Unemployment rate
4	Employed
5	Unemployed
6	Wage growth factor
7	Average weekly benefit amount
8	Average annual covered wage
9	Weeks compensated (regular program)
10	Regular benefit payments
11	Covered employment
12	Wage base
13	(empty)
14	Ratio of taxable to total wages
15	Covered wages
16	Taxable wages
17	Tax rate
18	Tax receipts
19	Interest rate
20	Gross balance, end of year
21	Interest earned
22	Net balance, end of year
23	Cumulative loans
24	Weeks compensated (extended benefits program)
25	Payments, extended benefits program, State share
26	Total State benefit payments (regular and extended benefits)
27	Net flow = tax receipts + interest − benefit payments
28	Average weekly benefit amount growth factor

FIGURE A–1. Fortran programming for simulations of long-run State trust fund behavior

```
C EXPANDING WAGE BASE.
      DIMENSION Z(25,36),LZ(5),COEF(4)
      DATA COEF/8.076,4.898,2.812,1.782/

      DO 1 I=1,25
      DO 1 J=1,36
    1 Z(I,J)= 0.0
      Z(2,3)= 7.0
      Z(2,7)= 78.71
      Z(2,8)= 11317.
      Z(2,20)= 5525852.0
      Z(2,9)= 106017000.
      Z(2,16)= 324227495.
      Z(2,18)= 9170529.
      Z(3,19)= 8.29
      Z(2,22)= 950381.
      Z(2,23)= 4575471.
      Z(3,3)= 6.0
      DO 2 I=1,25
    2 Z(I,1)= I + 1975
      READ (5,103) (Z(I,2),I=1,25)
  103 FORMAT (F6.0)
      Z(3,2)= 100420.
C DEFINE AND LOAD THE UNEMPLOYMENT RATE.
C CREATE THE EMPLOYED AND UNEMPLOYED.
      UR= 5.47
      DO 5 I= 3,25
      IF (I.NE.3) Z(I,3)= UR
```

FIGURE A–1. (*continued*)

```
      Z(I,5)= Z(I,2) * Z(I,3)/100
      Z(I,4)= Z(I,2) - Z(I,5)
    5 CONTINUE
C DEFINE AND LOAD THE WAGE GROWTH FACTOR.
C CREATE THE AWBA AND THE AVERAGE COVERED WAGE.
      WGF= 4.72
      BGF= 4.85
      DO 6 I= 3,25
      Z(I,6)= 1.0 + (WGF/100)
      Z(I,28)= 1.0 + (BGF/100)
      Z(I,7)= Z(I-1,7) * Z(I,28)
      Z(I,8)= Z(I-1,8) * Z(I,6)
    6 CONTINUE
C CALCULATE REG. WEEKS COMPENSATED, EB WEEKS, AND STATE SHARE
C   OF EB BENEFITS
      DO 14 I=3,25
     Z(I,9) = 6035320 - 4619.89 * Z(I,5)
     1        + 1609.27 * Z(I,5) * Z(I,3)
     2        - 0.023658 * Z(I-1,3) * Z(I-1,9)
     3        + 11850300 * Z(I,3)
      Z(I,24)= -9881860. +0.0240053*Z(I,3)*Z(I,9)
     1        + 0.0150280*Z(I,3)*Z(I-1,9)
      Z(I,25)= 1.07* Z(I,24)*Z(I,7)*0.5/1000
   14 CONTINUE
C
C CALCULATE REGULAR BENEFIT PAYMENTS.
      DO 7 I= 3,25
      Z(I,10)= 1.07*Z(I,9) * Z(I,7)/1000
    7 Z(I,26)= Z(I,10)+Z(I,25)
C LOAD COV-EMP/TOT-EMP FACTOR AND CALCULATE COVERED EMPLOYMENT.
C
      PCT= 75.0
      DO 8 I=3,25
    8 Z(I,11) = Z(I,4) * PCT/100
C CALCULATE WAGE BASE SERIES TAX/TOT, COVERED WAGES
C   AND TAXABLE WAGES.
      Z(3,12)= 6269
      DO 9 I= 4,25
    9 Z(I,12)= Z(I-1,12)*(1+((WGF/100)*0.1022))
     DO 10 I= 3,25
      XINT1= Z(I,12)/(Z(I,8)*1000)
      XINT2= -1.54854 + 3073.94 * XINT1
      XINT3= 1/EXP(XINT2)
      XINT4= 1/(1 + XINT3)
      Z(I,14)= XINT4
      Z(I,15)= Z(I,11) * Z(I,8)
      Z(I,16)= Z(I,14) * Z(I,15)
   10 CONTINUE
C ENTER INTEREST RATE.
      RI = 5.65
      DO 12 I= 3,25
C CALCULATE TAX RATE AND TAX RECEIPTS.
      Z(I,17)= 1.31221 +53.0434*Z(I-1,18)/Z(I-1,16)
     1          -8.01054*Z(I-1,22)/Z(I-1,16)
```

FIGURE A–1. (*continued*)

```
     2          +28.393*Z(I—1,23)/Z(I—1,16)
     Z(I,18)= Z(I,17)*Z(I,16)/100
C
C CALCULATE INTEREST.
     IF (I.NE.3) Z(I,19)= RI
     Z(I,21)= 54235.0 + 0.00649295*Z(I—1,20)*Z(1,19)
    1           +0.00276518*(Z(I,18)—Z(I,26))*Z(I,19)
     IF (Z(I,21).LT.0.0) Z(I,21)= 0.0
C CALCULATE BALANCES END OF YEAR.
     FLOW= Z(I,18)+Z(I,21)—Z(I,26)
     Z(I,27)= FLOW
     IF (Z(I—1,23).GT.0.0) GO TO 20
 21  REPAY=0.0
     GO TO 22
 20  CONTINUE
     IF (FLOW.LE.0) GO TO 21
     REPAY= 0.3*FLOW
     IF (REPAY.GT.Z(I—1,23)) REPAY=Z(I—1,23)
 22  Z(I,22)= Z(I—1,22)+FLOW—REPAY
     Z(I,20)= Z(I—1,20)+FLOW—2*REPAY
     Z(I,23)= (Z(I—1,23)—REPAY
 12  CONTINUE
C PRINT MATRIX AFTER ADJUSTING SCALE.
     DO 40 I=1,25
     Z(I,9)= Z(I,9)/1000
     Z(I,10)= Z(I,10)/1000
     Z(I,15)= Z(I,15)/1000
     Z(I,16)= Z(I,16)/1000
     Z(I,18)= Z(I,18)/1000
     DO 41 J= 20,27
 41  Z(I,J)= Z(I,J)/1000
 40  CONTINUE
     DO 3 K=1,7
     J1= K*5–4
     J2= K*5
     DO 4 LZ1=1,5
  4  LZ(LZ1)= J1+LZ1—1
     WRITE (6,102) LZ
102  FORMAT (1H1///2X,'YEAR',5X,5(3X,I5,6X))
     DO 3 I=1,25
     K9= Z(I,1)
     WRITE (6,101) K9,(Z(I,J),J=J1,J2)
101  FORMAT (1X,I5,2X,5F14.3)
  3  CONTINUE
     STOP
     END
```

An Evaluation of UI Funds

Marianne Bowes
Frank P. R. Brechling
Kathleen P. Classen Utgoff

In the 1970's heavy demands were made on the unemployment compensation trust funds, which are used to finance unemployment benefit payments. The heavy demands were caused primarily by relatively severe and prolonged unemployment and by legislated changes in unemployment benefit entitlements. Consequently, benefit outflows have risen dramatically. In spite of the fact that tax inflows from the State payroll taxes also rose sharply, the total unemployment insurance (UI) funds were reduced by nearly $25 billion between 1970 and 1977.

In view of the fact that the States' net reserves (actual reserves minus Federal loans) are close to zero and that total benefit payments have recently exceeded $11 billion annually, serious questions about the financial viability of the UI system have arisen. Why were the substantial increases in tax inflows insufficient to pay for the increases in benefit outflows? Is the insufficiency of tax inflows only temporary, or is it permanent? In other words, is it necessary to radically revise the tax structure of the system in order to ensure its longrun financial viability? The research that underlies this report, which is a summary of research reported in CRC 431, *Evaluating Tax Systems for Financing th Unemployment Insurance Program* by the Center foi Naval Analyses in Alexandria, Va., was designed to provide the answers to some of these questions. In particular, different aspects, characteristics, and implications of financing mechanisms have been examined.

The research consisted of a theoretical part and an empirical part. In the theoretical part the basic properties of UI financing mechanisms and their implications for fund adequacy have been examined. While the theoretical research cannot generate quantitative estimates of the relevant variables, it does point to ways in which financing mechanisms should be changed to avoid fund inadequacies. Hence, the theoretical work has some relevant and possibly important policy implications.

The empirical part of the research was designed to discover the determinants of the desirable properties of fund balances. An attempt was made to discover whether changes in particular parameters of the tax structure reduced the average fund balance, reduced the probability of insolvency, or improved the timing of the tax burden over the cycle.

Theoretical Analysis

The theoretical analysis consisted of an examination of some fundamental properties of various UI financing mechanisms and, in particular, of their implications for the fund balance. Two questions are of special interest. First, what is the purpose of a positive average fund balance? Second, are there mechanisms that ensure automatic fund stability? An attempt is made to answer these questions in the next subsections.

Desirable features of financing mechanisms

The problem of the optimal fund balance should not be approached in isolation but should be treated, instead, as part of the entire financing mechanism of the UI system. Positive mean fund balances (average balances greater than zero) do have an opportunity cost because they could have been used by firms for economically productive purposes. Consequently, positive balances have to be justified in terms of an excess of benefits over costs within a particular financing mechanism. It is certainly easy to conceive of financing mechanisms in which the mean fund balances are trivially small. These mechanisms must be shown to have shortcomings that are absent in other mechanisms with substantial fund balances.

One financing mechanism that does not require a substantial fund balance is the reimbursable system currently in partial use in several States. Under this

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system, employers pay fully for any unemployment benefits charged to them after a relatively short time lag. Hence, funds are required only to cover the period between payment of benefits and reimbursement by employers. This "billing lag" can be made very short so that the system requires only a trivial positive mean fund balance. Thus, the reimbursable system requires complete and immediate experience rating. It internalizes the cost of unemployment to individual employers entirely and swiftly. While a surcharge for administrative costs, bankruptcies, and noncharged benefits may be required, the reimbursable system is a viable financing mechanism that obviates the necessity for a substantial mean fund balance.

What, then, are the shortcomings of the reimbursable system that would make a system with a substantial mean fund balance preferable? Two such shortcomings appear to be particularly important.

- First, the reimbursable system eliminates completely any insurance principle from the UI financing mechanism. Insurance principle means that firms *within the same risk class* pay the same contributions, although in any particular period some may have high and others low charged benefits. Risk class means that firms have the same expected or average charged benefits. Since the reimbursable system requires that all firms pay for their own charged benefits entirely and almost immediately, there is no room for the short-term subsidization of the "unlucky" firms by the "lucky" ones within the same risk class.
- Second, the reimbursable system does not permit firms to even out their cash flows through good and bad times. When charged benefits are high, the typical firm is likely to have relatively low cash flows so that the immediate reimbursement of the charged benefits may put special financial stress on it. A preferred system may be one under which firms pay relatively high taxes in good times and relatively low taxes in bad times.

These two shortcomings of the reimbursable system may be the reasons why most States have made very limited or no use of this system.[1] Systems that permit some insurance within risk classes, as well as some cash-flow smoothing for firms, require nontrivial fund balances, or substantial borrowing facilities, especially if the charged benefits of different firms in the same risk class tend to be highly correlated. In a recession the charged benefits of all firms in a given risk class tend to go up, so that a balance (or borrowing power) is required if immediate tax increases are to be avoided.

Since any excess of benefit outflows over tax inflows can be financed either by reducing a positive fund balance or by borrowing, the question of optimal borrowing power arises. Completely unrestricted borrowing power seems quite undesirable because it would permit ever-increasing negative fund balances: all benefit payments could be financed by borrowing that need never be repaid.

Thus, some restrictions have to be imposed on the borrowing power of States. In particular, specific repayment schedules seem desirable. In accordance with the previous arguments, the phasing of the repayments should have some cash-flow smoothing or countercyclical properties. Furthermore, States should be charged an interest rate on their borrowing that reflects accurately the opportunity cost of money. Such restricted borrowing powers would enable States to maintain lower average fund balances than would be possible in the absence of borrowing.

To sum up: the question of the optimal fund balance can be discussed only within a broad framework describing the purposes and desirable characteristics of the financing mechanism. Positive fund balances are unnecessary in a reimbursable system or in the presence of unrestricted borrowing power. The more insurance and/or cash-flow smoothing is in the system and the more restricted is the borrowing power, the higher the average fund balance must be.

Financing mechanisms and fund adequacy

The question of fund properties is approached from a purely theoretical point of view. In particular, it is shown that a financing mechanism can be designed that has some of the attractive features described previously and also ensures automatic fund adequacy.

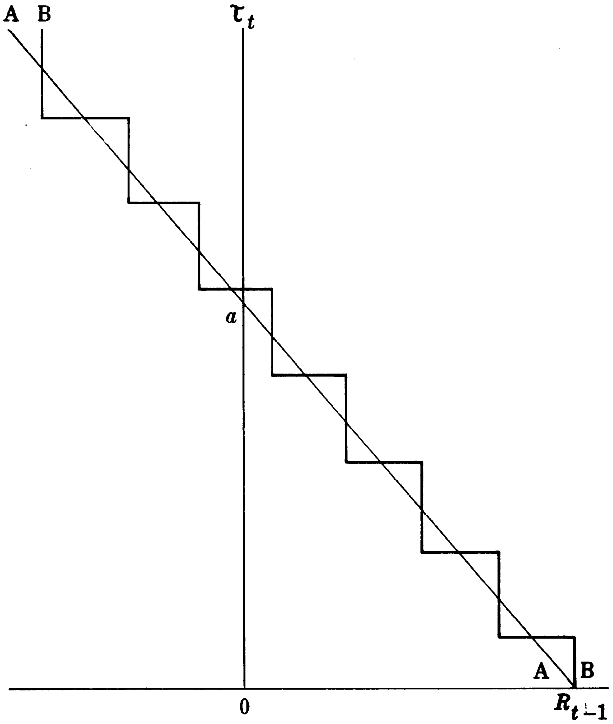
Attention will be confined to the reserve-ratio method of taxation, the most common among States. Each individual firm's reserve ratio (R) is defined as its balance in the State UI fund divided by its taxable payroll, or a moving average thereof. The firm's tax rate (τ_t) is a function of the lagged reserve ratio (R_{t-1}).

In Figure 1, two tax schedules are illustrated. The schedule labeled A-A is sloped continuously, while schedule B-B consists of a series of steps.

If the continuous tax schedule A-A were in effect, then all firms would be experience rated in the sense that, in the long run, their tax payments would be equal to their charged benefits. But the tax payments would lag behind the benefit outflows, first because of the discrete lag of τ_t behind R_{t-1}, and second because the slope is less than unity. The less steep the slope, the slower the response of tax payments.

If schedule B-B were in effect, then firms would not be experience rated as long as their reserve ratios remained within the bounds of a constant tax rate. One might argue that the firms on each step belong to the same risk class and so have identical tax rates. Their expected charged benefits (when scaled by the tax base) are identical, hence their longrun tax payments are expected to equal their charged benefits.

FIGURE 1. Tax schedules



The important point about tax schedules of the type illustrated in Figure 1 is that in the absence of noncharged benefits, the State UI fund cannot be rising or falling for long periods of time unless the ratio of benefits to the taxable payroll has a consistent longrun upward or downward trend over time. The reason for this is that each firm pays for its charged benefits completely in the long run. Formally, the time path of the reserve ratio for a firm can be described by the following equation:[2]

$$R_t = (1 - s)R_{t-1} + a_t - \frac{b_t}{m_t} \qquad (1)$$

where s is the slope of the tax schedule, a_t is the intercept of the tax schedule, and b_t/m_t is the ratio of total benefits to the total taxable payroll. This equation shows clearly that with a constant $(a_t - b_t/m_t)$ and $0 < s < 1$ the reserve ratio will move to its steady state value

$$R_t^* = \frac{1}{s}(a_t - b_t/m_t). \qquad (2)$$

This steady state value R_t^* may be negative if $a_t < b_t/m_t$. Furthermore, if $(a_t - b_t/m_t)$ does fluctuate cyclically but does not have a longrun positive or negative time trend then R_t tends to fluctuate about R_t^*, but it will not be ever-increasing or ever-decreasing. Since this mechanism operates for each individual firm, it must, in the absence of noncharged benefits, also operate for the State as a whole.

This theoretical discussion is designed to show that a financing mechanism exists that has attractive features and, moreover, ensures fund adequacy virtually automatically. The essential characteristics of this mechanism are as follows:

- All benefit payments are charged to some firm's account.
- The difference $(a_t - b_t/m_t)$ is not allowed to have a positive or negative longrun time trend. Hence, increases in benefits (b_t) must be offset by increases in the taxable payroll (m_t) or increases in the intercept of the tax schedule (a_t).
- The difference $(a_t - b_t/m_t)$ is fixed at a level such that the value of $\frac{1}{s}(a_t - b_t/m_t)$ equals the desired longrun reserve ratio. This desired longrun reserve ratio need not be very large, especially if the State has ample opportunity to borrow at relatively low interest rates.
- The tax schedule may be continuous or a series of steps, but it covers the range from very large negative reserve ratios to the positive ratio at which the tax rate becomes zero. Most importantly, there is no maximum tax rate that a firm can reach and still have an excess of benefit outflows over tax inflows.
- The slope of the tax schedule (or average slope in the case of [B-B]) is not as small as zero or as large as unity. The exact value of s depends on the amount of the desired cash-flow smoothing. Apart from the discrete lag of τ_t behind R_{t-1}, the closer s is to unity, the more coincident are tax payments with benefit outflows.

To sum up: There exists a financing mechanism that has desirable insurance and cash-flow smoothing properties and may not require very large mean fund balances but which ensures fund stability almost automatically. Such a system thus has much to recommend it.

Empirical Analysis: The Conceptual Framework

The empirical analysis was designed to discover whether certain properties of the fund balance could be changed by changing some parameters of the tax structure and whether, thereby, the performance of the financing mechanism could be improved. For this purpose, the desirable properties of the fund balance must first be determined.

Conventional evaluation measures of fund balances

The conventional definition of an "adequate" State UI fund is one that is sufficiently large for benefits to be paid through a typical recession without *any* borrowing from the Federal trust fund. In other words, the probability of having a negative balance should be reduced to close to zero.

The conventional measure of fund adequacy can be formalized in terms of a collective utility function with only one determinant, namely, the probability of having a negative balance (Pr):

$$U = U(Pr) \qquad (3)$$

Since Pr cannot be negative, utility is uniquely maximized when $Pr = 0$:

$$U^* = U(0) \qquad (4)$$

The probability of having a negative balance can be assumed to be determined by the statistical mean (M) and the statistical variance (V) of the balance: [3]

$$Pr = Pr(M,V) \qquad (5)$$

The influence of M on Pr is negative, and that of V on Pr is positive. Thus, the conventional recommendation is that M should be raised until $Pr = 0$ and $U = U^*$.

There are several ways in which the conventional recommendation can be quantified. The most common number is the "high-cost multiple."[4] According to this measure, at the beginning of a period of relatively high unemployment the fund balance should be sufficiently high to finance the previously highest benefit levels for about 1½ years.

As shown in the Appendix, the majority of the States that did adhere to the high-cost multiple certainly avoided negative balances in the 1975–76 recession. Nevertheless, the conventional approach outlined previously has some serious shortcomings, some arising from its underlying principles, and some from the specific measure, the high-cost multiple.

- The conventional approach to fund balance adequacy places a very large value on the implied (shadow) cost of borrowing by States to cover negative balances temporarily. Hence, borrowing is virtually ruled out in this approach.
- The conventional approach to fund balance adequacy places a very low, probably zero, value on the implied (shadow) opportunity cost of fund balances. Hence, the recommended fund balances are likely to be too high.
- The high-cost multiple is derived from the fund balance and benefits paid. It completely ignores the responsiveness of tax inflows to benefit outflows. Hence, it is an imperfect measure of the probability of having a negative balance.
- The high-cost multiple is only a recommended target. It does not suggest any particular method of achieving this target. Nor does it tell States how to recognize "the beginning of a period of relatively high unemployment."

Thus, the authors conclude that the conventional approach to fund adequacy is based on extreme assumptions and that the concept of the high-cost multiple is not useful as a policy tool. The most that can be said for the high-cost multiple is that it may serve as a political instrument to exhort States to revise their financing mechanisms to ensure some (unspecified) longrun financial viability.

An alternative approach to evaluation of fund balances

In view of the shortcomings of the conventional approach, an alternative approach to the problem of evaluating fund balances has been adopted for the purposes of the research underlying this report. In brief, a fund is regarded as more desirable, other things being equal, the smaller the average balance, the smaller the probability of having negative values, and the larger the amount of the cash-flow smoothing or the countercyclical impact.

The average longrun balance should be as small as possible (other things being equal) simply to minimize the opportunity cost of holding it. However, other things are unlikely to remain equal as the fund balance is changed. In particular, the probability of having a negative balance at any time must be expected to depend on the average balance. As stated in equation (5), this probability is assumed to depend negatively on the average balance and positively on the variance of the balance.

The three desirable features of the fund balance can be expressed formally in terms of a collective utility function:

$$U = U(M,Pr(M,V),C) \qquad (6)$$

where U stands for the collective utility and C for the amount of cash-flow smoothing or the countercyclical impact.[5] The marginal utility of V is negative and that of C is positive. The influence of M on U is, however, not unambiguous. An increase in M has two effects: directly it reduces U, but indirectly, through Pr, it raises U. Given an aversion to risk, it is plausible to hypothesize that the positive effect dominates when M is low and the negative effect dominates when M is high, so that there exists an optimum average fund balance M^*. The marginal utility of M is positive when $M < M^*$ or negative when $M > M^*$.

Collective utility (U) may be changed by altering certain parameters of the tax and benefit structure which, in turn, affect the levels of M, V, and C. Suppose that $M > M^*$ and that a change in a particular tax parameter leads to a fall in M and V and to a rise in C. Such a change would raise the collective utility through all three variables, and hence, it would be unambiguously desirable. If such a parameter change can be found it would be an implication that there are "gross inefficiencies" in the tax system.

It is more difficult to assess the desirability of a change that does not eliminate a gross inefficiency. What can be recommended if, for instance, a particular parameter change raises M and reduces both V and C? If $M > M^*$, then the first and third effects reduce collective utility, while the second raises it. In this and similar cases, there may still be inefficiencies, but the analysis has to be somewhat more complex. In particular, a second parameter has to be changed.

The purpose of this change in the second parameter is to counteract the impact of the first parameter on one of the variables M, V, or C. Suppose a rise in the first parameter P_1 reduces C and a rise in the second one, P_2, raises C, then P_1 and P_2 must both be raised, so as to keep C constant. Then the joint effect of P_1 and P_2 on M and V is analyzed. If the joint impact of raising P_1 and P_2 holding C constant consists of a fall in both M and V, then there exists a net inefficiency. In such a case, both P_1 and P_2 should be raised. If, on the other hand, the above rise in P_1 and P_2 raises M but reduces V, then there is no inefficiency in the system, and no recommendation can be made without knowledge of the parameters of the collective utility function.

Net inefficiencies may be illustrated by means of a set of diagrams. In Figures 2a, 2b, and 2c, the partial relationships between V and M, V and C, and C and M are illustrated. They are conditional relationships in the sense that the appropriate third variable is held constant at $\overline{C}$, $\overline{M}$, and $\overline{V}$. The lines labeled (A-A) display net inefficiencies, because the simultaneous change in P_1 and P_2 would move the variables from, say, x_1 to x_2, which represents an unambiguous gain in collective utility. The lines (B-B) illustrate efficient frontiers because a move from x'_1 to x'_2 would yield more utility through one variable and less utility through the other variable.

An approach to the problem of evaluating UI fund adequacy has been sketched that differs from the conventional one of the high-cost multiple. The alternative approach presented can be conceptualized by postulating a collective utility function in which the average fund balances and the probability of negative fund balances have a negative effect on utility, and the countercyclical or cash-flow-smoothing properties have a positive effect on utility.

A system is said to be grossly inefficient if a change in a single tax parameter reduces the average fund balance and the probability of a negative balance and raises the countercyclical effects. Net inefficiencies exist when two tax parameters can be changed in such a way as to hold one of the determinants of utility constant and the joint impact on the remaining two determinants unambiguously raises the level of utility.

Methodology for empirical research

The primary goal of the empirical research reported here consists of the determination of the extent of gross and net inefficiencies in the UI systems. A corollary of the discoveries of inefficiencies is a set of policies and recommendations about those parameter changes that would unambiguously raise the level of collective utility.

A very broad approach was adopted in the empirical

FIGURE 2. Illustration of net inefficiencies

FIGURE 2a

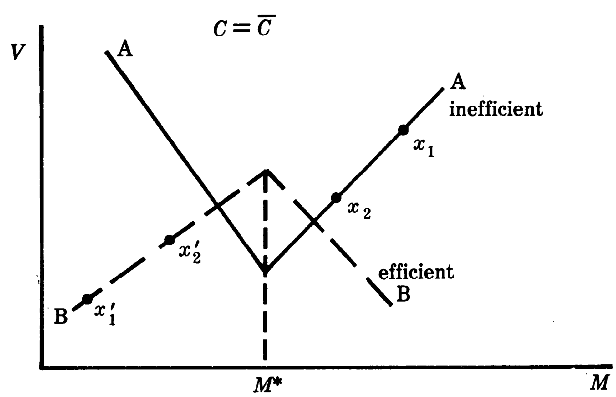


FIGURE 2b

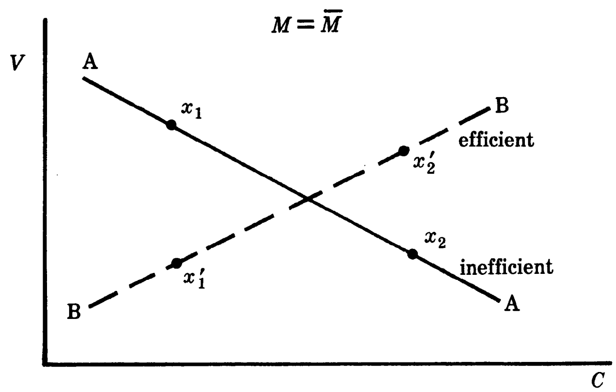
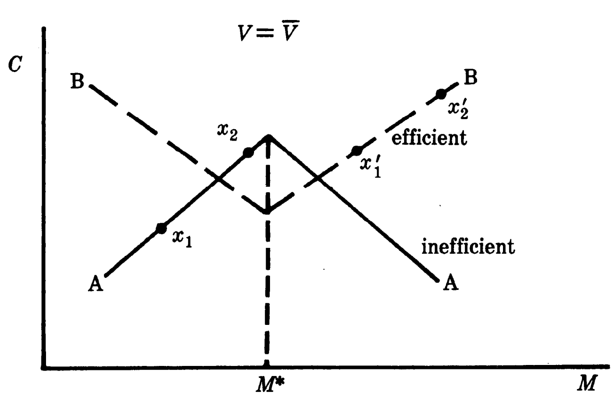


FIGURE 2c



investigation. In fact, three distinct but related research projects were undertaken.

The first was the development of a microeconomic State-specific model. Two versions of this model were constructed, one for Massachusetts and the other for New Jersey. The second project consisted of a micro simulation model for a typical (hypothetical) State. In this model, fund balances are simulated for several types of tax systems, using hypothetical distributions of firms and cyclical employment patterns. The third project consisted of the econometric estimation and simulation of macroeconomic models describing the behavior of 30 reserve-ratio States.

The three projects had a common methodology. Effort was first concentrated on developing a simulation model that yielded reasonable predictions of the fund balance. Where possible, simulated balances were compared with actual balances for individual States. Once a model appeared to work reasonably well, it was used for a second round of simulations.

In the second round of simulations, the tax parameters were allowed to vary while other variables retained their previous values. The six tax parameters considered were: $\tilde{w}$, the taxable wage base; NEGTAX, which applies to firms with negative balances; MAXTAX, which applies to firms with small positive balances; SLOPE, which is the average gradient of the sloped part of the tax schedule; MINTAX, which is the lowest tax rate; and MINRES, which is the reserve ratio at which MAXTAX ceases and the sloped part of the schedule begins. As illustrated in Figure 3, the last five parameters are sufficient to describe fully a typical tax schedule.

The simulations were done as follows. First, a base set of values for $\tilde{w}$, NEGTAX, MAXTAX, SLOPE, MINTAX, and MINRES was chosen; this set was the same for all three projects. In each of the simulations, one tax parameter was altered while the others were held constant at their base values. For each resulting series of fund balances, the average balance, the variance of the balance, and the cash-flow-smoothing measure were calculated.

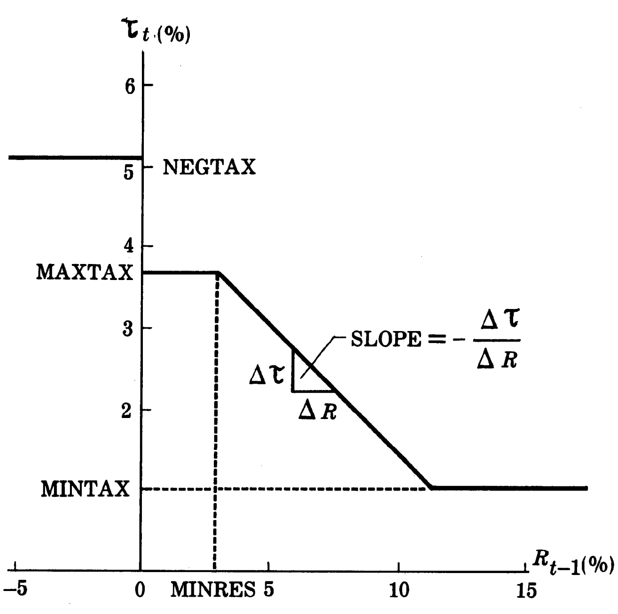
The simulation results were then used to regress the evaluation measures M, V, and C on the tax parameters from which the authors obtained estimates of the partial relationships between each of the six tax parameters and each of three evaluation measures. These partial relationships give direct evidence about the existence of gross inefficiencies in the tax system. Furthermore, they were used to compute measures of net inefficiencies.

Before presenting the findings of the three simulation models, it might be useful to explain why three alternative approaches were used (rather than just one). The authors were aware that the results and corresponding policy implications of a simulation model depend on the assumptions underlying that model. Accordingly, the authors wanted to be able to check any conclusions from one type of model against those from another type. If the results from different types of models are the same, the authors can feel somewhat confident in making policy recommendations. If they differ, then strong recommendations do not appear justified.

Each of the three models we developed—the micro State-specific, the micro stylized State, and the macroeconomic State-specific—has certain advantages and disadvantages. Theoretically, one could expect a micro model to predict fund balances better than a macro model because of the increased information embodied in disaggregated data. However, the data requirements for a micro model are high. Moreover, given the limited amount of disaggregated data actually available, a macro model may, in practice, predict better than a micro model using semidisaggregated data.

A State-specific simulation model is potentially very useful to the State it represents, but probably uninteresting to States with very different tax systems or firm distributions. A stylized-State model is more flexible and may be more useful in deriving general policy conclusions.

FIGURE 3. A typical tax schedule



The micro State-specific model. There are two possible ways of predicting taxes in a model that simulates the balance in a State's UI fund. What is here referred to as the "macro" approach uses aggregate data to predict a tax rate for the State as a whole. The "micro" approach, on the other hand, uses disaggregated data to predict tax rates for individual firms or groups of similar firms. The latter aproach was used to develop both a State-specific simulation model, described in this section, and a stylized State model, described next.

We had two reasons for developing a micro State-specific (or "micro") model. First, we wished to test the micro approach against historical data. To do this, it was necessary to predict the fund balance for a particular State over a period of time for which data on that State's actual balance were available. The predicted and actual values could then be compared. Second, we wanted to compare the micro and macro approaches. To do this, macro model predictions of the balance were computed, and they were compared with the corresponding micro model ones. Statistics based on the forecasting errors from the two sets of predictions were used to determine which model predicted better.

Micro simulation programs were developed for two States, Massachusetts and New Jersey, for 1970–1977. For Massachusetts, the micro model tended to overpredict the fund balance while the macro model tended to underpredict. Statistical tests indicated that the macro model predicted better than the micro model did. For New Jersey, it was again found that the micro model tended to overpredict the balance. In this case, however, the macro model overpredicted even more than the micro model did, so that the micro model was the better predictor.

The micro model was next used for simulations in which tax parameters were allowed to vary around a set of base values. The New Jersey version of the micro model was used for these simulations, with 1970–1977 again defined as the projection period.

From the results of this set of simulations, the authors concluded that there were some inefficiencies in the base tax system. The extent of inefficiency depends, however, on whether the average fund balance under the base system is greater or less than M^*, the optimal average balance. The simulated balance using the base tax parameters declined dramatically during the projection period, and was negative for the last 3 years of the period. Accordingly, one might conclude that the marginal utility of M is positive. In this case there are a number of inefficiencies, both gross and net, in the base tax system. If, however, the base average balance exceeds M^*, there are no gross inefficiencies and few cases of partial inefficiency.

The micro stylized State model. The micro stylized State model simulates a UI fund balance by aggregating the tax and benefit payments of 50 different hypothetical firms, each with different employment paths and turnover rates. Benefits charged to each firm are proportional to reductions in employment and turnover in the firm. Tax rates for each firm are determined according to a specified tax schedule, and taxes are paid on the taxable wages of each employee's annual salary. Therefore, taxes paid by a firm are a function of its employment and turnover. The distribution of wages in the firm and the firm's labor turnover rate are determined at the start of the simulation by random draws from a normal distribution. Each year's change in employment in the firm is also random. The resulting employment pattern for each firm, which is a random walk, determines its tax and benefit payments under each specified tax schedule.

There are two types of parameters in the model: economic parameters that determine wages, employment levels, and turnover and parameters of the tax schedule. Each simulation covered a 100-year period. The simulation exercises can be grouped according to the kind of change they considered. They were:

- Tax parameter changes. Different tax schedules were simulated for constant economic conditions and the identical pattern of random components. Four types of tax systems were simulated: two types of reserve-ratio systems, the benefit-ratio system, and the benefit-wage-ratio system. Each system was simulated repeatedly to test the effects of varying the parameters describing the tax schedule: (1) the minimum tax rate, (2) the maximum tax rate, (3) how the tax varied in between these two limits with variations in the firm's experience, (4) the wage base, and (5) average benefit levels per claimant.
- Economic parameter changes. The economic parameters were varied to determine the sensitivity of the model to the assumptions and to determine how differences in economic conditions across types of States might affect the State's balances, given the same tax system.
- Changes in the random component of yearly employment shocks. Many simulations were repeated with different random draws from the same distribution to make sure that the 100-year period used in the simulation was enough to make valid comparisons between the systems.
- Employment shocks. The model was simulated with several different kinds of employment shocks to determine how different tax systems responded to general declines and fluctuations in employment.

In addition, the data from the simulations were aggregated to conform to the data in the *Handbook,* which are the data used by the macro model. The macro model regressions were reestimated with data from the stylized State simulation to allow comparison of the two models and to obtain a quantitative measure of how quickly tax systems responded to benefit outflows.

Most of the simulation results can be described in terms of the effects of parameter changes on the percent of firms at the minimum and maximum tax rates and the slope of the tax schedule between these rates.

The average balance in the fund depends partly on the relation between the number of firms at the minimum and maximum tax rate. Firms that provide net inflows into the tax system—firms at the minimum tax rate—must balance net-deficit firms—firms at the maximum tax rate and most firms that have gone out of business. The fund balance also depends on the average reserve ratio of firms that are not at the minimum or maximum tax rate. This reserve ratio depends on the slope of the tax schedule.

The fluctuations in the balance also depend on the firms' distribution and the slope of the tax schedule. A system will have few fluctuations in the balance if it has few of its firms at the minimum or maximum tax rate. A steep slope between the minimum and maximum tax rates also leads to smaller fluctuations in the balance. In general, a system that has little fluctuation in the balance (low variance) has little countercyclical power.

After the simulations just described were performed, a further set of simulations was done that involved systematically varying the tax parameters around their base values. The variance and the countercyclical measure moved together under most parameter changes so that the simulations revealed few gross inefficiencies. The identification of net inefficiency depends on whether the actual mean is above or below the desired mean (M^*).

Most of the parameter changes result in better balances according to the evaluation criteria only if the mean balance should be reduced ($M > M^*$). Varying the parameters of the tax schedule to hold the mean constant led to a lower variance and a better countercyclical timing in about half the cases. Only one of these changes was also judged to be an improvement using the other micro model. Most of the improvements, both assuming $M > M^*$ and $M < M^*$, involved increasing the fraction of firms that were on the sloped portion of the tax schedule, that is, increasing the range of reserve ratios that would be subject to a change in tax rates when reserve ratios (balances) change.

The macroeconometric models for specific States. The models described here are macroeconomic in the sense that they contain as variables the aggregate taxable payroll, total taxes paid, the average tax rate, and so on, but they do not contain information for individual firms or for groups of firms. In this respect the macroeconomic approach differs crucially from the other simulation experiments that are reported in the previous two sections.

The determination of the taxable payroll. Previous theoretical work suggests that the taxable payroll typically is smaller than the actual payroll, is a nonlinear function of the taxable wage base, and rises with interfirm labor turnover as well as with annual earnings. Consequently, the following specification has been used in the estimation of the taxable payroll:

$$m = c_0 + c_1 w + c_2 \tilde{w} + c_3 \tilde{w}^2 + c_4 u \tag{7}$$

where m stands for the taxable payroll per employee, w for annual earnings, $\tilde{w}$ for the taxable wage base, and u for the unemployment rate. The unemployment rate was used as a proxy variable for labor turnover. As is well known, interfirm labor turnover is highly procyclical.

Equation (7) was fitted to an annual time series for the period 1948 to 1977. The resulting regression equations have substantial explanatory power. The coefficients c_1 and c_2 are positive and highly significant; c_3 tends to be weakly negative and c_4 strongly negative. All these signs conform to the theoretical expectations. Since interfirm labor turnover is negatively correlated with the unemployment rate, the negative sign of c_4 is consistent with the hypothesis that labor turnover has a positive influence on the taxable payroll.

The determination of the tax rate. The basic relationship that determines the tax rate (τ) can be expressed simply as:

$$\tau_t = \alpha + \beta R_{t-1} \tag{8}$$

where R_{t-1} stands for the lagged reserve ratio. Both τ_t and R_{t-1} refer to State aggregates. In the initial estimation, a version of equation (8) was fitted to the annual time series for each State. The results turned out to be satisfactory by conventional standards.

Both α and β, however, are likely to be influenced by the parameters of the tax structure as well as by factors (such as the industrial composition) that may be peculiar to the State. Hence, the coefficients α and β were assumed to be linear functions of the five tax schedule parameters of the reserve-ratio method. They will be referred to as P_i ($i = 1 \ldots 5$). Thus

$$\alpha = \gamma_0 + \sum_{i=1}^{5} \gamma_i P_i \tag{9}$$

and

$$\beta = \delta_0 + \sum_{i=1}^{5} \delta_i P_i \tag{10}$$

Hence, equation (8) becomes:

$$\tau_t = \gamma_0 + \sum_{i=1}^{5} \gamma_i P_i + \delta_0 R_{t-1} + \left(\sum_{i=1}^{5} \delta_i P_i\right) R_{t-1} \tag{11}$$

Equation (9) was fitted to annual data for 1961–1977 for each reserve-ratio State. The relatively short time series and lack of variability in some of the tax parameters led to some unsatisfactory results. Consequently, the States were grouped according to similarity of coefficients, and then equation (8) was reestimated with pooled cross-section (States) and time series data, and all γ and δ parameters were allowed to vary from one group of States to another.

The results of the second empirical estimation turned out to be quite satisfactory. The overall R^2 was about 0.91 and several of the coefficients were highly significant. In general, the coefficients had the theoretically expected signs.

The simulations. The estimated coefficients of equation (8) were used to compute fund balances for the period 1961 to 1977. For this purpose, total benefit payments, covered employment, and interest rates to the funds were assumed to equal their actual historical values. In the first simulation experiment, the computed and actual fund balances were compared. By and large, the computed fund balances tracked the actual ones reasonably well.

In the second experiment, the parameters of equation (11), including the State dummy variables, were used to estimate the effects of changes in the tax parameters (P_i) on the relevant fund measures, M, V, and C. The results were then used to compute gross and net inefficiencies.

The results of the second simulation can be summarized as follows:

- If M^* falls short of M in all States, then there are relatively more States with inefficiencies than with efficiencies in M-V and M-C space. To obtain an unambiguous improvement, in utility in this case, the taxable wage base ($\tilde{w}$), the maximum tax for positive balance (MAXTAX), and the minimum tax (MINTAX) should all be lowered in pairwise changes with other parameters.
- If M^* exceeds M in all States, there are relatively more efficiencies than inefficiencies in M-V and M-C space and no policy prescriptions emerge.
- The set of results that refers to the V-C space is fairly uniform. Their interpretation is also independent of whether $M^* < M$ or $M^* > M$. They suggest that in the vast majority of States the frontier in V-C space is efficient because V and C can only be lowered or raised together when pairwise parameter changes are made.

The results of the three projects. Three sets of models were constructed and used for the simulations in the hope that all three would yield similar basic messages. Unfortunately, however, the results appear to be quite diverse.

To illustrate the diversity of results, compare the inefficiencies that have been found in the V-C space, holding the mean fund balance constant at $M = \overline{M}$.

1. In the micro State-specific model the variance (V) can be lowered and the cash-flow smoothing or countercyclical measures (C) can be raised by:

- increasing MAXTAX and decreasing $\tilde{w}$,
- increasing MINRES and decreasing $\tilde{w}$, or
- increasing MAXTAX and decreasing MINRES.

2. In the micro stylized State model, V can be lowered and C raised by:

- increasing MAXTAX and decreasing $\tilde{w}$,
- increasing MAXTAX and decreasing MINTAX,
- increasing NEGTAX and decreasing MINTAX,
- increasing NEGTAX and decreasing $\tilde{w}$,
- increasing SLOPE and decreasing MINTAX,
- increasing $\tilde{w}$ and decreasing MINTAX,
- increasing both MAXTAX and SLOPE, or
- decreasing both $\tilde{w}$ and SLOPE.

3. In the macroeconometric models for specific States, there are not many inefficiencies in V-C space. In five States there appear to be net inefficiencies and V can be lowered and C raised by decreasing $\tilde{w}$ and raising SLOPE. In another four States, the same can apparently be achieved by decreasing $\tilde{w}$ and increasing NEGTAX.

The results derived from the three models are not entirely at variance with one another. For instance, the pairwise change of an increase in MAXTAX or NEGTAX with a decrease in $\tilde{w}$ emerges from the first two models and for a small number of States from the third as well. But while this and similar results may serve as a very general guideline to States, the evidence from the macroeconometric models for specific States suggests strongly that specific changes in the tax structure are not applicable to all States.

In the empirical research underlying this report, the authors constructed three types of models: two micro models and one macroeconometric model. In the authors' view, these types of models are useful in organizing the relevant arguments and material and in designing improvements in the performance of the financing mechanisms. The results of the simulations suggest, however, that specific parameter changes are not likely to have general applicability. State-specific models should, therefore, be constructed and used for the evaluation of individual State fund balances.

Conclusions and Implications for Policy

During the past decade, increased benefit payments have made heavy demands on the UI trust funds. Questions have, therefore, arisen about the ability of the financing mechanisms to increase tax flows sufficiently to prevent ever-increasing indebtedness of the system as a whole. The research underlying this report was designed to answer some of these questions. Specific as well as general changes in the financing systems were examined in order to determine whether their performance could be improved.

A desirable financing system was defined as one that: provides sufficient funds to pay for benefits in the long run, so that it does not have a negative fund balance too frequently; is not wasteful in the sense of having too high a mean fund balance; and does provide for some cash-flow smoothing or countercyclical timing of tax flows.

Improvements in the financing systems in one or more of these respects were studied both theoretically and empirically. The theoretical findings and policy implications are general and not quantitatively exact.

The main theoretical result is that there exists at least one financing system that does have these three desirable properties. The main features of such a system are as follows:

- There are no, or negligible amounts of, noncharged benefits.
- There is no maximum and no positive minimum tax rate. The tax schedule may have steps, but it keeps rising as individual firms' benefit withdrawals increase.
- Longrun increases in benefit payments, caused by either legislated benefit increases or by longrun trends in unemployment, are offset by equiproportionate increases in the taxable payroll or by increases in the entire tax schedule.
- The tax rate is adjusted to benefit outflows with a substantial lag; in other words, the tax schedule is not too steep.
- States have substantial powers to borrow either from the Federal Government or from one another. But precise repayment schedules are laid down and adhered to rigidly. Further, realistic interest rates are charged on borrowed funds.

From the authors' theoretical work, it is concluded that funds would be more efficient if:

- noncharged benefits were reduced and the sloped part of the tax schedule were extended;
- the taxable wage base on the entire tax structure were raised in response to longrun increases in total benefits;
- the Federal Government charged a realistic interest rate and imposed strict repayment terms on money borrowed from the Federal trust fund.

In addition, the authors believe that the possibility of the pooling of State trust funds ought to be investigated. Such pooling would permit States to borrow from one another. Such a system might act as the International Monetary Fund does in the international sphere.

The first two of these policy recommendations cannot be applied uniformly to all States because they differ in many relevant and important respects. For instance, the recently proposed uniform linking of the taxable wage base to average wages may yield too high a fund balance in States with low benefit rates and too low a fund balance in States with high benefit rates. To be sure, the authors feel that such linkings are desirable but oppose their uniformity across States.

In the empirical research, an attempt was made to discover inefficiencies in the tax systems represented by three different sets of models. Inefficiencies were said to exist if a change in one or more parameters of the tax structure would unambiguously improve the performance of the financing system. A large number of specific pairwise parameter changes were investigated.

The results of the three simulation experiments were quite diverse. Moreover, the authors found a substantial amount of diversity among States. It is also hard to interpret some of the results in terms of inefficiencies because the latter depend on whether the actual mean fund balance exceeds or falls short of the optimal mean fund balance.

Although the authors had hoped for greater generality of the empirical results than actually occurred, the research has an important policy implication. There seem to be no *specific* parameter changes that have very *general* applicability. Each affects the performance of the financing mechanisms positively in some States and circumstances and negatively in others. States seem to differ enough in economic environments and financing mechanisms that generalizations about specific parameter changes are hard to make.

A further implication of the diversity of these results is that States should be encouraged to investigate their own financing mechanisms and search for ways of improving their performance. For this purpose, the conceptual framework and the three sets of models used for the simulations may serve as a suitable starting point.

Since federally imposed specific parameter changes are likely to be nonoptimal in at least some of the States, what role should the Federal authorities play? In the view of the authors, Federal policy ought to be directed at creating appropriate incentives that encourage States to seek improvements in their systems. Such incentives are embodied in the Federal lending policies previously recommended. Interest should be charged on funds borrowed by the States and repayment schedules should be enforced. Another Federal incentive to States might arise from the rebates of Federal taxes to States with experience-rated tax systems. Such rebates might be reduced or suspended if States did not comply with some broad principles of financial viability.

In summary, neither the theoretical nor the empirical research has led to specific quantitative recommendations that would improve the performance of the financing mechanisms in all States. Therefore, specific improvements can be implemented only at the State level and most federally imposed specific changes cannot be expected to improve all systems. If this conclusion is correct, then the role for the Federal authorities would be to create the appropriate incentives for the States to seek improvements in their systems. Such incentives may be embodied in Federal lending policies or in the method of rebating Federal taxes to States with experience-rated tax systems.

Notes

1. The reimbursable system also does not permit the subsidization of firms belonging to one risk class by firms belonging to another risk class. It is hard, if not impossible, to justify such subsidization across risk classes on economic groups. Joseph Becker, in *Experience Rating in Unemployment Insurance* (Baltimore, The Johns Hopkins University Press, 1972), has argued that an inefficient allocation of resources is likely to result from such cross-subsidization.

2. For a detailed derivation of the results, see Frank Brechling, "The Incentive Effects of the U.S. Unemployment Insurance Tax," in *Research in Labor Economics,* vol. I, JAI Press, 1977.

3. This is true only if the distribution of the fund balance is normal. In other cases, higher moments of the distribution should be determinants of *Pr*.

4. See the Appendix for a precise definition of the high-cost multiple.

5. The measure of countercyclical power (C) used in this paper is:

$$C = \sum_t \left(T_t - B_t\right)\left(\bar{B} - B_t\right)$$

where

T_t = taxes collected during period t

B_t = benefits paid during period t

$\bar{B}$ = the average yearly amount of benefits paid during the timespan for which the measure is being calculated.

Tax system A is measured as more countercyclical than tax system B if $C(A)$ is larger than $C(B)$. The measure sums products of two factors, one for the size of the countercyclical impulse ($T_t - B_t$) and the other for the timing ($\bar{B} - B_t$). The first factor measures how much money is being pumped into or drawn out of the economy. When $T_t > B_t$, the UI program is drawing funds out of the rest of the economy. Conversely, when $T_t < B_t$, money is flowing from the UI program to the rest of the economy. The second factor ($\bar{B} - B_t$) puts a weight on each yearly impulse according to the cyclical position of the economy. If benefit schedules are constant, then $\bar{B} > B_t$ occurs in a boom and $\bar{B} < B_t$ occurs in a recession.

Appendix: Conventional Measures of Fund Adequacy

The conventional evaluation measure of a UI fund is fund adequacy. An adequate fund is one that is large enough for benefits to be paid through a typical recession without any borrowing from the Federal trust fund.

The current balance in the fund is always used to measure adequacy, and all States have provisions for altering tax schedules if the balance is judged to be too low.[1] The triggering points for raising tax rates vary widely across States, but almost all of them fit one of the following three categories:

1. the balance falls below some fixed dollar amount,
2. the balance as a percent of total or taxable payroll falls below a specified level, or
3. the balance falls below some multiple of average yearly benefits or benefits paid during a very bad year.

For over a decade, the Department of Labor (DOL) has been advocating a measure of fund adequacy that is a combination of the last two, known as the high-cost multiple (HCM). According to the DOL, "at the beginning of a period of relatively high unemployment," the ratio of the balance in the fund (BAL_t) to total wages paid in the last year (TW_t) should be one-and-a-half times the ratio of benefits in the high-cost year (BEN_{HC}) to total wages paid in that same high-cost year:

$$\frac{BAL_t}{TW_t} > (1.5)\,\frac{BEN_{HC}}{TW_{HC}} \qquad \text{(A-1)}$$

The high-cost year is the 12-month period since January 1958 with the highest dollar payout in benefits.[2] This formula takes into account both benefit experience and wage growth (or inflation). The formula can be rewritten as

$$BAL_t > (1.5)\,BEN_{HC} \cdot \frac{TW_t}{TW_{HC}} \qquad \text{(A-2)}$$

Thus, a balance is less likely to meet the high-cost criterion if the State pays out unusually high benefits, or there has been inflation or payroll growth since the high-cost year.

How well does the HCM work? If it does what it is supposed to, the HCM should predict whether a fund becomes insolvent during a recession. To evaluate the HCM, the authors looked at how well it predicted fund behavior during the mid-seventies recession. Table A-1 shows the HCM at the end of 1973 for the 52 UI jurisdictions. One of the worst recessions in recent decades began in 1974. Thus, the end of 1973 should qualify as the stipulated "beginning of a period of relatively high unemployment."

Figure A-1 shows the relationship between the HCM and the behavior of the State fund balance from 1973 to 1976. Twenty-one States had HCM's greater than or equal to 1.5 at the end of 1973. Of these, only one—

the District of Columbia—had negative balances during the next 3 years.[3] Thirty-one States did not meet the high-cost rule. Twenty of these States' funds had negative balances between 1973 and 1976. The best possible score for the HCM would have been 52, meaning that all jurisdictions had been perfectly predicted. The actual score for the HCM is 40 accurate predictions.

Most States do not use the high-cost multiple measure of fund adequacy. Instead, they focus on the reserve ratio, which is simply the ratio of the balance to taxable or total wages:

$$RR_t = \frac{BAL_t}{TW_t} \qquad \text{(A-3)}$$

Each State decides what RR is adequate. HCM can be compared with RR by setting the additional factor in the HCM (BEN_{HC}/TW_{HC}) equal to the national average (2). Thus, if the additional factor in the HCM had no predictive power, an $RR > 3$ should predict as well as an HCM > 1.5. Figure A-2 shows the State breakdown using this RR rule. The score for this fund measure is only 33. Thus, the benefit factor does add predictive power. In particular, it has fewer mistakes of the kind shown in the lower left-hand box of Figures A-1 and A-2. The HCM allows States with relatively

TABLE A–1. High-cost multiple, 1973

United States	1.04 [g]
Alabama	1.01
Alaska	1.12
Arizona	2.71
Arkansas	1.15
California	1.02
Colorado	1.62
Connecticut	[g]
Delaware	1.43
District of Columbia	1.80
Florida	1.69
Georgia	2.64
Hawaii	0.70
Idaho	1.88
Illinois	0.75
Indiana	1.55
Iowa	2.28
Kansas	1.79
Kentucky	1.22
Louisiana	0.89
Maine	0.56
Maryland	0.76
Massachusetts	0.63
Michigan	0.57
Minnesota	0.61
Mississippi	1.62
Missouri	1.66
Montana	0.72
Nebraska	2.01
Nevada	0.66
New Hampshire	1.92
New Jersey	0.29
New Mexico	1.60
New York	1.17
North Carolina	2.44
North Dakota	1.27
Ohio	1.06
Oklahoma	0.90
Oregon	0.86
Pennsylvania	0.64
Puerto Rico	0.47
Rhode Island	0.52
South Carolina	3.01
South Dakota	2.75
Tennessee	1.58
Texas	1.32
Utah	1.85
Vermont	0.16
Virginia	2.63
Washington	[g]
West Virginia	1.20
Wisconsin	1.55
Wyoming	1.46

[g] State ratio/multiple not calculated due to outstanding loan indebtedness at the end of the year. United States ratio/multiple includes all States.

FIGURE A-1. State solvency (1973 – 1976) and the high-cost multiple (1973)

	HCM < 1.5	HCM > 1.5
Negative balances any year	20	1
Solvent all years	11	20

FIGURE A-2. State solvency (1973 – 1976) and reserve ratios (1973)

	$RR < 3$	$RR \geq 3$
Negative balances any year	21	0
Solvent all years	19	12

low benefit payouts, due to either low benefit schedules or mild economic responses, to keep relatively low reserves.

While the high-cost multiple and the reserve ratio have the great advantage of being simple numbers that can be communicated and used quite easily, they suffer from serious shortcomings.

Notes to Appendix

1. Some States also base their tax schedules on a subset of the balance, often called a solvency account. This account reflects the danger to the fund from benefits that cannot be charged to any employer. The solvency account reflects the long-term trend in the fund balance in the absence of economic fluctuations.

2. Definitions of HCM were taken from U.S. Department of Labor (1978).

3. The usual assumption made in designing fund adequacy measures is that the recession will last 18 months. Using the 3 years of the mid-seventies' recession to test the HCM gives it more of an opportunity to predict well.

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Solvency Measures and Experience Rating

Russell L. Hibbard

The process of projecting future unemployment insurance costs is extremely difficult. Past cost experience has generally proved to be quite inadequate for future cost projections. The range between optimistic and pessimistic projections of economic developments is often extremely wide even though both projections are within the limits of plausibility. The differences are so wide that policy decisions on fund solvency continue to be largely judgmental.

Unpredictable economic developments, such as the recent Middle East oil embargo, changing governmental trade and economic policies, or the economic dislocations caused by war, vastly complicate the projections entailed in deciding how large a State unemployment fund should be.

It is not generally recognized that two equally important aspects of economic projections bear on unemployment compensation (UC) financial policy. One of these is generally recognized—the amplitude of fluctuations in the number of persons employed and unemployed. At least equally important, but not so widely noted, is the frequency with which fluctuations occur. Under the State laws employees can build up to maximum benefit entitlement in a relatively short period after they return to work. Swiftly recurring periods of severe unemployment impose maximum burdens on the funds without giving the tax system time to restore the funds.

The impact of the cost of legislative changes on the benefit formulas of State UC laws is also often difficult to project. In fact, the nature of such changes is not easy to predict. Legislative changes may increase costs in ways such as raising weekly benefit amounts and extending the period of protection. They can also increase costs by changing the mix of characteristics in the claimant population and by leading to greater selectivity among claimants about the types of work they will seek or accept. If a State law is changed from a duration formula in which benefit weeks are related to weeks of work or earnings in the base period to provision for a uniform duration for all claimants, the amount of benefits paid for seasonal unemployment (payable regardless of general economic conditions) will become relatively more significant.[1] If the law's provision for a 1-week waiting period per year is repealed, benefit costs will increase by a substantial percentage in good times but by a relatively small percentage in bad times.[2]

Projection of future UC costs is far from an exact science. The difficulty of forecasting future unemployment rates is compounded by the uncertainties of future legislative changes and of rational human response to those changes. Under these circumstances, sound financing policy may require either or both (1) the building of unemployment funds to levels well beyond what would be required by cost projections derived from past cost experience or (2) the framing of the unemployment tax formula so that it responds quickly and emphatically to increased cost experience.

In view of the many uncertainties faced in providing for the financial stability of the State UC systems, it is of fundamental importance that the mechanical details of the State taxing formulas should be reliable. For a variety of reasons, some types of State taxing provisions, and some features of most types, do not respond to changing conditions in the ways that they ought to or as quickly or as effectively as they need to if broad financial policy is to be carried out.

This report points out some types of tax provisions that, either by absence or presence in some State laws, can interfere with the execution of financial policy.

Failure Promptly To Reflect Some Types of Benefit Costs in Employer Tax Rates

Employers' tax rates under the State UC laws are typically adjusted to reflect their experience with benefits under the State law. In most States, experience with benefits is measured by the amount of benefits paid to the employer's employees during at least 3 previous years. In a few States, experience is measured by the frequency of successful claims among the employer's employees multiplied by the average amount of benefits paid to all successful claimants. In the remaining States

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experience for tax rate assignment purposes is imputed from declines in quarterly and/or annual gross (as distinguished from taxable) payrolls.[3]

The reliability of an unemployment tax formula requires that tax rates should respond to all benefit payments, and that they should respond as quickly as necessary to restore the State's fund. Under many State laws, the response of tax rates to certain types of benefit payments does not occur until the delay in recouping those payments has jeopardized the solvency of the entire unemployment fund.

In two types of situations, this dangerous postponement of recovery of benefit payments may occur. One type of situation is commonly referred to as "noncharged benefits". The other is usually described as "ineffectively charged benefits".

Noncharged benefits

Many believe that employer opposition has effectively blocked legislation to pay benefits (after a relatively brief period of disqualification) to individuals who have caused their own unemployment. To eliminate the reason believed to motivate this employer opposition, many States have been persuaded to exclude from the benefits considered in employer experience rating the benefits paid to individuals after they have completed a period of disqualification for causing their own unemployment.

More recently, many States have decided not to include, as benefits affecting individual employers' experience rating and unemployment tax rates, the State's share (½) of the cost of paying extended-duration benefits under the Federal-State extended benefits (EB) program. Table 1 shows the significance of the amount of these excluded benefits from the operation of the normal benefit recoupment provisions of some State laws.

This report does not discuss the desirability of the noncharging of benefits as a policy, except to note that noncharging removes substantial amounts of benefit payments from the cost-conserving interest and activities of employers that constitutes one of the paramount objectives of experience rating. The U.S. Department of Labor (DOL) is responsible for certifying that the experience-rating provisions of State laws meet the conditions for allowance of "additional credit" against the Federal unemployment tax. The DOL has not found that the noncharging of benefits in disqualification and EB cases prevents the allowance of additional credit; and it routinely certifies State laws that provide for such noncharging. The DOL, however, has not conditioned its approval of noncharging on the existence of State law provisions that will ensure the prompt recoupment of the amounts of noncharged benefits to the State fund.

Some States have acted on this problem by enacting a supplementary unemployment tax rate that fluctuates in accordance with the amount of noncharged benefits. These supplementary tax rates go under various names: "balancing tax," "mutualized tax," or "nonchargeable benefits component" (of the employer's tax rate). By whatever name, this device provides a current and reliable source of revenue to finance noncharged benefits.

In the absence of provision for a supplementary tax tailored toward the financing of noncharged benefits, these benefits must be recouped through other features of the tax structure that were not designed for the purpose and whose intended functions are undermined by this unintended use.

Sources of revenue that may serve to defray the cost of noncharged benefits are as follows:

TABLE 1. 1971–1975 non-charged benefits under State unemployment compensation laws

State [1]	Total benefits paid, 1971–75 (in millions of dollars)	Non-charged benefits (in millions of dollars)			Pct of benefits non-charged	Federal advance [3]	Advance as percent of non-charged benefit
		Extended	Other	Total			
All [2]	23,146.647	762.360	2,374.358	3,136.718	13.6	NA	NA
District of Columbia	158.312	3.955	1.648	5.603	3.5	7,000	125
Maine	156.813	0	39.385	39.385	25.1	2,400	6
Massachusetts	1,522.901	0	265.000	265.000	20.5	140,000	53
Michigan	2,017.378	214.207	0	214.207	10.6	326,000	152
Minnesota	484.433	29.306	88.881	118.187	24.4	47,000	40
Pennsylvania	2,457.436	101.380	335.156	436.536	17.8	173,800	40
Rhode Island	257.859	29.216	46.333	75.549	29.3	45,800	61
Vermont	86.920	0	23.557	23.557	27.1	28,300	120

[1] The States that are listed in this column are those that meet the description in footnote 2 and that had a balance of unrepaid Federal advances at the close of 1975. "Debtor" States that are not listed because they did not meet the description in footnote 2 are: Alabama, Connecticut, Delaware, Illinois, New Jersey, and Washington. The unrepaid advances of these omitted States totalled $783,800,000.

[2] The figures for all States are for States that charge actual benefit payments to employers' experience records for purposes of experience rating and reported their noncharged benefits for the entire period to the Bureau of Employment Security.

[3] The amounts in this column are the amounts of advances made to the respective State funds by the Federal Government that had not been repaid by December 31, 1975.

SOURCE: Data supplied by U.S. Department of Labor, Employment and Training Administration.

1. Earnings from investment of the State fund in U.S. obligations may defray the cost. In some States, these earnings are credited, pro rata, to employers' experience-rating accounts. Where this is done, the fund's interest earnings are not available to cover noncharged benefits. In many instances, the fund's earnings are not large enough to cover the amount of noncharged benefits. This is especially true since the amounts of benefits that are "ineffectively charged" compound the problem.

2. Surplus revenue is created in cases where a statutory minimum tax rate forces some employers to make payments into the fund substantially higher than the amounts of benefits paid to their employees. There are several reasons why this recourse for financing noncharged benefits may be less satisfactory than a supplementary tax for this purpose.

a. No provision exists for accounting to ensure that the surplus revenue from the minimum rate (plus undistributed interest earnings, if any) is sufficient to offset the cost of noncharged benefits.

b. It is hard to justify imposing a major share of the burden of noncharged benefits on the employers whose operations put the smallest burden on the fund.

3. Reliance on surplus revenue from the minimum rate to finance noncharged benefits forces a relatively high minimum rate. A tax rate that produces from employers more than the cost of their employees' benefits destroys their financial incentive to minimize layoffs and to oppose invalid claims since doing these things costs time and money and brings no financial return. In fact, the employers may be tempted to try to "get their money's worth" by shutting their eyes to eligibility questions.

4. In that majority of States that use the "reserve ratio" system of experience rating, use of surplus revenue from a minimum rate to finance noncharged benefits can undermine the validity of the measure of experience because money that is actually used to pay for noncharged benefits is nevertheless credited to the employers' accounts in the fund, and this balance determines their "reserve ratio" and tax rate. As a result the accounts of minimum rate employers usually show surplus reserves (i.e., balances exceeding those needed to qualify for the minimum tax rate) that do not, in fact, exist, having been siphoned off for another purpose. This in turn means that benefits are ineffectively charged to these accounts, because they are charged against fictitious balances, and may not affect the employers' tax rates.

Whenever the fund's interest earnings plus any revenue available because of a minimum rate are inadequate to cover the cost of noncharged benefits, the fund balance will decline (benefits paid out will not be fully recovered). When the depletion of the fund proceeds far enough, the law's fund solvency provisions will begin to operate. This usually involves the application of a higher schedule of tax rates, or even suspension of experience rating. Relying on fund solvency provisions to finance noncharged benefits lessens their effectiveness in restoring the fund after a period of exceptionally high costs due to cyclical unemployment. Moreover, relying on this mechanism to finance noncharged benefits means that the fund balance must be continuously down to the point where the less favorable tax schedules are operative; the ability of the fund to withstand severe fluctuations in benefit costs is thus seriously impaired.

Most frequently, fund solvency provisions operate by raising the minimum and intermediate tax rates under experience rating but leave the maximum tax rate unchanged. In extreme situations, some laws suspend experience rating entirely, raising all employers' rates to the maximum. There is no evident rational basis for putting the entire burden of financing noncharged benefits on the employers who qualify for favorable tax rates under experience rating. A separate tax rate or rates, imposed for the express purpose of financing noncharged benefits, offers the opportunity to design the tax so that its impact on employers can be justified.

Ineffectively charged benefits

Some benefits paid under State laws are said to be "ineffectively charged," when charging them to employers' experience records fail to produce an increase in their unemployment tax rate sufficient to recover the full amount charged. In every State law, the legislature has set a ceiling on the tax rates that may be assigned to employers. For example, employers' benefit costs may average 5 percent of their taxable payroll. If the maximum tax rate under the applicable State law is 4 percent, then an amount of benefits equal to 1 percent of the employer's taxable payroll is "ineffectively charged," because the law provides no mechanism that will promptly produce revenue to offset those benefit charges.

It is true that part (sometimes even all) of the benefit charges that were originally ineffective in producing additional revenue may become effective in a later year or years as the result of improved experience of the employers involved.

In the States that have adopted the benefit ratio or benefit wage ratio types of experience-rating formulas, benefits charged to employers' experience records affect their tax rate for at least 3 years; therefore, in some instances despite the limitation imposed by the maximum tax rate, benefits ineffectively charged in 1 year may be recovered in whole or in part in 1 or 2 subsequent years if the employers' benefit charges in those years are less than their tax payments in those years. However, under the best of circumstances, substantial amounts of benefit charging will always be permanently ineffective.

In States that use reserve ratio experience rating, the likelihood of recovery of 1 year's ineffective benefit charges in a subsequent year is greater than in the benefit ratio and benefit wage ratio States. In reserve ratio States, accounts in the fund are maintained for all employers that record their tax payments into the fund and the benefits charged to their experience record. At any given date, this account shows a cumulative balance (if positive, a cumulative excess of tax payments over benefit charges; and, if negative, a cumulative excess of benefit charges over tax payments). This balance, stated as a percentage of the employer's annual taxable payroll, is the employer's "reserve ratio." This ratio is compared with the law's tax rate table, so that the employer's tax rate is the rate that corresponds with the table's reserve ratio bracket that includes the reserve ratio of the employer's account.[4]

Thus, the existence of ineffectively charged benefits is clearly revealed in a reserve ratio rating system. If employers' accounts show a negative balance, the amount of that negative balance (subject to note 4) is the amount of ineffectively charged benefits accumulated in their accounts.

The way in which ineffectively charged benefits undermine an experience-rating tax formula is most clearly evident under a reserve ratio rating system.

To illustrate this, suppose that a State law has collected a cumulative total of $1 billion in taxes and received a total of $40 million in interest on invested funds, and benefit payments have amounted to $940 million. The fund balance, accordingly, is $100 million. In the employer accounts within the same fund, however, the total of the balances in employer accounts having positive balances is $250 million—$150 million in excess of the balance in the fund. The explanation for this lies in a total of $150 million of noncharged or ineffectively charged benefits.

The danger in a situation like this is that the experience-rating formula then assigns tax rates to "positive balance employers" partly on the basis of fictitious account credits. In this example, the ratio of positive account balances to actual money in the fund was 2.5 to 1. Stated another way, only 40 percent of the amount credited to positive employer accounts is really in the fund. The other 60 percent has been used to cover ineffectively charged benefits and noncharged benefits, without reflecting the transactions on the experience-rating books.

As a result, the whole basis of reserve ratio experience rating (namely, the allowance of favorable rates on the basis of accumulation of adequate reserves) is vitiated; the tax rate schedules are unable to produce the revenue that they were designed to produce and that they would produce if all benefit costs were accounted for in a way that resulted in recovery of all benefits paid.

Recommendation for State Legislation

UC law should minimize noncharging and ineffective charging of benefits. Ineffective charging can be limited by giving broader scope to experience rating. This should be the preferred remedy. Failing that, the law should provide a method of accurate accounting for benefits paid but not charged, or ineffectively charged to individual employers under the law's experience-rating formula. A supplementary tax rate should be provided that will respond to the existence of unrecovered noncharged or ineffectively charged benefits by assessing additional taxes at a flat rate sufficient (subject to such maximum as may be found safe and appropriate) to recoup in 1 year the total amount of such unrecovered benefits paid from the fund in the preceding year.

Alternative remedies, such as an experience-rated supplementary tax rate (such as a percentage of normal tax rates) or cancellation of fictitious reserves in positive balance accounts, are less desirable from a policy standpoint but administratively feasible and effective.

Mechanical flaws in solvency safeguards

There are two important aspects to solvency safeguarding provisions in State UC laws. The policy aspect (namely, how big the State fund should be) is outside of the scope of this report. The issue here is the effectiveness of the solvency provisions in carrying out the policies, whatever they may be.

The most common device for adjusting fund income in the interest of solvency is the provision of two or more alternative schedules of tax rates whose applicability depends on the relation of the current fund balance to the solvency standard selected by the State. Presumably, in an effort to prevent too wide and rapid fluctuations in employer tax rates, perhaps in some cases to promote countercyclical fluctuations in the general level of employer tax rates, it is usual for the State laws to provide for intermediate tax rate schedules that apply when the fund balance is somewhere between completely satisfactory and too small (in relation to the solvency standard adopted by the State). Thus, in a particular State, tax schedules may be provided to yield an average of 0.5 percent of taxable payroll when the fund is at its optimum level, 1 percent when it is three-quarters of its optimum level, 1.5 percent when it is one-half of its optimum level, and 2.7 percent when the fund is at a critically low level.

To illustrate the problem, assume that benefit costs in a hypothetical State average 1.5 percent of taxable payroll. What are the consequences of this fact, in terms of the operation of the State's solvency safeguard? The workings of the formula will be as follows:

If the average tax rate in the State increases above 1.5 percent (for example, because of an earlier cyclical bulge in benefit payments) a revenue surplus will exist, the fund balance will grow, and in due course one of the more favorable schedule of tax rates will apply. This will reduce revenues below average benefit costs, the fund balance will decline, and the State will then probably revert to the tax schedule that produces 1.5 percent on taxable payroll and balances benefit costs. From then on, subject of course to minor fluctuations, benefit outgo and tax income will be in equilibrium; and the fund balance will *remain at one-half of its optimum level.* Where a State law provides several alternate schedules of tax rates depending on the balance of its unemployment fund, this arithmetical process (which might be called a "law of equilibrium") tends to prevent the State fund from reaching its optimum level. The balance of the fund will have a strong tendency to remain at a lower level that will require an average tax rate approximately equal to the benefit-cost rate (benefits divided by annual taxable payroll).

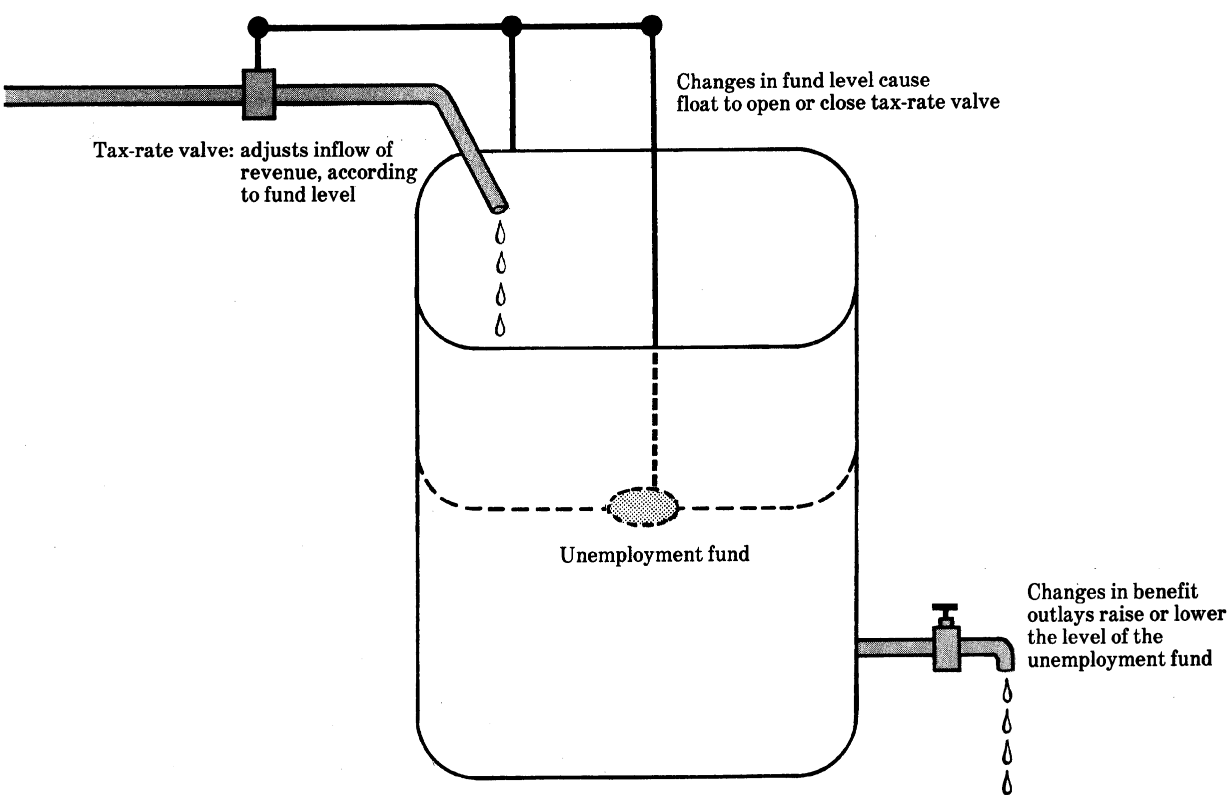
A corollary of the law of equilibrium is that an increase in the benefit-cost rate as the result of liberalizing legislation tends to cause a decrease in the size of the fund. To achieve an equilibrium with benefit costs after the legislated increase, average tax rates must rise, but they will not rise until the fund is depleted enough to call a higher schedule of tax rates into play. Only while the fund remains at its new, lower level will equilibrium be maintained; but, whenever equilibrium ceases, then a change in the fund balance will restore it.

The workings of this law of equilibrium may be clarified by a physical example, as shown by Figure 1.

An intriguing aspect of the mechanism is that, since the system is constantly tending toward equilibrium, the factors involved interact. As earlier noted, the first effect of an increase in benefit expenditures is a reduction in the size of the fund. This reduction is soon reflected, through the operation of the float valve (namely, a shift to a higher tax rate schedule) by an increase in tax rates and a more rapid flow of revenue into the fund. When an equilibrium is thereby established, the fund balance is stabilized, but at a lower level. Similarly, if revenues are increased without an increase in benefits, or if benefits are reduced, the fund balance will grow. This growth is soon reflected, through the operation of the float valve (namely, a shift to a lower rate schedule) by a lowering of tax rates and a slower flow of revenue into the fund. When equilibrium is thus established, the fund balance is stabilized, but at a higher level.

The law of equilibrium operates in any State that has alternative schedules of tax rates, provided there is at least one schedule that can produce revenues equaling benefit costs. Moreover, the law of equilibrium also affects individual employers within a tax rate schedule so long as their rates are not prevented (by the legal

FIGURE 1. **Mechanics of the law of equilibrium**



maximum or minimum rates) from conforming to their benefit costs.

For example, the "Draft Bill for State Unemployment Compensation of Pooled Fund . . . Type," published by the Social Security Board in January 1936 provided for three alternative schedules of tax rates: (1) a flat 2.7 percent rate for all employers if the fund balance was smaller than the amount of benefits paid in the preceding year; (2) rates of 1.8 percent and 2.7 percent depending on individual employer experience if the fund balance equaled or exceeded the benefits paid in the preceding year but were less than twice that amount of benefits; and (3) rates of 0.9 percent, 1.8 percent, and 2.7 percent depending on individual employer experience if the fund balance was 2 or more times the amount of benefits paid in the preceding year.

Suppose that benefit cost in a State having the federally suggested tax rate schedule was 2.25 percent of payroll. Suppose also that the schedule that permitted two tax rates (1.8 percent and 2.7 percent) produced an average tax rate of 2 percent. In that case, in the years in which the fund balance permitted the two rates, the fund balance would decline; in the years in which only the 2.7 percent rate was permitted, the fund balance would increase. From year to year, the fluctuating balance of the State fund would cause the State to alternate between the two rate schedules; over time, the average tax rate would equal the benefit cost rate, namely, 2.25 percent of the payroll. The same process would apply to the tax rates of individual employers. The lack of multiple rate tables, or a small number of tax rates within the tables, cannot prevent the operation of the law of equilibrium.

All in all, this structure presents a "through the looking glass" approach to financing, in which the size of reserves is inversely related to the level of benefit costs. In other words, the higher the risk of loss, the lower the reserves; and the lower the risk, the higher the reserves. The most conservative of solvency standards can be rendered ineffectual by this anomaly in the tax structures.

Such a flaw in the operation of the laws' fund solvency protective provisions can and will be corrected, at least in part, by the routine operation of the formula for *individual* employer experience rating.

This gives rise immediately to the question: If fund solvency protective provisions operate in reverse so that the variation of individual employer tax rates under experience rating must operate in part to overcome this weakness, why should fund solvency provisions be retained?

Unfortunately, in the States where experience-rating provisions are based on a replenishment concept (those with the benefit ratio or benefit wage ratio formulas) no consideration is given to reserves in fixing individual tax rates, except by way of the fund solvency provisions. And in the reserve ratio States, as will be shown, the same flaw that tends to emasculate fund solvency provisions also besets the individual rating formula. The law of equilibrium operates within each tax rate table as a microcosm of the operation of the fund solvency provisions.

To the tables of tax rates in reserve ratio laws, tax rates are assigned to employers according to the brackets in which their respective reserve ratios fall. Reserve ratio, in turn, is the percentage derived by dividing the balance in the employers' accounts in the fund by their annual taxable payrolls. The higher the reserve ratio, the lower the tax rate, and vice versa. Negative employers account balances exist, and, quite often, tax rates vary for negative balance employers according to their negative account percentages. Thus, in a given State, employers may be required to build up their reserve to, say, 12 percent of their annual taxable payroll before they can qualify for the minimum tax rate; they may be permitted to draw down their account to a negative 10 percent of their annual taxable payroll before they are required to pay the maximum tax rate.

The law of equilibrium is fully applicable to tax rates and employers' account balances under reserve ratio experience rating. The three factors—tax rates, benefit cost rates, and reserve ratios—are interelated and interact so that a change in any one ratio changes the other two. An increase in the benefit-cost rate (whether due to statutory change, decline of the employer's industry, change in seasonal patterns, and the like) will first, lower employers' reserve ratios; second, increase their tax rate and, in the end, bring the tax rate in balance with the cost rate, freezing the employers' reserve ratios and account balances at the lower level needed to maintain equilibrium between income and outgo.

The prevailing types of experience-rating formulas, therefore, either do nothing to offset the results of the flaw in the fund solvency provisions or they contain the same type of flaw so that their operation emphasizes the problem. Another aspect of this problem is the fact that the provision of a series of graduated tax-rate schedules slows down the recovery of the fund after a period of heavy disbursements due to cyclical unemployment. Tax rates start to go down before the fund has fully recovered.

Slow response to changing economic conditions and to fluctuations in benefit costs looked like good policy when the State laws were originally enacted; and, in view of the then-accepted 7- to 10-year business cycle pattern, gradual response to changing economic condition seemed to be quite safe. A good deal of policy emphasis was given to achieving countercyclical impact of financing burdens. This can be done by delaying the tax increases due to bulges in benefit costs. Discussing financing policy in the earlier days of the program, Ewan Clague told State UC administrators in a speech to the Interstate Conference of Employment Security Administrators "ideally, employers should pay in good times for the unemployment benefits that must be paid in bad times."

This policy of countercyclical financing is a good one. It prevents the partial vitiation of the increase in purchasing power achieved by paying more benefits through a concurrent, and offsetting, rise in the payroll taxes that finance the benefits. However, if it comes to a choice, the solvency of State unemployment funds must take precedence over the countercyclical incidence of the taxes.

Numerous devices have been used to slip the high and low unemployment taxes so as to promote countercyclical tax fluctuation. Among these are provisions limiting the possible increase in tax rates from year to year and, in reserve ratio States, the use of only the most recent year's taxable payroll (instead of the average for the last 3 or 5 years) in calculating reserve ratios. These provisions work; but their operation delays the recovery of the State fund balance after a period of sustained heavy benefit payments. While this might have been safe when business cycles lasted 7 to 10 years, in recent years recessions have been recurring so quickly that artificially delayed tax revenue endangers the solvency of the funds. It is still possible safely to attain a degree of countercyclical incidence of unemployment taxes but only at the expense of maintaining a much larger unemployment fund balance than might otherwise be necessary. In other words, in determining policy for financing a State unemployment fund, consideration must be given to a trade-off of size-of-fund versus timing of the incidence of the tax.

Recommendation for State Legislation

It is vital that the tax structure of UC laws respond quickly enough to cyclical increases in benefit payments so that the fund will be able to weather the bulge in benefit payments in the next business decline. The present practice (of providing a series of tax tables that reduce revenue by progressive steps as the fund approaches its solvency goal) delays too long the recovery of the funds. Moreover, under the law of equilibrium, such a series of tax tables reduces the size of the fund in response to legislated increases in benefit expenditures. The common reserve ratio formulas for setting the tax rates of individual employers are also subject to the law of equilibrium and also exhibit the same dangerous tendencies.

To correct these related flaws, study should be given to including the following new approaches in State tax formulas:

1. Raise the maximum tax rates that may be assigned under experience rating. If action to raise maximum tax rates does not solve the problem, provide for a uniform tax rate (underlying the experience-rated tax rates) to be paid by all employers whenever, and as long as, the fund is below its optimum level, whatever that may be.

2. In the formula for tax rates based on experience rating, provide for two separately determined components of employer tax rates, components that will not affect each other in the way that tax rates, reserves, and benefit-cost rates interact under the law of equilibrium. One such component should be oriented toward recoupment by the fund of benefits recently charged to the employer's experience-rating record. This component would closely resemble the product of the benefit ratio rating formula. The second component should be aimed at requiring all employers to accumulate a reserve in their accounts in the fund that meet the same criterion as adopted for the whole fund. Being totally disconnected from benefit costs, this second component would require employers to include, in their total tax rate, a fixed "account-building component" that would remain in effect unchanged unless and until their account reached the specified level. Thus, the law of equilibrium is avoided, and the required size of reserves will no longer be unintentionally decreased as the result of higher benefit costs. Adoption of this approach is not dependent on a State's selection of one or another of the available fund solvency standards. It is believed, however, that a formula such as the one proposed here can better ensure that States will achieve whatever standard of solvency they may choose.

Taxable wage base

It might appear that provision in a State law for automatic, annual increases in the limit on an employee's annual wages that is subject to tax could alleviate the difficulties in maintaining fund solvency caused by the flaws that have been described. In practice, this will seldom, if ever, work.

In the benefit ratio and benefit-wage ratio types of experience rating, the arithmetic of the rating formula prevents any significant, long-term improvement of a State's fund balance as a result of an increase in the taxable wage base. Under those laws, tax rates are the quotient obtained by dividing actual benefits (or, in benefit-wage ratio formulas, approximated benefits) by taxable payroll. Accordingly, after an increase in the taxable wage base has been in effect throughout the period (usually 3 years) for which the rating ratio is computed, tax rates drop because the benefits are divided by a larger number. The drop in tax rates substantially offsets the increase in taxable payrolls to which the rates are applied. After a temporary bulge while the new, higher tax base is fully worked into the rating formula, revenue settles back to substantially the same level relative to benefit costs as prior to the wage base increase.

If the fund solvency protective criterion, in a benefit ratio or benefit wage ratio law, is expressed as a percentage of taxable payroll, then an increase in the taxable wage base will cause a rise in the fund balance (if not an absolute rise, at least a rise to a level higher than it would otherwise be). However, this is an uncontrolled and a one-time result. There is no assurance that the resultant increase will be sufficient to offset the problems continually being presented by the formula flaws discussed.

Maximum tax rates under experience rating

Statutory maximum (and minimum) limits on the tax rates that may be assigned to individual employers have the effect of limiting the size of the group of employers for whom experience-rating incentives have their intended effect. For this report, however, note that the level of the maximum rate affects fund solvency by determining the proportion of all benefit payments that will be "ineffectively charged."

Over the years, State legislatures have tended to resist setting maximum tax rates above the maximum allowable offset against the Federal unemployment tax. The States are not compelled to hold their maximum tax rates down to that level, but the existence of that Federal maximum has proved to be a practical obstacle to needed change.

Although the Congress has several times increased the taxable wage base for the Federal unemployment tax, it has never increased the maximum allowable credit against the Federal unemployment tax during the more than 40 years that the tax has existed. When more net Federal income from the Federal unemployment tax was needed than could be realized by a tax base increase, the Congress has increased the rate of the Federal tax but provided that 100 percent of the yield of the rate increase should be for Federal expenses in the program.

During the decades since the Congress legislated the maximum allowable offset, State benefit provisions have been repeatedly liberalized. In recent years, it has become apparent that some States need *average* tax rates *in excess* of the *2.7 percent* maximum credit in order to finance their benefit costs.

It is time for the Congress to raise the gross rate of the Federal unemployment tax. The 90 percent limit on allowable credit against the Federal tax should be retained. For example, if the gross rate of the Federal tax were increased to 6 percent, with continued 90 percent credit, then the net Federal tax would be six-tenths of 1 percent (approximately what has been needed in recent years) and the maximum allowable credit would be increased from 2.7 percent to 5.4 percent. The latter figure seems amply justified by the legislated increases in benefit costs that have occurred in the States since 1936.

Increasing the Federal unemployment tax rate would require the States to increase their "standard rates" from 2.7 percent to the new level. It would not compel any tax rate changes for other than employers whose operations are contributing to the problem of ineffectively charged benefits. Newly covered employers could be made subject to rates lower than the maximum allowable credit by providing for lower Federal unemployment tax rates for employers newly subject to the Federal unemployment tax.

Conclusions

In view of the many uncertainties faced in providing for the financial stability of the State UC systems, it is vital that the mechanical details of the State taxing formulas should be reliable. Some provisions in State laws can interfere with the execution of financial policy.

1. Noncharged and ineffectively charged benefits should be minimized through more suitable maximum tax rates under experience rating, and the remainder should be financed by a separate tax rate dedicated to, and sufficient for, the purpose.

2. Fund solvency provisions and reserve ratio tax schedules can fail to operate as intended because, with tax rates graduated according to the size of the reserves, fund and account levels tend to vary inversely with changes in benefit costs. Moreover, replenishment is often prematurely slowed down by reducing tax rates well before optimum reserve levels are reached. Tardy replenishment is a serious solvency threat now since recessions and slowdowns follow each other closely.

3. In most States, the maximum tax rates under experience rating have not kept pace with legislated increases in benefit costs. This lag narrows the group of employers for whom experience-rating incentives are effective, increases the significance and amount of ineffectively charged benefits, and undermines solvency.

4. Tax base increases are not effective in solving these problems. To minimize these problems, study should be given to these, and other, changes in State tax formulas:

a. Instead of providing alternate tables of tax rates to apply at various fund levels, provide a single tax table but supplement it, if necessary, with a separate, flat tax rate to be paid by all employers in addition to their experience-rated assessments whenever and as long as the fund is below the applicable solvency standard.

b. In the laws having reserve ratio experience rating, separate the tax-rate components based on recent benefit costs from the tax-rate components designed to maintain adequate account balances. This would break the undesirable causative link between benefit costs and size of reserves that now often cause reserve requirements to dwindle as benefit costs rise.

c. States should review their maximum tax rates in relation to the amount of ineffectively charged benefits and the number and percentage of all covered employers who are subject to the maximum tax rate.

d. The Federal Government should remove an existing obstruction to State action to increase maximum tax rates, by raising the gross rate of the Federal unemployment tax while retaining the limit on offset at 90 percent of the gross Federal tax rate.

Notes

1. A higher qualifying requirement may or may not be enacted concurrently to offset this effect in whole or in part.

2. If the average duration of benefit payments in good times would otherwise be 10 weeks the repeal of the waiting week might increase costs by 7 percent (1 benefit week more for all claimants who did not exhaust their entitlement); but, in bad times, the waiting week repeal might add only 3 percent to costs due to an increase in the proportion of claimants who exhausted their entitlement.

3. In this report, this type of experience-rating scheme will not be discussed. It is rare, seems to be fading out of the picture, and presents unique problems.

4. In reserve ratio laws, the balance of employers' accounts reveal their cumulative experience for a long period of time. Often this accounting runs back to the date when the employer first became subject to the law. However, some States write off, cancel or forgive negative balances in excess of 2 percent of the employer's annual taxable payroll; and some States give the employer a choice between an all-time account balance and the balance in recent (not less than 3) years.

Borrowing and Investment Provisions for the UI Trust Fund

Joseph E. Hight

Solvency of the Federal-State unemployment insurance (UI) system has become a major issue in recent years. The 1974–75 recession, with its resulting high unemployment, caused many States to exhaust their UI trust funds. Those States have had to borrow from the Federal Unemployment Account (FUA), from which interest-free loans are available, in order to continue paying UI benefits. Other States, however, had built relatively higher trust fund reserves and did not have to borrow despite high rates of unemployment.

The different relative reserve levels in State trust funds prior to 1974–75 can be attributed to the absence of mandated solvency standards and the ease of borrowing when State trust funds are exhausted. In particular, the interest-free nature of the loans makes them an attractive alternative to building and maintaining trust fund reserves, especially when the rate of inflation makes for repayment in substantially deflated dollars. U.S. Department of Labor (DOL) officials generally have urged States to voluntarily meet suggested solvency standards in the form of maintaining reserves at specific levels relative to high-cost years (for example, 1.5 times a recent highest-cost year). Most States, however, have not attained the suggested standards.

In the next section the author describes the present arrangements for the investing of State UI trust fund balances, the present loan provisions, and the likely effect that these investment and loan provisions have on incentives to maintain State solvency and on the integrity of the system. After this, the author discusses mandatory solvency standards and alternative borrowing and investment provisions in which an explicit interest rate would be charged against a State's UI fund for any outstanding loans. In the concluding section, the author suggests a policy alternative to either the present system or to mandatory solvency standards.

The Present System

Investment of trust fund balances

Under the present system, States must deposit their UI tax receipts with the U.S. Treasury. The Treasury credits these receipts to the UI trust fund. Each State has a separate account in the trust fund to which its tax receipts are credited and from which it draws to pay UI benefits.

Trust fund balances are invested by law—42 U.S.C. 1104(b)—in U.S. Government securities. Investments can be made in any of the marketable U.S. Government securities, in which case they earn the market-determined yield, or they can be invested in special-issue securities that earn a rate of return equal to the average rate earned on all Government securities in the month preceding the date of issue of the special securities. Current practice is to invest all incoming funds in the special issues and to phase out investment in the marketable securities as they reach maturity.

The average rate of return to the trust fund changes monthly as market-determined interest rates change, but, since only the interest rates on newly invested balances change, this average rate of return changes more slowly than do market rates. The average rate of return as of December of each year since 1972 and as of March 1979 was as follows (Source—U.S. Treasury Department):

Date	Rate of return (percent)
December 1972	4.86
December 1973	5.46
December 1974	5.92
December 1975	4.68
December 1976	5.26
December 1977	5.56
March 1979	6.52

Provisions for borrowing

According to Title XII of the Social Security Act, a State that expects its trust fund account balance to be

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insufficient to cover estimated benefit costs during the next 3 months may receive an advance from the FUA, which receives its funds from the Federal UI tax or borrows from the general fund of the U.S. Treasury. No explicit interest is charged for such loans although there is a modest implicit cost to the States for such borrowing.

A State is free to make partial payments or to fully pay back FUA loans at any time it wishes. However, present law specifies a repayment mechanism should a State fail to repay a loan by the 10th of November following the second January in which the loan remains outstanding. The repayment provision works through the employers' credit against the Federal UI tax. Presently, employers receive a 2.7 percentage point credit against the 3.2 percent Federal UI payroll tax. In a State that has failed to repay a FUA loan within the specified time, the employers' tax credit against the Federal UI tax is reduced by 0.3 percentage points for the first year, with progressively larger reductions in subsequent years in which unpaid advances remain.

The tax receipts resulting from reduced tax credits are used to retire the State trust fund debt. However, the Secretary of Labor has been granted the authority to suspend these repayment provisions (PL 94–95 and PL 95–19) if a State's UI tax laws meet certain minimum tax rate provisions. Under present law the Secretary of Labor can defer these repayment provisions through the end of 1979 and has, in fact, done so for a number of States in recent years.

Implicit cost of borrowing

Although, under current law, States are not charged an explicit interest rate for borrowing, there is an implicit cost for borrowing whenever the States simultaneously carry an outstanding advance and a positive reserve balance in their trust fund account. States receive earnings only on account balances above outstanding advances. This loss of interest earnings on any balance up to the amount of any outstanding loan constitutes a cost of borrowing.

For example, if a State were to carry an outstanding advance of $200 million throughout the year and an average trust fund account balance of $100 million, it would receive no interest earnings on the $100 million.[1] At a 6 percent rate of return, this would mean forfeited earnings of $6 million or 3 percent of the $200 million loan. (This example is very close to New Jersey's experience during 1975.) In theory, any State with an outstanding advance can minimize the cost of that loan by minimizing its account balance through changes in tax and/or benefit provisions of its laws or by simply failing to increase tax rates.

This example overstates the cost of borrowing for most State since most States with outstanding loans carry very small reserve balances. Also, because of inflation, the longer a loan remains outstanding the less costly it becomes since it will be repaid in substantially deflated dollars. Of course, market interest rates and, hence, the rate of return on trust fund balances increases as the rate of inflation rises. States in a borrowing position lose more earnings on balances below their loan liability as inflation accelerates. However, this cost rises modestly since the return on trust fund balances lags behind increases in the rate of inflation.

Incentives for maintaining solvency and the integrity of the system

The cost of carrying positive balances in a State's UI trust fund account is borne directly by employers in the State. The higher the reserve balance a State attempts to maintain, the higher will be the UI payroll taxes that employers must pay at any given rate of benefit costs and interest earnings on these balances. These higher tax moneys that employers must pay could be used in other ways; for example, they could be invested in the employers' businesses to increase future earnings, or they could be used to offer higher wages and attract a more skillful and motivated work force.

These opportunity costs of carrying reserve balances can be offset by incentives to increase employers' willingness to finance these balances. The earnings received by the trust fund through investment in Government securities is such an offset. These earnings are credited to the trust fund accounts and, hence, allow lower taxes for any given level of benefit outflow and desired trust fund balance.

There is also a cost to employers if a State does not carry an adequate level of reserves. Carrying a low level of reserves increases the probability that the State UI system will have to borrow. The cost of borrowing should be an inducement to employers to support an adequate level of reserves. However, under the present system, the cost for borrowing, as just discussed, is relatively modest, being limited to forgone earnings on any trust fund deposits up to the amount of any outstanding loan.

Another incentive to States for carrying adequate reserves might be termed "moral suasion." U.S. DOL officials constantly lecture the States about the necessity for maintaining the "integrity" of the system by maintaining adequate reserves to avoid borrowing or "insolvency." The DOL urges States to meet suggested solvency standards in the form of maintaining reserves equal to a multiple of benefit costs in a high-cost year. Periodically, the possibility of federally mandated solvency standards are discussed. However, in the face of such attractive borrowing provisions, this approach has had an uneven effect. Some States have been more susceptible to "moral suasion" than others.

Those States that borrow from the FUA are in effect being subsidized by those States that fail to borrow. This account is funded by the Federal unemployment payroll tax, and, hence, all States contribute to it. States that borrow from this account are in effect borrowing from the other States. When these loans are paid back in deflated dollars and with no interest, the borrowing States have in effect received a subsidy. They have not fully financed their own benefit costs. If the integrity of the system means that each State is to finance its own benefits, then this integrity is violated by interest-free loans.

Alternatives to the Present System

Mandatory solvency standards

One way of modifying the present system would be to require the States to meet specific solvency standards. On the surface this is an appealing solution. However, when one attempts to specify the details of such a requirement, difficulties quickly emerge.

First, "mandatory" must be defined. In the extreme, States that fail to meet the standards could lose Federal certification for their UI programs and, hence, lose Federal financing of their administrative costs. However, lesser penalties could be devised, such as loss of borrowing privileges from the FUA or loss of the employer tax credits against the Federal unemployment tax. The difficulty is to assess the effectiveness of various penalties. Also, the more burdensome the solvency standards are, the more severe the penalties will have to be in order to elicit adherence to the standards.

The second difficulty is to define the standard. The simplest procedure would be to define the standard in terms of a level of reserves relative to the highest-cost year of some past span of years and to require States to *always* meet this standard. However, such a requirement would mean holding reserves that are not really available to pay benefits, since they must serve to meet the solvency standard.

More sensibly, a solvency standard might be related to the current benefit-cost level. For example, the standard might be that when current benefit costs (stated as a percent of covered wages) equal the average of the past 10 years, then reserves should equal some multiple of the highest-cost year among the 10 years. When current benefit costs are above this 10-year average, reserves could be lower than this multiple, and similarly reserves would be required to be higher when current benefit costs were below the 10-year average. This, of course, is only meant to be illustrative. Such a workable flexible standard is more complex to devise and administer than the simpler one described above.

The most damaging argument against a federally mandated solvency standard is that differences in State UI systems and the State economies cause any single standard to provide varying degrees of protection against insolvency and to be unnecessarily burdensome for some States. It is argued that, because of differences in industrial mix, seasonality, economic growth rates, and UI tax structure, some States are better able to withstand and recover from a higher benefit-cost drain than others, and, hence, can make do with lower reserve levels. If this argument holds, then solvency standards that reflect differences among the States are advisable. However, this may add so much complexity to any proposed standard as to make them unworkable.

Alternative borrowing and investment provisions

The complexity of devising effective solvency standards suggests a search for alternatives. One possibility would be to increase the incentives to build and maintain reserve balances. Inducements to employers to more willingly support a tax structure that will yield higher trust fund account balances can be achieved by increasing the cost of borrowing and increasing the yield on invested funds.

The availability of interest-free loans is perhaps the most glaring defect of the present system. Indeed, the present system with its interest-free loans and fairly modest rate of return on invested fund balances suggested that States that follow low reserve fund policies are only being prudent. Corrective action would be to charge an interest rate on borrowing at least equal to the yield on reserve balances.

The cost of borrowing could be raised even further by charging an interest rate differential between that paid on borrowing and that earned on invested trust funds. For example, if, for a given period the yield on invested reserves were 6 percent, outstanding advances could be charged interest at the rate of 7 or 8 percent. Ideally, the interest rate on loans should reflect the rate of inflation plus the opportunity cost of these funds to employers who must pay the taxes to finance them.

Finally, the positive inducement for carrying reserves could be increased by raising the yield on invested funds. In a study of the methods for paying interest on government trust funds, the General Accounting Office (GAO) has recommended to the Congress a change that would accomplish this.[2] The GAO recommended that trust fund balances not be invested in special issue securities but instead be paid interest on a basis similar to savings accounts in banks. The interest rate should be computed on the basis of market yields on all outstanding marketable securities or another appropriate measure of the U.S. Treasury's cost to borrow from the public and should be adjusted periodically. The GAO found that in most instances this would increase interest earnings of the trust fund balances. For example, the assigned rate of interest on special issue securities for the UI trust fund and the comparable open-market yield on June 30, 1970, through June 30, 1974, was as follows (Source—GAO Report B–154394, Appendix VI, pp. 42–50):

Date	Assigned rate (percent)	Comparable open market rate (percent)
June 30, 1970	5.50	7.36
June 30, 1971	5.00	6.18
June 30, 1972	5.00	5.36
June 30, 1973	5.75	7.78
June 30, 1974	6.50	8.92

A change along the lines suggested by the GAO would make the rate of return to trust fund balances more nearly equal to the opportunity costs of these funds to employers.

Conclusions

Urging States to maintain suggested solvency standards has not proven successful. One problem has been that, given the differences among the States in their UI laws, the structure of their economies, their abilities to withstand and to rebound from recessions, and their basic economic rates of growth, a single standard for all States is untenable. On the other hand, to determine different standards for different States or even to determine flexible standards based on State characteristics may prove to be too complex a problem.

Given the difficulty of determining solvency standards, an alternative policy may be in order. A suggested alternative might include the following:

1. An interest rate at least equal to and possibly higher than the yield on positive reserve fund balances should be charged for borrowing. This should encourage States to follow a reserve fund policy that would lessen the probability of having to borrow.

2. As recommended by the GAO, change the system of paying interest on trust fund balances to one similar to the way interest is paid to accounts in savings banks, with the interest rate computed on the basis of the cost to the Treasury of borrowing from the public. These rates would, of course, reflect rates of inflation. This would, in most cases, increase yields on these funds and should encourage States to carry higher average reserve balances.

The advantages of such a policy are that it circumvents the difficulty of defining solvency standards for the States but offers inducements to the States for following sensible reserve policies on their own. Loans will not be eliminated under such a system. However, in a system in which loans are made at interest rates that reflect rates of inflation and the opportunity cost of these funds, no inherent subsidies are involved. Loans under this type of system should be no cause for alarm and should do no damage to the integrity of the system.

Notes

1. For this example to be strictly correct the State's trust fund account balance could not have risen above $200 million at any time during the year. For if it had, it would have received some interest earnings for the time its balance was above this level.

2. *Need for a Uniform Method for Paying Interest on Government Trust Funds* (U.S. Department of Treasury, General Accounting Office, Washington, D.C., January 10, 1975).

The Impact of Financing

Richard S. Toikka
Peter Greenston

Within the framework of the Social Security Act of 1935 and subsequent Federal legislation, States have adopted unemployment insurance (UI) programs to finance benefits paid to the jobless. As with any tax, major issues concern its incidence—who bears the tax burden and what are the resulting implications for efficient resource allocation. Some of these issues are: the effect on the relative utilization and prices of production factors; the impact on workers with different levels of skills and earnings; and the impact on the size and the composition of output due to the financing system that makes industries with low labor turnover subsidize those with high turnover. It is also possible to consider separately the effects of particular provisions of the system on employment stability or labor turnover. Finally, changes in UI tax rates, depending on incidence and wage-price behavior, affect aggregate inflation rates. Other changes may affect the anticyclical properties of the financing system. Also, alternative approaches to replenishing the UI trust fund may well have different macroeconomic effects on aggregate employment and price levels.

The purpose of this report is to summarize what is known about these issues. Pertinent features of the financing system are briefly described before the issues are discussed. The last section identifies several important policy areas and the research that would illuminate them.

UI Taxation Structure

The Federal payroll tax is currently 3.4 percent of UI taxable wages and was recently increased to apply to the first $6,000 of "annual" earnings per employee.[1] Employers may claim a credit of up to 2.7 percent of taxable wages for taxes paid to finance a State UI program; this credit may include taxes saved through the use of an experience-rated plan.

Several novel concepts are embodied in the UI programs. One such concept is that partial support of unemployed workers is seen as a cost of doing business, and, therefore, the responsibility of employers.[2] The issue of the tax's incidence on workers was apparently not raised originally, the presumptions being that the tax would be paid from employer profits. Only recently has there been theoretical analysis of the potential impacts on the salaries of different groups of workers.

The UI program also reflects the new idea that employers' responsibility is collective. Soon after the law was enacted, all States adopted employer reserves, which were then pooled. Thus, some sharing of the burden developed from the start.

Finally, experience rating means that the collective responsibility is still shared in such a way that employer taxes bear some relation to the unemployment experience of individual firms or industries.

State UI taxation systems are usually described and compared by their degree of experience rating—how closely a firm's tax rate reflects its unemployment experience. The five systems presently in use are reserve ratio (in 32 States), benefit ratio (15), benefit-wage ratio (4), compensable separations (1), and payroll variation (4).[3] Each system measures unemployment experience or the cost of benefits in the past compared to total payroll or some other measure of exposure to unemployment. The five systems differ in a number of ways: in the experience factors measured and the methods of their measurement, in the number of years over which experience is recorded, in the relative weight given factors in assigning rates, and in the construction of formulas. Each system has three basic parts: a definition of experience, the measurement of experience as defined, and the tax schedule and its parameters.

Definition of experience. Under the reserve-ratio and benefit-ratio systems, chosen by most States, benefit payments represent employer experience with unemployment. In this scheme the employer assumes some liability for the taxes needed to pay the benefits due under the law. Under the benefit-wage-ratio formula, experience is measured by the number of workers whose separation has resulted in benefit payments; the duration of benefits is not considered.[4] Finally, under the

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recently developed payroll variation plan, the employer's unemployment experience is measured by the decline in payroll from the last period; benefit payments are not considered.

Measurement of experience. Measurement determines which benefits are charged to employers and which employers are charged. A completely experience-rated system would charge all benefits. Nevertheless, State laws also provide for not charging benefits.[5] The circumstances provided for vary from State to State but include employment of short duration; unemployment of short duration; reversal of benefit determination; part-time employment; seasonal employment; and voluntary quits, misconduct, or refusal of suitable work. The frequencies with which the various circumstances occur continually fluctuate.

When a claimant has had more than one employer in the base period (about 25 percent of all claimants are in this category), charges can be allocated to the most recent employer, in inverse chronological order among all employers, or to the employers in proportion to the claimant's base-period wages.

Tax schedule. In all but nine States the standard UI tax rate is 2.7 percent for firms not qualified for experience rating. Federal and State laws require a minimum period of coverage to qualify for experience rating. States also have certain fund solvency requirements before they allow reduced rates. For qualifying employers, a tax schedule converts experience into a tax premium. In general, the wider the range and the greater the number of rates, the higher the degree of experience rating. The degree of experience rating is also correlated with the responsiveness of tax rates to reserve ratios. A completely experience-rated system would have a zero minimum and an unlimited maximum.[6] Over the last 20 years, States have gradually adopted higher maximum rates.[7] At present, there are only six States with a maximum of 2.7 percent, 38 States go up to 4.5 percent, and 17 have even higher limits. Over the last 10 years, there has been a decline in the number of States with zero minimums to three, though in 1969 about 25 percent of all payrolls were taxed at less than 0.5 percent.

The size of the taxable wage base has grown relatively little and until recently had remained the same from the beginning of the UI system. At the program's inception, the base of $3,000 was approximately equal to average annual wages; the current base of $6,000, established in 1978, puts taxable payrolls at around 50 percent of total payrolls. Increases in the base affect the degree of experience rating, with high-wage employers hardest hit.[8] Increases could also smooth out employment fluctuations by affecting how employers alter their labor demand as product demand changes. Most important, increases in the base raise the relative cost of employing high-wage workers and thereby increase the demand for low-wage workers.

The Impact of UI Financing

There are a number of ways in which the UI financing system affects the behavior and economic situation of firms and households. The payroll tax gives firms certain incentives to alter their way of doing business. And these changes affect the markets in which they sell and buy. The research on the importance of these effects, reviewed here, falls into five categories: (1) studies of the long-run incidence of payroll taxes—who pays the tax in the long run; (2) studies of the short-run inflationary impact of changes in payroll taxes; (3) studies on how experience rating and the size of the taxable wage base affect the behavior of firms; (4) studies of the extent and impact of interindustry subsidies introduced by the UI tax system; and (5) studies of the role of UI taxes in stabilizing output and employment.

The fact that the UI tax is collected from employers does not necessarily imply that it is ultimately paid by them. A tax on payrolls raises the cost of employing labor and introduces an incentive to economize on it. If firms respond to the tax by reducing their demand for labor, the market wage may fall, thus shifting part or all of the tax cost to workers in the form of lower wages. If firms respond by reducing production or by marking up prices over unit cost, part or all of the tax cost may be shifted to the consuming public.

Long-run incidence. There have been a number of studies of the long-run incidence of payroll taxes.[9] They seek to determine whether the tax ultimately comes out of wages, profits, or the return to capital. Some studies have focused on the U.S. social security payroll tax, others on both the UI tax and the social security tax. Their conclusions are very mixed. In a thorough study of the incidence of the social security tax, John Brittain concluded that the payroll tax is completely shifted onto labor in the form of lower wages.[10] Brittain's results have been challenged on methodological grounds, and a number of studies using more general techniques have weakened his conclusion.[11] While there is still controversy in interpreting the evidence, the consensus of recent studies seems to be that, at least in the United States, only one-third to one-half of the tax is shifted to labor and this shifting occurs during the first year after a tax increase.[12] The remainder of the tax comes either out of profits or the return to capital. Economic theory strongly predicts that the tax will be shifted either to labor or capital in the long run. In the absence of a good estimate of how much of the tax is eventually paid out of capital's share, it is reasonable to assume that what is not shifted onto labor is eventually shifted onto capital.

Impact on short-run price levels. The impact of a payroll tax on prices and money wages has also been studied.[13] The studies tend to show that an increase in a payroll tax is at least partially shifted to prices by pushing prices up over unit labor costs. Unless it is immediately and completely shifted onto wages, the payroll tax affects unit labor costs in the short run, so that there may be a short-run price response to any change in the payroll tax rate.

The initial impact is only part of the story. The price increases induced by an increased payroll tax can then affect wages, as unions and workers demand higher wages to compensate for the increase in the cost of living. Changes in the payroll tax also affect wages directly, as employers attempt to shift at least some of the tax onto labor by paying lower wages than they would have otherwise. The results of this whole process are thought to be, first, a reduction in the real wages, that is, money wages adjusted for the price level, as *some* of the tax is shifted to labor; and, second, price and wage increases, as a price-wage-price inflationary spiral is set off. The process would occur in reverse if there were a reduction in the payroll tax.

In fact, payroll tax rollbacks are currently being debated as a means of curbing inflation. The Carter administration's Council of Economic Advisors has estimated that it would be necessary to reduce payroll tax revenues by 15 to 18 billion dollars to lower price inflation by 1 percent.[14] This estimate is consistent with the prediction of major econometric models.[15]

The role payroll taxes play in inflation is probably less relevant for the UI system than it is for social security. First, the UI tax is much smaller than the Old-Age, Survivors, Disability, and Health Insurance program (OASDHI) tax, both in its rate and its taxable maximum. Second, the OASDHI tax has been increasing faster than the UI tax, primarily because the number of persons receiving pensions has been growing relative to workers paying into the system. The same secular imbalance is unlikely to arise in the UI system, since, over long periods of time, benefits and receipts remain in line with each other, if tax and benefit rates are constant and if unemployment does not have a secular trend.

Experience-rating incentive effects. Another group of studies has focused on the incentive effects of the UI tax.[16] Recent theoretical research has indicated that experience rating introduces incentives for firms to reduce separations that result in chargeable benefits. A firm may attempt to do so by stabilizing output, changing the length of the workweek, reducing overtime, increasing nonchargeable labor turnover, or retaining workers even when the value of what they produce falls short of labor cost. There is some empirical evidence that firms respond in these ways, but more research is needed for the case to be convincing.

Recent theoretical work has also shown that the maximum on taxable wages creates incentives for the firm.[17] The firm's taxes are reduced if it substitutes high-wage for low-wage labor, because a lower fraction of a high-wage worker's wages is taxable. There is no empirical evidence on the importance of this effect. The taxable maximum also penalizes firms with high labor turnover. Because firms are taxed on the first $6,000 of *each* worker's earnings, it is to a firm's advantage to keep turnover low. There is some evidence that firms respond to this incentive, but it is weak because the taxable maximum has not changed very much over time and because data on individual firms have not yet been analyzed.[18]

Cross-subsidization. Studies have also examined the implications of a particular feature of experience rating. Experience-rating systems are incomplete because firms pay less than 100 percent of all the benefits charged to them and because some benefits are not charged to any firm.[19] All State systems are incompletely experience-rated because there are maximum or positive minimum tax rates or both. These maximums and minimums lead to cross-industry subsidies, with some industries picking up the tab for others with higher turnover. Research has shown that construction, agriculture, and other seasonal industries are consistently subsidized. A recent theoretical study concluded that neither capital nor labor would gain much from these interindustry subsidies unless there was a substantial difference among the industries in the ratio of labor to capital or in the ease with which they could be substituted for one another.[20] The study assumed that employers maximized profits and that workers were mobile across industries.

Macroeconomic effects. Finally, there is evidence on the macroeconomic effects of UI financing.[21] Both UI benefits and tax receipts are affected by the business cycle. In a recession, UI tax receipts fall off as employment is reduced; at the same time, UI benefits rise because more workers are unemployed. In a recovery, the reverse is true: receipts rise, benefits fall. Most States try to protect their trust funds by tying the level of tax rates to the level of reserves in UI funds. When the economy experiences a downturn, UI tax rates rise for two reasons. First, the experience-rating system causes tax rates to rise as more firms lay off workers. Second, the entire schedule of taxes may rise as the State fund is drawn down. Both of these adjustments occur after a long period. The tax rates for a calendar year are usually computed on the fund balances in the middle of the preceding year.

The lag time in the system may cause it to behave anticyclically, that is, to restrain inflation and contain recessions. In an economic downturn, the UI system pays out more than it takes in because tax rates do not rise immediately. This behavior stimulates the economy. In an upturn, the system takes in more than it pays out because the tax rates do not fall immediately. In fact, because of the way in which tax rates are determined, there is generally a lag of about 3 years before tax rates fully reflect experience. Because most postwar recessions have lasted 3 to 5 years, the tax response is not likely to occur until the economy is on the way out of the recession. The studies that have examined the role of taxes in postwar recessions indicate that the drag on net expenditures due to rising UI taxes has been minimal.[22]

Any modification of the tax system to assure the solvency of State funds must consider how this modification will affect the system's capability to stabilize output and employment. One issue here is the extent to which Federal loans or grants should substitute for a payroll tax increase to keep State funds solvent during a prolonged recession.

Suggested Future Research

Topics. A number of issues in UI financing are important for policy and amenable to research. They include: the effect of the UI tax on labor demand; the effect of the UI tax and benefits on labor supply; the impact of UI financing on the average wage; the long-run incidence of the tax; the short-run inflationary consequences of changes in the tax; and the effectiveness of the tax system as an automatic stabilizer of employment and income.

All but the last issue are relevant for predicting the impact of any change in the financing system as, for example, in the tax rate, the taxable maximum, or the method of experience rating. Research information would allow the costs and benefits of changes to be assessed. Logically, these issues should fit together in the following way. The tax initially rests on employers; therefore, any incremental change in the tax structure will have its initial impact on employers. If firms minimize costs, there will be a drop in demand for the taxed factor of production, labor, causing the wage rate to fall and shifting some of the tax to labor. If workers respond to the wage reduction by reducing labor supply, then employment and output will fall and the wage will not fall by the full amount of the tax increase. Thus, to estimate the impact of the tax on wages and the long-run incidence (who pays the tax), it is necessary to have knowledge of both the labor supply and labor demand relations. The short-run inflationary impact of changes in the UI tax structure can also be assessed in the framework of the demand for labor. If the tax change is not immediately and completely shifted to labor in the form of lower wages, then unit labor costs are increased to the firm. Research on the relation between the tax and unit labor cost in the short run and the relation between unit labor cost and price inflation can indicate how much of the tax shifts forward onto prices in the short run.

The last issue—the tax as a stabilizer—is singular because it is concerned with the financing system's impact on aggregate economic activity and with how the national economy affects UI taxes and revenues and vice versa.

Methods of analysis. The first issues can be analyzed best by a series of studies with common methodology. Much of the previous research has been disconnected, without a unified framework, a fault that has limited its usefulness.

To study the tax's impact on labor demand, a common framework would include firms that are optimizing their production over time with a specified technology. Recent advances in specification and estimation of production functions should be used.[23] The effect of the tax rate and the taxable maximum on total and relative demand for labor would be considered, as well as the short-run shifting of unit labor costs onto prices. Labor supply should be analyzed along with labor demand. Two elements are crucial in the supply study: workers' response to changes in their real wages induced by changes in labor demand, and the effect on the labor supply of changes in the level of availability of UI benefits.

Next, the labor demand and supply studies would be brought together in a general equilibrium analysis in which the effects of the tax on the wage level, employment, and output could be determined. The results would indicate the long-run incidence of the tax and the short-run inflationary implications of changes in the tax structure.

Finally, it is important to study how various incremental changes in the financing system would affect the UI system as a stabilizing mechanism. This study could draw on existing econometric models, which predict the relation between taxes and economic activity, or specify a simple model of the UI system and analyze its behavior under assumed changes in structure.

Data and available data sources. Previous studies of the impact of payroll taxes and experience rating have used a wide variety of data sources. They include cross-sectional data for countries, time series data for single countries, cross-sectional time series data aggregated for industries and industry/State groups, and longitudinal data for individuals. For the United States, the major data sources include: the decennial census data on individual employment and wages by industry, occupation, and State; various industry censuses giving data on sales or value added by industry and State; the

Bureau of Labor Statistics (BLS) series 790 and 1219 data on employment, payrolls, hours, and labor turnover by manufacturing industry and State; the Michigan Panel Study of Income Dynamics, which gives longitudinal data on individual employment and wages; the National Longitudinal Surveys giving longitudinal data on employment and earnings of individuals in four age-sex cohorts; and State data on the status of their funds and their tax rate schedules.

The ideal data source for this research, however, would be longitudinal data on individual firms. A national sample of such data does not exist in usable form. A study currently in progress has constructed a longitudinal data set with 20 quarters of data for approximately 300 firms in Georgia. This panel was created by merging data from the BLS 790 and 1219 establishment surveys with UI program data. The BLS data would be a logical starting point for the construction of a similar national data set. The analysis of the UI financing system as it affects aggregate employment, output, and inflation can probably be carried out adequately using published national data sources.

Knowledge of this impact of the UI tax could be greatly expanded if the BLS 790 and 1219 establishment survey data could be linked to UI program data on a national scale. An optimal sample size would have to be determined and allocated across States, and then the required number of firms from each State would have to be randomly selected. The State agencies would then be requested to provide longitudinal program data. Because the sample would be national, the burden on any one State would be greatly reduced: for example, a national sample of 1,000 firms would require State agencies to compile data on only about 20 firms each.

Notes

1. Ten States and Puerto Rico have larger taxabl wage bases. The Federal tax, nevertheless, is 0.7 percent of annual earnings up to $6,000.

2. The Federal tax is a payroll tax; in three States employees also contribute.

3. Puerto Rico does not have an experience-rated system.

4. The relative experience of employers is the proportion of each employer's payroll paid to workers who become unemployed and receive benefits.

5. In States that charge benefit wages, certain wages are not counted as benefit wages.

6. In practice, unlimited maximum rates could become a deterrent to hiring in the short run. Furthermore, the insurance program was originated to spread the uncertainty of the risk, even of high-turnover employers, among the entire group.

7. Beginning in the early 1950's, reserves began to diminish, stable employers protested their subsidization role, the gap between the wages on which benefits were based and taxable wages widened, and growing actuarial skills led to the adoption of higher tax rates. See Joseph M. Becker, *Experience in Unemployment Insurance: An Experiment in Competitive Socialism* (Baltimore, The Johns Hopkins University Press, 1972), pp. 22–23.

8. The net impact depends on the initial distribution of employers along the tax schedules and on any compensating changes in tax rates.

9. These studies include the following: John Brittain, *The Payroll Tax for Social Security* (Washington, D.C., The Brookings Institution, 1972); Wayne Vroman, "Employer Payroll Tax Incidence: Empirical Tests with Cross-Country Data," *Public Finance,* vol. 2, 1974, pp. 184–200; Wayne Vroman, "Employer Payroll Taxes and Money Wage Behavior," *Applied Economics,* vol. 6, 1974, pp. 189–204; Jane Leuthold, "The Incidence of the Payroll Tax in the United States," *Public Finance Quarterly,* vol. 3, 1975, pp. 3–13; Ronald G. Ehrenberg and others, *The Distribution of Unemployment Insurance Benefits and Costs* (Ithaca, N.Y., New York State School of Industrial and Labor Relations, Cornell University, 1978); Daniel S. Hamermesh, "New Estimates of the Incidence of the Payroll Tax," preliminary paper, research funded by the Social Security Administration, 1978.

10. Brittain, *Payroll Tax.*

11. Ibid.

12. For example, Vroman, "Employer Payroll Taxes," concludes that less than half of the tax is shifted. Hamermesh, "New Estimates," concludes that no more than one-third of the tax is shifted.

13. For examples, see Robert J. Gordon, "Inflation in Recession and Recovery," *Brookings Papers on Economic Activity,* vol. 2, 1971, pp. 105–66; and George Perry, "Changing Labor Markets and Inflation," *Brookings Papers on Economic Activity,* vol. 3, 1970, pp. 411–41. In addition, all the major econometric models have wage equations that relate wages to unit labor costs.

14. *The Economic Report of the President* (Washington, D.C., U.S. Government Printing Office, 1978), p. 151.

15. The econometric models indicate that when the price-wage-price-spiral effects of an increase in payroll taxes are worked out, prices rise by at least as much as the payroll tax increase.

16. For examples, see Frank Brechling, "Unemployment Insurance Taxes and Labor Turnover: Summary and Findings," *Industrial and Labor Relations Review,* vol. 30, 1977, pp. 483–92; and Frank Brechling and Christopher Jehn, "The Unemployment Insurance Tax and Labor Turnover: An Empirical Analysis," research funded by the U.S. Department of Labor, Office of Assistant Secretary of Policy, Evaluation and

Research, at the Institute for Naval Studies, Center for Naval Analysis, 1978.

17. For a theoretical analysis, see Frank Brechling, "The Incentive Effects of the U.S. Unemployment Insurance," *Research in Labor Economics,* 1977, pp. 41–103.

18. For empirical evidence, see Brechling and Jehn, "UI Tax and Labor Turnover."

19. See Becker, *Experience in Unemployment Insurance,* and Charles McClure, "The Incidence of the Financing of Unemployment Insurance," *Industrial and Labor Relations Review,* 1977, pp. 469–80.

20. See McClure, "Incidence of the Financing."

21. For a discussion of the evidence, see Daniel S. Hamermesh, *Jobless Pay and the Economy* (Baltimore, The Johns Hopkins University Press, 1977), pp. 62–64; also *Economic Recovery and the Financing of Social Insurance* (U.S. Senate, Committee on the Budget, U.S. Government Printing Office, 1977), the "Dernberg Discussion."

22. Hamermesh in *Jobless Pay* states that only two studies have considered the impact of UI taxes on recession and recovery: George Rejda, "Unemployment Insurance as an Automatic Stabilizer," *Journal of Risk and Insurance,* vol. 33, 1966, pp. 195–208, and M. O. Clement, "The Quantitative Impact of Automatic Stabilizers," *Review of Economics and Statistics,* vol. 42, 1960, pp. 56–61. Rejda found no fiscal impact, and Clement found a small one.

23. For example, see L. R. Christensen and others, "Transcendental Logarithms Production Frontiers," *Review of Economics and Statistics,* vol. 55, 1973, pp. 28–45.

Reinsurance and Cost Equalization

Joseph M. Becker, S.J.

The U.S. unemployment insurance (UI) program consists of two kinds of money flow: the inflow of taxes and the outflow of benefits. Although benefits are inherently related to taxes and, as such, must be part of any discussion of UI, the direct and explicit issue in this report is not benefits but taxes.

The issue of taxes also has two parts: tax level and distribution of the tax burden, a division equivalent to the problems of adequacy and equity. The issue under discussion here is not the size (adequacy) of the taxes, not whether funds will be available to pay the covenanted benefits. The sole issue under discussion here is the distribution (equity) of the tax burden.

The issue of distribution likewise has two parts: distribution of the tax burden among employers within a State and distribution among States. The first is the issue of experience rating. The second is the issue of reinsurance and cost equalization. It is this second issue that is under discussion here.[1] It may be put succinctly in this question: should each State be responsible for its own costs, or should there be (more) sharing of costs among States?

Defining Terms

Both reinsurance and cost equalization promote the sharing of costs among States. However, their individual objectives and methods differ. The main objective of reinsurance is to protect against uncertainty; the main objective of cost equalization is to lessen inequality. Likewise, the method of reinsurance is that of insurance, and the method of cost equalization is that of subsidy.

The reason for reinsurance is uncertainty. To the question "Why have a reinsurance scheme?" the answer is that no State is safe from a sudden, unforeseen rise in its benefit costs. The method of reinsurance is simply a further application of the insurance technique, which substitutes a small certain loss (the premium or tax) for a large uncertain loss (a sudden increase in costs).

The reason for cost equalization is inequality. To the question "Why have a cost equalization scheme?" the answer is that a State may be burdened with benefit costs that are "too high" whether or not foreseen. The method of cost equalization allows the redistribution of costs so that no State is inequitably burdened. In the literature, the terms *reinsurance* and *cost equalization* are often used interchangeably, sometimes out of carelessness or ignorance, sometimes out of a deliberate desire to obfuscate the issue.

Because they serve different purposes, reinsurance and cost equalization are not logical alternatives. A State may have both, or one, or neither. In some political situations, they may become alternatives. Or they may be combined variously in a single program. Thus the current Brodhead and Javits bills (H.R. 8292 and S. 1853) represent a program that is predominantly reinsurance with a heavy overlay of cost equalization. To have a clear understanding of the implications of such mixed programs, and to be prepared for what further variations the process of political compromise may produce, it is necessary to understand the separate natures of both reinsurance and cost equalization.

Reinsurance

Some form of reinsurance is a customary part of most large insurance schemes that provide for what is called "catastrophe insurance." Each of a group of insurers contributes to a central fund used to support any member of the group having an extraordinarily unfavorable experience. It relieves all the insurers of the necessity of accumulating excessively large reserves sufficient to meet the occasional catastrophic event.

In UI, reinsurance allows a State whose benefit-cost rate (the ratio of benefits to wages, usually total wages, over some period of time, usually a year) in a given year exceeds its "normal" level to become eligible for a grant from a central fund. The State's "normal" rate may be calculated in various ways (for example, by taking an average of recent years or by taking the lowest year in a recent period), and the amount of excess required to trigger a grant may be small or great. The grant may make up a part or the whole of the excess.

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In pure reinsurance, it is not possible to predict which States are likely to receive a grant. In this respect, reinsurance fulfills an essential condition of any genuine insurance, namely, that the actual incidence of the occurrence insured against be uncertain. Also, unlike cost equalization, reinsurance does not permit a State to remain similarly eligible for a grant indefinitely. This is because a State's bad experience enters into the base of its norm, causing it to rise gradually.

Reinsurance is intended as protection against situations of unemployment that are occasional and unforeseen. Thus, reinsurance is not intended to protect against seasonal unemployment nor against chronic unemployment. Typical of the kind of situations against which reinsurance is the proper safeguard are natural disasters, wars, lesser political disturbances such as an oil embargo, or the initial impact of the shutdown of a major industry. Reinsurance is generally considered usable for protection against cyclical, not seasonal, unemployment. However, to the extent that some States are predictably more cyclically sensitive than others, any reinsurance program will contain elements of cost equalization, discussed later in this report.

In pure reinsurance, the grant is funded by the collective insurers. To the extent that the award comes from a source outside the insurance system itself (as in the Brodhead and Javits bills, which use general revenues) the arrangement resembles a form of cost equalization, in which the "sharing" is between the insurers and some outside body. This type of reinsurance should probably be thought of as a hybrid form and for clarity's sake should not be described as reinsurance.

Proposals for reinsurance in the UI program have a long history. They were considered by the Committee on Economic Security in 1934 and by the Social Security Board in the early 1940's. They continued to emerge at intervals. Often proposals bearing the title of "reinsurance" were really cost-equalization plans, such as the 1950 bill of the Truman administration (H.R. 8059). In 1952 the Federal Advisory Council turned its attention to something called reinsurance but was unable to agree on anything more than a document setting forth the relative advantages of loans and "reinsurance grants."

In 1953 a genuine reinsurance plan was put forward by Milton O. Loysen, administrator of the New York Employment Security Agency. Loysen's background was, appropriately enough, insurance. In 1963 the Benefit Financing Committee of the Interstate Conference of Employment Security Agencies (ICESA) produced a developed version of the Loysen plan. In the ICESA plan, called catastrophe reinsurance, funds were provided by a tax on all States, and a State became eligible for a grant when its benefit-cost rate exceeded 1.6 times its own average rate over the preceding 5 years. The grant covered 60 percent of this excess cost.

Policymaking issues

For policy guidance in decisions relating to reinsurance, two observations are undisputed: that an arrangement is needed whereby States that have a catastrophic experience may obtain funds over and beyond their current reserves, and that an adequate reinsurance program is easily devised and certainly workable. The debate about reinsurance centers on two questions that remain unanswered. First, at what level is defined the "catastrophe" that triggers the program into operation? (The answer to this question goes far to determine the degree of cost equalization that will inhere in any given reinsurance program.) Second, why not use a loan program instead of a reinsurance program? A loan program would also enable States to limit the size of their reserves. And the UI program has had many years of successful experience with a loan program. The only difference between a loan program and reinsurance is that a borrowing State must eventually repay the advance it receives. Reinsurance is preferred by borrowing States that would be "unable" to make repayment. This fact leads directly to the issue of cost equalization.

Cost Equalization

The issue of cost equalization is similar to the issue of reinsurance insofar as it involves the subsidization of States that have experienced unusually high unemployment costs. The principal difference is the way in which "unusual" is defined. In cost equalization, the norm is not a State's own previous experience but some absolute norm that applies to all States at all times. The States that have experienced a benefit-cost rate higher than this norm are recompensed from some central fund for all or a portion of the excess. The norms most frequently proposed have been either the average benefit-cost rate of all States or a benefit-cost rate of 2 percent of total wages. The reason for cost equalization is not uncertainty but inability. A State is assumed to be unable to meet a benefit-cost rate above 2 percent of total wages. Whereas the reason for reinsurance is the unforeseen nature of the burden, the reason for cost equalization is the excessive size of the burden, even if it is foreseen.

Unlike in a reinsurance program, in a cost-equalization program it is possible to predict which States are more likely to receive equalization grants, and there is nothing to prevent a State from receiving a grant every year. When the revenues are derived from the Federal Unemployment Tax Act account, it is possible to measure the probable extent to which some States will subsidize other States.

Proposals for cost equalization have a long history. Discussed by the Committee on Economic Security in 1934, they have surfaced repeatedly over the years—for example, in 1944 (S. 1730), in 1950 (H.R. 8059), in 1952 (H.R. 6954), in 1959 (H.R. 3547), and in 1965 (H.R. 8282).

The main considerations entering into a decision on cost equalization may be classified under two general headings: (1) economic effects, the alleged impact of the proposed program on the separate State economies, and (2) intrinsic effects, the alleged impact of the proposed program on the UI system itself.

Economic Effects Favoring Cost Equalization

Not responsible for unemployment

Every society has a general principle of helping members who are experiencing unusual difficulty. A common example is the aid the Federal Government provides to disaster areas. States that are burdened by unusually heavy unemployment are like disaster areas and should qualify for "disaster" assistance.

Unemployment is similar to a natural disaster in that it is beyond the control of the States. The State of Washington has more unemployment than the State of Texas because of its climate and its seasonal industries. No matter how hard it has tried, Washington has not been able to bring its unemployment down to the low level that Texas enjoys. Even adjoining States, such as Michigan and Ohio, regularly have very different unemployment rates (Michigan high, Ohio low) because of their different industrial structures. It is in the nature of the auto industry, for example, to produce more than average unemployment. If the nation wants automobiles, as it does, then the nation's consumers, whose fluctuating demand causes the unemployment that characterizes auto production, should bear part of the cost of that unemployment. The State that assumes the function of producing the autos should not be burdened with the total cost.

The burden of cyclical unemployment, especially, should not fall on the individual States that happen to experience more of it. Cyclical unemployment is not predictable, and the individual States should not be required to build up fully adequate reserves against the cyclical threat. Also, the business cycle is, by definition, a broad, national phenomenon, resulting from national causes clearly outside the control of the individual States. Cyclical unemployment, therefore, should be financed, at least in part, by a tax levied on the total economy. It should not be a burden borne unevenly by a few States.

Interstate competition

For some years now a flow of industry into the Sun Belt has been occurring at the expense of the Snow Belt States. While the trend cannot, and perhaps should not, be stopped, it should not proceed at such a pace that great economic losses are sustained as factories and utilities are left to deteriorate in the North while new ones are built in the South. If the proposed program would provide more help to the North than to the South, as it probably would, this result could be considered desirable, as it might slow the pace of the exodus. Although the amount of assistance provided would be small, every little bit helps when the margin of profit is thin, as it is for the threatened industries.

Although the States in the North would probably receive a disproportionate part of the subsidy, they are also the ones that are paying a disproportionate percentage of the Federal taxes. The present pattern of Federal taxes and benefits still reflects the former and now rapidly changing pattern of income distribution, whereby the North systematically subsidizes the South. The subsidy provided by the proposed program would represent only a slight correction of the existing imbalance.

Economic Effects Opposing Cost Equalization

Responsibility for unemployment

Economic losses sustained in the regular cost of doing business are not normally subsidized by government, and unemployment benefits are among these regular costs. They are about as predictable as most other business costs and are as traceable to particular economic activities. In these respects, the experience of unemployment differs from the experience of "natural disasters." A firm engaged in outside construction work expects to experience more unemployment than one engaged in inside construction and very much more than one engaged in the banking business. These differential costs get translated into differential prices of various kinds by the normal workings of the competitive market. When unemployment is regarded in this manner, firms are held responsible for their individual levels of joblessness.

It is useful to note an ambiguity in the term "responsible" as used in this connection. When it is said that a firm is responsible for its own unemployment, the meaning is not that the firm is in some way at fault—that the economic agent, whether firm or State, could or should have done something differently to avoid the unemployment. The economic agent is responsible for the unemployment only in the sense that it must pay for it as a regular cost of engaging in that kind of economic activity. The cost is brought home to the responsible party only in the sense that this cost, just like other business costs, is allocated to its source and thus becomes a part of the price mechanism. Whether the economic agent could or could not have avoided the unemployment is irrelevant to this meaning of responsibility.

Cyclical unemployment does not differ essentially from other kinds of unemployment. Some economic activities are known to be more cyclically sensitive than others, and this characteristic normally enters into the cost calculations of firms that engage in such activities. Although somewhat less predictable than other kinds of unemployment, and somewhat larger in amount, cyclical unemployment belongs among the regular costs of doing business.

The statement that cyclical unemployment is different from other unemployment because it flows from "national causes" is very ambiguous. Any and every kind of unemployment can come from "national causes." The cyclically unemployed are not a different kind of unemployed; their unemployment stems from the same personal and impersonal causes as unemployment in general. A business recession is merely a time when these causes are more operative than usual, that is, when a greater number of firms than usual are cutting back on economic activity. As noted earlier, some economic activities are known to be more cyclically sensitive than others, and a firm engaged in them normally takes this characteristic into account. The cost of unemployment benefits is only a small part of the cyclical costs a firm expects to meet.

While it is true that the people in Texas who wish to have the use of automobiles manufactured in Michigan should be ready to share in the cost of the unemployment benefits necessarily connected with the production of automobiles, it does not follow that the best way to achieve this sharing is by having the employers of Texas pay a subsidy to the employers of Michigan. The normal way is for the purchasers of automobiles to find the cost included in the price they have to pay for automobiles. This is the normal way of allowing the market to allocate resources.

There could be a situation, of course, in which the cost of unemployment benefits for a particular State or industry is so great that the stability of the State or industry is endangered. In this case it would be consonant with general practice for the Federal Government to provide a temporary subsidy that would carry the affected economic agents over the emergency. But evidence would have to be forthcoming that the tax burden was indeed "unbearable." The Brodhead and Javits bills, for example, propose the norm of 6 percent insured unemployment as the point at which unemployment costs become unbearable and justify providing help from a central fund. But no evidence has been produced to establish this alleged fact. On the contrary, some evidence calls this assumption into doubt. For example, the State of Washington has had an average insured unemployment rate of over 8 percent during the past 7 years and yet has managed to stay afloat and run a respectable UI program. Evidence is needed that other States cannot do what Washington has proved can be done.

When the UI program was first established in 1935, the decision was reached that, given the weak state of the economy at that time, the maximum tax rate should not exceed 3 percent of total wages. Now that the economy is much stronger, the question that inevitably presents itself is this: why are firms today unable to meet a tax rate above 2 percent of total wages (the cost equivalent of a 6 percent insured unemployment rate)? It may be said that there was no basis for the early estimate of 3 percent, and that is true. However, it is equally true that no evidence has been adduced for the proposition that is the basis for the proposed legislation, namely, that States are unable to levy a tax higher than 2 percent.

Interstate competition

Although the gap between North and South is narrowing, the States in the North are still richer than those of the South. It would seem, therefore, that they might be expected to meet their own UI costs. There is not the same justification for subsidizing the North now as there was for subsidizing the South in an earlier generation. Instead, we seem to be approaching a more balanced situation in which each State may properly be required to meet its own costs.

The argument that the UI tax has a significant effect on the movement of firms into or out of a State, while often proposed, has never been supported by evidence. In fact, the available evidence runs counter to this proposition: the UI tax is a small part of fringe benefits, a much smaller part of employee remuneration, and a still smaller part of total production costs. All the leaders of management who have testified before the Congress have taken the position that the unemployment tax ranks far down the line of factors that influence the location of a firm. This contradicts the argument that the tax determines a firm's location.

A more refined argument would point out that, although small, the UI cost has some impact. A change in the UI tax can be significant to the well-being of firms, especially firms with small profit margins. In States that have declining industries, there may be many such firms with small profit margins.

Here the notion of responsibility as described earlier is relevant. To the extent that the cost of supporting unemployed workers is a regular cost of doing business, the cost should be permitted to have its influence, like all other business costs, on the conduct of the firm. It is when costs, all costs, are faithfully reflected in prices that the price system and the competitive market work best. This is true especially in the long run, when it is better to let those industries that cannot pay their own costs go under rather than to continue to subsidize weak ones.

States are economic entities in competition with one another. Hence, other things being equal, each State is expected to meet its own costs. In a society like ours, which uses the competitive market and the price system as its chief methods for the allocation of resources among its citizens, the burden of proof rests on any proposal to have the Federal Government intervene in the competition between the States and to require the employers of one State to subsidize the employers of another. Thus far, no attempt has been made to supply such proof.

Intrinsic Effects Favoring Cost Equalization

The effects of a proposed cost equalization program on the UI system are both larger and more certain than its effects on the State economies. For both reasons, a program is likely to be judged acceptable or not acceptable primarily on whether it makes for a more or less effective UI program. By an effective UI program is meant one that achieves its principal goals, especially the goal of supporting the unemployed person in dignity and security. Under this heading, the principal favoring considerations are two: effects on Federal-State relations and effects on the adequacy of benefits.

Federal-State relations

An effective cost-equalization program would lessen the danger of financial collapse. Back of the fear of financial collapse lies not so much an apprehension that benefits would not be paid (they would continue to be paid, as they were in the last recession, out of general revenues) but an apprehension that a collapse would likely bring about a restructuring of the present system. The Federal Government would have to take over the program and assume control.

This result would not be seen as a disadvantage, of course, by those who would prefer to see the program federalized. But those who would prefer to maintain the present Federal-State system argue that the precise issue is not so much that the few States with very high unemployment *could* not maintain their fiscal solvency, but rather that they *would* not. The State legislatures in these few States would be tempted to take the easy way out: maintain benefits, neglect to raise taxes, and let the Federal Government eventually shoulder the burden.

Benefit adequacy

Easing the burden borne by States with heavy unemployment would make it easier for these States to maintain adequate benefit provisions and reasonable disqualification provisions. Since the States with the most unemployment are the large industrial States, where most of the covered workers live, it is important for the general health of the system that these States maintain an effective UI program.

New York, for example, used to be an outstanding leader among the States in the liberality of its program; but in more recent years, when its economy has been trailing behind the national average, the New York Legislature seems to have become more cautious about liberalizing its program. Certainly, in States with above-average unemployment and above-average taxes, employers commonly use the high taxes as an argument against both an increase in benefits and a relaxation of disqualification provisions.

The proposed subsidies of cost equalization need not necessarily encourage States to abuse the system, that is, to liberalize their programs irresponsibly. In the Brodhead and Javits bills, for example, at least two safeguards are provided against such abuse. First, the subsidy is triggered not by the cost of benefits, over which the State has direct control, but by its unemployment rate, over which the State has little control. Second, the subsidy never covers the whole of the excess cost. A State that liberalizes its program—in benefit amount, benefit duration, or conditions of eligibility—must always expect to bear part of the burden itself, no matter how high the cost.

Intrinsic Effects Opposing Cost Equalization

The argument that a cost-equalization provision would make for a more efficient UI program is its proponents' chief argument. It is better analyzed when split into two interrelated propositions: (1) cost sharing would cause the system to provide better protection for the unemployed and (2) this effect can be obtained without offsetting disadvantages—specifically, without diminishing the social insurance character of the program.

Opponents challenge both of these propositions. They doubt the significance of the first alleged effect, because the effect, if any, would be small. They contend that the liberality of a UI program is less a function of cost than of a State's general political climate and the strength of organized labor. They doubt the existence of any close (negative) correlation between a State's average unemployment rate and the adequacy of its UI program. The large industrialized States that have the most unemployment seem also to have the most adequate UI programs. One attempt to test this correlation found that, of four measures of liberality, two had no correlation at all with high and low costs and the two that did correlate were correlated negatively; that is, the higher-cost States had the more liberal programs.[2]

Opponents are also doubtful of the second proposition, that no threat is posed to the social insurance character of the program. An essential distinction between social insurance and social assistance (welfare) is that insurance benefits have the character of an earned right. They have this character primarily because of their financial base: benefits are directly related to the previous work and earnings of the beneficiary. In the United States, where each State is responsible for its own costs, and where employers are taxed in some proportion to their individual experience, a solid case can be made that unemployment benefits are largely deferred wages. To maintain the social judgment that unemployment benefits are indeed deferred wages and an earned right, it is necessary to maintain a direct relationship between employees' work and their entitlement to benefits. The proposed bills represent a step away from this direct relationship.

What chiefly concerns the opponents is that this first step could easily be followed by other steps in the same direction. For example, "excessive" unemployment is defined in the Brodhead and Javits bills as a 6 percent insured unemployment rate. But no evidence is provided that this rate is in fact excessive. It is an impression; it "looks like" too much. Since it is based on an impression, it is subject to unpredictable changes, up or down—most likely down.

There is a constant attempt on the part of all economic agents to escape the discipline of the market. Once cost equalization is accepted without measurable proof that it is needed, a principle has been abandoned, and there remains no reliable barrier against successive steps in the same direction. Proposals will certainly be made to substitute a lower norm by which costs are deemed to be "excessive." Also, proposals will be made to subsidize a greater proportion of that excessive cost. Already there have been three such steps—from the original ICESA proposals, to the later ICESA proposal, to the current Javits bill. Each later step was more liberal than the previous one.

More significant, perhaps, than any of these particular considerations is one general consideration that looks to the nature of the program in itself, especially its "insurance" character. One's attitude toward cost equalization is likely to be influenced chiefly by whether one tends to stress the similarity or the difference between social assistance (welfare) and social insurance. It is a question of emphasizing the noun or the adjective in the title "social insurance." By "emphasizing" is meant giving the benefit of the doubt to one and putting the burden of proof on the other.

As mentioned above, the essential difference between social insurance and social assistance (welfare) is that social insurance benefits are considered to be an earned right because of their integration with the market. Any modification that weakens the market relationship of the program also weakens the basis for distinguishing social insurance from social assistance.

Some modifications of the market relationship already exist, such as the ceiling on the maximum tax rate that may be imposed on employers no matter how great their cost to the common fund. Such modifications reflect the significance of the adjective in the term *"social* insurance." Social insurance is thus a hybrid standing halfway between wages (based on market performance) and welfare (based on individual need). It partakes of the nature of both, and there is no rigid quantitative norm by which to determine the most desirable mixture of the two elements. All that can be said generally is that the more social insurance resembles the competitive market, the more it will share in the advantages and disadvantages of the market, and the more it resembles welfare, the more it will share in the advantages and disadvantages of welfare.

The chief advantage of the market is freedom, and its chief disadvantage is inequality. The chief advantage of welfare is increased equality, and its chief disadvantage is a necessary limitation on individual freedom. Cost equalization moves the UI program somewhat away from the market and toward welfare. This effect is clear and is not under debate. What is under debate are the relative gains and losses produced by the shift.[3]

Notes

1. In addition to the reports of the 1963 Benefit Financing Committee of the Interstate Conference of Employment Security Agencies, the following provide some history and discussion of these issues: Ida C. Merriam, *Social Security Financing,* Bureau Report No. 17 (Washington, D.C., Social Security Administration, 1952), chapter 3; Harry Malisoff, *The Insurance Character of Unemployment Insurance* (Kalamazoo, Mich., The W. E. Upjohn Institute for Employment Research, 1961), chapter 6; Richard A. Lester, *The Economics of Unemployment Compensation* (Princeton, N.J., Princeton University, 1962), chapter 6; and William Haber and Merrill G. Murray, *Unemployment Insurance in American Economy* (Homewood, Ill., Richard D. Irwin, Inc., 1966), chapter 19.

2. Joseph M. Becker, *Experience Rating in Unemployment Insurance, An Experiment in Competitive Socialism* (Baltimore, The Johns Hopkins University Press, 1972), pp. 214, 364.

3. For a comprehensive examination of the effects of the Brodhead and Javits bills, see *Legislative Analysis: H.R. 8292 and S. 1853,* the American Enterprise Institute, June 1979.

Cost Reinsurance

Robert Crosslin

Cost reinsurance protects a State's unemployment insurance (UI) trust fund from being drained in case an unexpected or catastrophic economic emergency occurs, such as a sudden tripling of the unemployment rate because of a national recession.

Conditions such as that are considered too infrequent or too unpredictable for provisions to deal with them to be incorporated into a State's normal financing reserve methods. To meet such extraordinary circumstances, States may establish cost reinsurance plans whereby they contribute to a special pooled fund through a payroll tax or an income tax or both. This removes the unpredictable portion of benefit costs from the usual financing mechanism and assures a smoother, more predictable financing of total benefit costs over the long run with less violent swings between revenues and costs.

Before setting up a cost reinsurance plan, States should consider the following:

- *Individual State eligibility criteria.* These criteria would determine a State's eligibility for a grant of any amount for a given year. The criteria should reflect expert opinions and statistical yardsticks on the types of State experiences that warrant a grant.
- *Definition of "normal" benefit costs.* Cost reinsurance grants would be related to the excess of current costs over "normal" costs. This requires a method for defining normal costs consistent with the plan's objectives.
- *Amount of a State's reinsurance grant.* A schedule of reimbursement for excess costs should be constructed. Political and economic considerations of overall program costs will influence this schedule. Such a schedule will determine the weight given to factors contributing to excess costs (for example, the importance of the level of the unemployment rate versus periodic change in the employment rate).
- *Source of funding.* Sources of funds for cost reinsurance have different effects on the overall program and different political implications.

Triggering Grants

What should determine the minimum level of UI benefits paid for which States could be eligible to receive grants under a cost reinsurance program—a national trigger, a State trigger, or both? It depends on whether grants should be limited to periods of national recession or if States experiencing *any* severe economic problems —possibly unrelated to national conditions—should be eligible for grants in their own right.

If one believes that any unemployment above a certain level is extraordinary and that the financial planning for such benefit costs should not be borne totally by the State trust fund, then a State trigger should be chosen. Although under such an arrangement most of the grants paid to States would result from national economic conditions, several States would receive grants almost every year because of structural economic problems in their economies. The original proposal of the Interstate Conference of Employment Security Agencies (ICESA)—the Brodhead bill—would have used State triggers only.

A national trigger implies that cost reinsurance grants are only appropriate when national economic recessions occur. This approach is based on the belief that States with chronic high unemployment related to national conditions should rely on their trust funds to finance unemployment benefit costs that are not directly attributable to national economic circumstances.

The revised ICESA proposal uses both national and State triggers. It sets a trigger at either a national insured unemployment rate (IUR) of 4.5 percent for the completed calendar year or a 25 percent increase in the national IUR from one calendar year to the next. A State trigger takes effect once the national trigger is on.

If either a national or a State rate can be a trigger, grants would be available to States meeting certain conditions when the national trigger was not on, and potentially to all States when the national trigger was on (as in the current program) of extended UI benefits.

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Selecting Measures

What measures of economic malfunction should be used to determine eligibility—the absolute level of the unemployment rate, the relative change in the unemployment rate, or both?

If a reinsurance program has a national trigger, it is necessary to define "severe national economic conditions." In the labor market, it is logical and customary to define conditions in terms of the level of unemployment—either the IUR or the total unemployment rate (TUR)—since the jobless rate measures the proportion of the labor force that is looking for work but cannot find it. For the nation, it does not seem logical to measure "severe economic conditions" as some given percentage increase in the unemployment rate. A 33 percent rise in the national unemployment rate from a "very low" 3 percent to a "low" 4 percent does not itself indicate severe national economic conditions.

The extended benefits program defines severe national economic conditions as a 4.5 percent IUR (seasonally adjusted). However, for a cost reinsurance program in which the goal is protection against more unpredictable, catastrophic national economic conditions, such as occurred in the 1974–76 recession, a national reinsurance trigger of an IUR of 5 percent or 5.5 percent might be more appropriate.

The revised ICESA proposal for a combination of national triggers would have caused the program to pay grants in 8 out of the last 20 years. It is questionable whether the country has experienced severe economic conditions during 40 percent of the past two decades.

The original ICESA plan would have made grants in every year. But that is not a valid comparison because the original plan did not have a national trigger. Under this plan, at least one State each year would have received a grant for reasons unrelated to national factors. Once again, the percentage increase in unemployment may not be valid for a national trigger. Likewise, the trigger rate for extended benefits (EB's) may or may not be the appropriate indicator of labor-market hardship for a reinsurance program.

The case is different for State eligibility triggers. Some States traditionally run very low unemployment rates that seldom reach levels that would be considered catastrophic, even though the nation as a whole may be in deep recession. However, sudden large increases in unemployment-related benefit costs for any State are unusual and place tremendous pressure on the State's reserves and financing mechanisms.

The original ICESA plan used the percent level of unemployment only, setting the trigger level for States at a 6 percent IUR. This approach does not take account of dramatically increased benefit cost problems experienced by States that start from a relatively low IUR. In other words, should not States whose benefit costs double or triple within a 2-year period be eligible for some amount of a cost reinsurance grant, even though their IUR remains below some arbitrary trigger level? This difficulty would have arisen for many States under the original ICESA plan.

The revised ICESA proposal recognizes this situation as a true recession hardship on States that have relatively low IUR's in normal times. The new plan allows grants when a State's IUR increases at least 25 percent over the base period. The new plan also lowers the State IUR trigger from 6 percent to 4.5 percent. The combined effect of using levels and rates of change with the triggers at 4.5 percent and a 25 percent increase respectively, would have made all but one State eligible for a grant in 1975, compared with 16 States that would have been ineligible under the old ICESA proposal.

The Insured Versus the Total Unemployment Rate

Which unemployment rate should be used—the IUR or the TUR? Which is the most appropriate yardstick on which to base eligibility for grants? The IUR only counts individuals who have made valid claims for UI benefits, as reported by State employment security agencies. The TUR counts all of the unemployed, regardless of their UI claim status. The argument is often made that the IUR is an inappropriate measure because it can be influenced by State UI provisions.

It is true that differences in IUR's can partly be attributed to differences in UI program provisions, as can benefit cost rates. States do not adjust qualification requirements or duration provisions to affect their cost rates and IUR's; they do it for a combination of social, economic, and political reasons. However, the results of their actions can and do influence their IUR's and benefit cost rates. Yet, how greatly do differences in program provisions cause differences in State unemployment rates and cost rates? And given these differences, is the IUR a more appropriate yardstick for determining both State eligibility for and the amount of cost reinsurance grants than the benefit cost rates? Two recent studies estimated the impact of State provisions on benefit costs rates.[1]

One study, by Saul Blaustein and Paul Kozlowski, estimated that less than 7 percent of the differences in benefit cost rates could be attributed to differences in State provisions. The other study, by Robert Hutchens, using a different technique, estimated that the impact of differing State UI provisions accounted for between 32 and 44 percent of the difference in State benefit cost rates. Program provisions affect benefit cost rates through their effect on the IUR (only the insured unemployed are eligible for benefits).

Numerous other studies have found a significant positive relationship between State UI program provisions and increased durations of unemployment. Longer durations of unemployment produce higher unemployment rates for a State.[2] Therefore, program provisions have a potentially large effect on IUR's although the true size of the impact is still debatable.

Another problem with using the IUR as a trigger rate for reinsurance is that it is not a *true* unemployment rate. A true unemployment rate divides the number of persons unemployed by the sum of the number of persons employed *and* unemployed (the labor force). The current method of official IUR calculation is to divide the number of unemployed by the number employed. For example, in a labor force of 100 with 4 unemployed workers, the IUR would be 4 divided by 96 instead of 4 divided by 100, the *true* rate. This biases the IUR upward, and more important, the bias increases with unemployment. At a "true" 4 percent IUR, the calculated IUR is 4.2 percent, yielding an upward bias of 5 percent (0.2 divided by 4). And at a "true" IUR of 6 percent, the calculated IUR is 6.4 percent, yielding an upward bias of almost 7 percent (0.4 divided by 6).

Proponents of the IUR argue that States would not purposely manipulate their program provisions to receive larger cost reinsurance grants. While this is probably true, whatever grants are received will be at least partly influenced by program provisions, especially if the IUR is used in the calculations. Proponents of the IUR also argue that insured benefit costs, as measured by the IUR, are the relevant costs to take into account in a UI reinsurance program because UI benefit costs are the actual liabilities being insured.

Is the TUR a more accurate indicator to trigger reinsurance benefits? First, over 90 percent of the work force in each State is covered by UI, so the TUR could not be considered inappropriate due to differences in coverage. The annual TUR for each State is derived from the monthly *Current Population Survey* conducted by the Bureau of the Census for the Bureau of Labor Statistics. The annual State rate, which would be used for reinsurance, is considered statistically reliable (the monthly rates are calculated differently and adjusted to the statistically reliable annual rate at year's end). The annual TUR is, therefore, an accurate measure of economic conditions in each State's labor market, unaffected by State program provisions, and would be suitable for reinsurance purposes if a strict measure of labor market activity is desired.

Defining the Base Period

Should the base period for determining a State's normal and excess costs be defined as a single "normal" year or as an average of several recent years?

A reinsurance plan protects the integrity of a State's trust fund from benefit costs in excess of some normal amount. Although many possible definitions exist for determining this normal amount, an average of several years is the most logical. The single-year approach has several problems. First, the year selected may not be "normal" at all. The original ICESA plan called for the year in the last 5 years with the lowest IUR. This could be a year of unusually low unemployment, thus understating normal costs and overstating excess costs. Second, inflation between the base year and the current year will also exert a downward bias on normal costs and an upward bias on excess costs. Third, years considered in selecting a base year may have been relatively high-cost years, thus overstating normal costs and understating excess costs.

These problems are largely overcome by averaging several recent years, provided the range of years selected is neither too long nor too short. A very short range, such as 2 or 3 years, could yield either abnormally high or low normal costs. An unusually long period, such as 10 years, would be biased by inflation or program changes or both. The new ICESA plan proposes a reasonable approach: eliminate the highest and lowest IUR (or TUR) years in the last 7 and take the average of the remaining 5. Including 5 years in the averaging process dampens the effect of unusually high or low cost recent years being added to the base.

Included Extended Benefits

Should the costs of EB's be included in the calculation of normal costs? The simplest way to present this issue is by example. Suppose a State had an unemployment rate of 6 percent in both its base period and in the just-completed year. It is possible that total regular benefits were the same as EB's for the two periods, thus yielding no excess costs. In such a case, including EB's in normal costs would give no reimbursement to the State.

Alternatively, EB costs could be considered "excess costs" in their own right, regardless of what happened to regular or total benefit costs. In other words, during a reinsurance period all costs for EB's might be considered directly attributable to severe national economic conditions and considered separately for reinsurance purposes. The revised ICESA plan treats costs in this manner, not allowing them to inflate either base period or current year benefit costs for reinsurance purposes.

Constructing the Reimbursement Schedule

How could the reimbursement schedule for excess costs be constructed? This issue is closely linked to State eligibility criteria. If only the absolute level of a State's unemployment rate is considered, then the schedule should correspond to absolute levels of that rate. If the relative change in the unemployment rate becomes a criterion, then the schedule should also take account of percentage changes in the rate.

Several options emerge:

- provide a fixed proportion of excess-cost reimbursement to States meeting the minimum eligibility criteria;
- provide a small number of different excess cost reimbursement percentages, depending on eligibility ranges;
- provide a relatively large number of different excess cost reimbursement percentages, corresponding to relatively small ranges of the eligibility criteria.

Determining the reimbursement schedule is a "cliff effect" issue, which has been a source of much controversy within ICESA. The first option—fixed proportion reimbursement—provides one steep cliff; a State either sinks or swims on one critical number. The difference of one-tenth of a percentage point in the State unemployment rate could be the difference between financial disaster and stability for a State's trust fund. No cost reinsurance plan has yet proposed this extreme.

However, not far removed is the second option, which offers three or four smaller cliffs. The original ICESA plan (the Brodhead bill) suggested this option, reimbursing excess costs at the rate of 25, 37.5, and 50 percent for IUR's in excess of 6, 6.5, and 7 percent, respectively.

The third option—several reimbursement rates for several criteria ranges—might eliminate serious financial injuries by providing an intricately designed bandage to match the damage. The revised ICESA plan starts low and gradually increases the reimbursement proportion for either the increasing level of the IUR (for regular benefits) or its percentage of increase for a State. The following lists the schedule.

Percent State IUR (T)	Percent of excess reimbursed	Percent increase in State	Percent of excess reimbursed
4.5–4.6	2.5	25–44	2.5
4.7–4.8	5.0	45–64	5.0
4.9–5.0	7.5	65–84	7.5
5.1–5.2	10.0	85–104	10.0
5.3–5.4	12.5	105–124	12.5
5.5–5.6	15.0	125 and above	15.0
5.7–5.8	17.5		
5.9–6.0	20.0		
6.1–6.2	22.5		
6.3–6.4	25.0		
6.5–6.6	27.5		
6.7–6.8	30.0		
6.9–7.0	32.5		
7.1 and over	35.0		

Figures 1(A) and 2(A) display this schedule.

Funding Reinsurance

What should be the source of funding for a cost reinsurance program: Federal general revenues, the Federal Unemployment Tax Act (FUTA) tax on payrolls, State trust fund revenues, or combinations of these?

From a macroeconomic viewpoint, tapping general revenues has several advantages. First, the grants would represent deficit spending during a severe recession, giving a greater boost to overall economic activity. Second, income taxes do not feed directly into unit labor costs and therefore are less of a disincentive to increased employment. General revenue financing may or may not be more inflationary than FUTA taxes, depending on the timing of the tax in the business cycle and on which groups of consumers bear the respective taxes. Some feel that because payroll taxes feed directly into unit labor costs they more heavily influence product prices and inflation. Others believe the action of the deficit financing makes general revenue funding the most inflationary approach. State trust fund financing would have essentially the same macroeconomic impact as FUTA financing, as both are employer payroll taxes. The difference is that experience rating is employed by States.

Philosophically, there is a plausible argument against introducing general revenues into an independently financed insurance system. Strong proponents of this view also believe that it would inevitably lead to more Federal control of the UI system, particularly from the Congress.

According to Federal statutes, State trust funds cannot be used for anything but the payment of UI benefits to unemployed workers. Direct State funding of a reinsurance program through the State trust fund essentially would make cost reinsurance grants experience rated to employers on a prepaid basis. Funding of the program solely by the trust fund would not greatly change the financing status quo.

FUTA financing would not be experience rated either to employers or to States and would maintain the "insurance-purity" of the trust fund system. Although some States essentially view general revenues as "free," they still pay for it through income taxes on their residents and businesses. FUTA funding is not as costly to the States and their employers when viewed in this light. If reinsurance is to provide protection against national economic disasters, then it should be paid for by the nation as a whole through general revenues. FUTA financing probably makes little economic difference.

Realistically, the Federal trust funds are too much in debt to take on a cost reinsurance program without some help from general revenues. If the Congress does not approve the Commission's interim recommendations to retroactively fund Federal supplemental and extended benefits out of general revenues when the national trigger is "on," then FUTA moneys cannot finance reinsurance without another 15 percent increase in the Federal tax. The significant increases in Federal payroll taxes in recent years make this unlikely.

A logical possibility would be to provide a second triggering device to pay the cost of reinsurance from general revenues when the national TUR reaches a given level (say 7 percent). This approach, coupled with a 2- or 3-year phase-in of the program, might allow FUTA to shoulder the program without favorable action by the Congress on the Commission's interim recommendations. Going a bit further, the general revenue-funding trigger could be phased out over a decade or so, allowing the Federal trust funds time to recover from 1974–76 and to gain financial experience under the new cost reinsurance plan.

Modifications to the Revised ICESA Plan

The revised ICESA proposal meets most of the objectives of most groups, with a sizable minority still opposed to the general principle of cost reinsurance. It is feasible to use this plan as a basic program scheme, with changes to meet alternative objectives.

Earlier sections of this report discussed several areas of modification: eliminating the percentage-increase provision of the national trigger, using the TUR incorporating phased implementation, and setting a high-level trigger for tapping general revenues in the most extreme situations.

This section focuses on the construction of the reimbursement schedule for State grants. Variations in the minimums, maximums, and the incremental rate of increased reimbursement all produce different grant distributions that may correspond to alternative objectives for cost reinsurance programs.

The four graphs in Figure 1 show the reimbursement schedule of the ICESA revised plan for a trigger using the absolute level of the unemployment rate and three alternative schedules. Figure 2 displays the schedule for these same plans when triggered for the rate of increase in the State IUR.

Figure 1(B) shows a schedule that *decreases* the maximum reimbursement grant to 25 percent of excess costs, to be reached at a 6.5 percent IUR. To approximately maintain constant program costs, this change would probably be made in conjunction with an *increase* in the maximum to 25 percent for the reimbursement schedule for the rate of increase in the IUR, shown in Figure 2(B). This change would give *more* weight (reimbursement) to States experiencing dramatic increases in their unemployment rates and *less* weight (reimbursement) to States experiencing high unemployment rates that had not changed greatly over the base period (for example, from 6.5 to 7 percent). Therefore, the combination of a lower maximum reimbursement rate for the IUR level and a higher rate for the IUR increase would result in relatively more reinsurance than cost equalization.

The revised ICESA plan states that the maximums were set so that twice the weight is given to the absolute value of the IUR, because excess costs are already heavily weighted by relative changes in the unemployment rate. In other words, excess costs are the difference between normal base period costs and those of the recently completed year. The size and difference—the excess costs—are directly proportional to the percentage increase in the unemployment rate (for example, a doubling in the unemployment rate would tend to double benefit costs). In any case, selection of the maximum is still somewhat arbitrary, and changing the maximums as illustrated would not violate the principles of cost reinsurance but only change the emphasis of the ICESA proposal.

Figure 1(C) shows how States could more *quickly* reach the maximum reimbursement rate for the IUR level. Correspondingly, Figure 2(C) shows how States could more *slowly* reach the maximum for the IUR increase. This pattern of change represents an opposite shift of emphasis from that described by Figure 1(B). This change would be consistent with the argument that the levels of the IUR above 4.5 percent are more catastrophic than just percentage increases, and so more weight (reimbursement) should be given in these cases. Likewise, less weight could be attached to small relative increases in unemployment, requiring States to have much larger percentage increases to obtain higher reimbursements. This type of change would make the plan more like the original ICESA proposal yet maintain relatively small grants for States experiencing large increases from very low levels of employment.

Figures 1(D) and 2(D) show the opposite of Figures 1(C) and 2(C). More weight is given to the relative increase component, allowing States to reach the maximum reimbursement faster with less dramatic unemployment rate changes (an IUR increase of slightly less than double instead of slightly more than double). This places more emphasis on the philosophy that sudden increases in unemployment are more devastating than smaller increases from an already high normal level.

Summary

In general,

- raising maximum reimbursement rebates increases reinsurance program costs;
- lowering maximum reimbursement rates decreases costs;

FIGURE 1. IUR component in sample reimbursement schedules

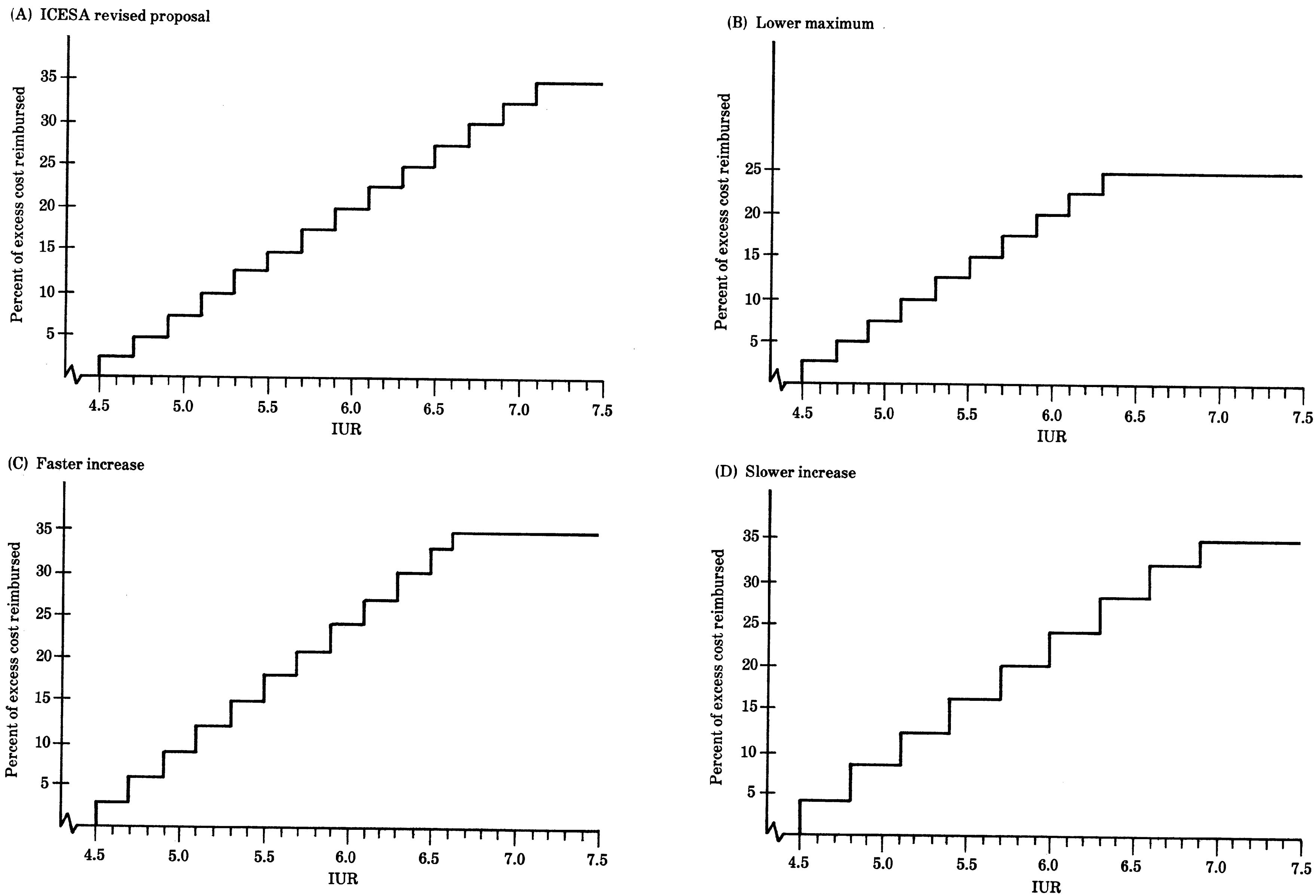
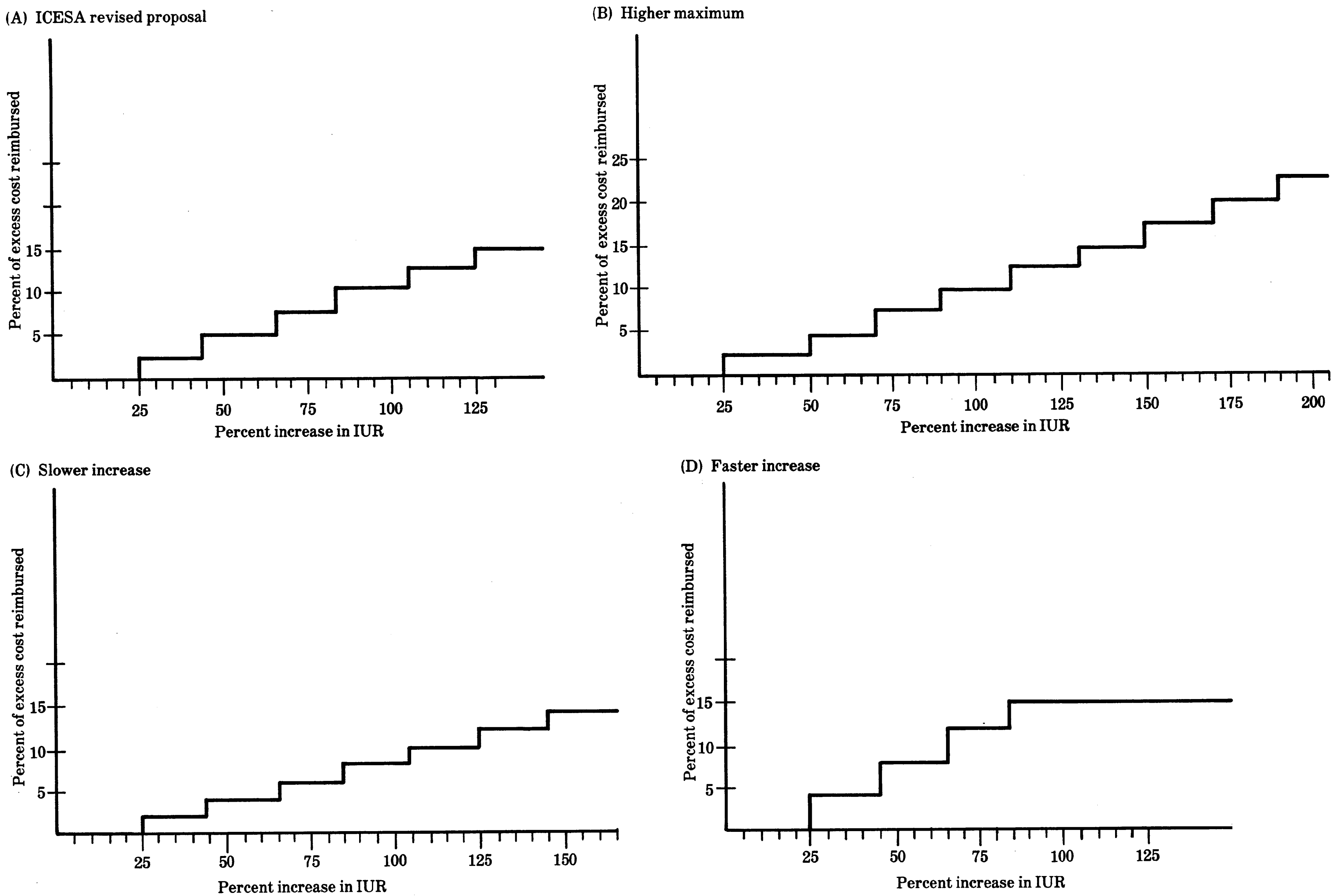


FIGURE 2. Percent increase component in sample reimbursement schedules



- accelerating the reimbursement rate between the minimum and maximum increases costs; and
- decelerating the reimbursement rate between the minimum and maximum decreases costs.

Also, to hold total program costs approximately constant, the following trade-offs are made between reinsurance and cost equalization:

Change	Result
Maximum reimbursement rate	
Higher for IUR level and Lower for IUR percent change	More cost equalization
Lower for IUR level and Higher for IUR percent change	More reinsurance
Acceleration of reimbursement rate	
Faster for IUR level and Slower for IUR percent change	More cost equalization
Slower for IUR level and Faster for IUR percent change	More reinsurance

Of course, other changes are possible, but these should illustrate the general rationales for, and implications of, different types of change in the schedules.

One final note is appropriate: States that have a relatively small IUR increase but maintain a very high level of unemployment (for example, from 5 to 6 percent) do not fare as badly as one might expect under the revised ICESA plan. These States pay a larger amount in EB's compared to lower IUR States. Because *all* EB costs are considered excess costs in the revised plan, these States receive a large reimbursement rate (up to 35 percent of all EB costs). The lower IUR States, even though they may double their IUR from 2.5 to 5 percent, will not be reimbursed for nearly as much of their EB costs.

Finally, it should be remembered that if the TUR were used instead of the IUR, the horizontal scales in Figure 1 would be shifted about two percentage points to the right, with the first reimbursement rate occurring at about 6 or 6.5 percent.

Application of Changes

Table 1 presents the schedules for the alternatives displayed in Figures 1 and 2. Tables 2 through 6 show how reimbursement percentages and grant amounts would change if these changes in the latest ICESA plan were applied.

Table 2 gives the detailed results of applying the schedule as ICESA now proposes. Tables 3 and 4 show how these results would be altered by allowing for either more reinsurance or more cost equalization. The last two columns in Tables 3 and 4 give the overall percentage change in the State's total grant and the dollar amount of that change. Useful summaries of the opposite effects of these two modifications are given in Tables 5 and 6.

TABLE 1. Alternative reimbursement schedules for the ICESA cost-reinsurance proposal

			Reimbursement as percentage of excess costs		
	Greater than or equal to	But less than	Revised ICESA plan	More reinsurance	More cost equalization
By insured unemployment rate (pct)	4.5	4.7	2.5	2.5	2.5
	4.7	4.9	5.0	5.0	5.0
	4.9	5.1	7.5	7.5	7.5
	5.1	5.3	10.0	10.0	10.0
	5.3	5.5	12.5	12.5	12.5
	5.5	5.7	15.0	15.0	15.0
	5.7	5.9	17.5	17.5	17.5
	5.9	6.1	20.0	20.0	20.0
	6.1	6.3	22.5	22.5	22.5
	6.3	6.5	25.0	25.0	25.0
	6.5	6.7	27.5		27.5
	6.7	6.9	30.0		30.0
	6.9	7.1	32.5		32.5
	7.1	7.3	35.0		35.0
	7.3	7.5			37.5
	7.5	7.7			40.0
By increase in insured unemployment rate (pct)	25.0	45.0	2.5	2.5	2.5
	45.0	65.0	5.0	5.0	5.0
	65.0	85.0	7.5	7.5	7.5
	85.0	105.0	10.0	10.0	10.0
	105.0	125.0	12.5	12.5	
	125.0	145.0	15.0	15.0	
	145.0	165.0		17.5	
	165.0	185.0		20.0	
	185.0	205.0		22.5	
	205.0	999.9		25.0	

Table 5 shows the expected result, that States experiencing very large increases in their IUR over the base period benefit from an extra infusion of reinsurance, at the expense of a large number of States that do not have such large increases. Also, the increased-grant States all started from very low unemployment rates, while the decreased-grant States all started from relatively high unemployment rates.

Table 6 shows that extra cost equalization (higher maximum reimbursement for the IUR level) helps only a few States. Only two of these States had a doubled IUR while other States experienced more than a doubling in their IUR's. The increased-grant States all had extremely high IUR's (more than 7.5 percent), as opposed to the decreased-grant States, which all had IUR's less than 7 percent. Although several States appear in only one of the two tables, most of the States that receive increased grants under more reinsurance receive decreased grants under more cost equalization and vice versa.

TABLE 2. Unemployment rates, benefit costs, and proposed ICESA reinsurance grants, by State, 1975 ($ in thousands)

St	IUR	Base IUR	Pct incr.	Benefit cost reg.	AVBC reg. UI	Excess cost	EB cost	Total excess	T1	RE1 ($)	T2	RE2 ($)	Total REIM ($)
AL	6.4	2.7	138.9	147,142	34,115	113,027	13,362	126,409	25.0	31,602	15.0	18,961	50,564
AK	6.8	8.3	−18.4	28,709	16,083	12,826	1,091	13,717	30.0	4,115	0.0	0	4,115
AZ	6.4	2.2	184.3	108,980	17,048	91,932	14,193	106,125	25.0	26,531	15.0	15,919	42,450
AR	7.9	3.1	155.1	90,741	20,026	70,715	8,037	78,752	35.0	27,563	15.0	11,813	39,376
CA	6.4	4.3	50.8	1,310,136	617,403	692,733	139,646	832,379	25.0	208,095	5.0	41,619	249,714
CO	3.3	1.2	174.5	69,549	13,035	56,514	5,995	62,509	0.0	0	15.0	9,376	9,376
CT	7.0	3.6	96.3	298,345	115,178	183,167	37,521	220,688	32.5	71,724	10.0	22,069	93,795
DE	5.4	2.2	143.0	47,681	9,265	38,416	4,658	43,074	12.5	5,384	15.0	6,461	11,845
DC	3.8	1.7	116.3	56,444	17,627	38,817	3,639	42,456	0.0	0	12.5	5,307	5,307
FL	4.5	1.8	146.7	306,911	46,092	260,819	41,575	302,394	2.5	7,560	15.0	45,399	52,919
GA	6.0	1.5	298.5	221,524	29,243	192,281	28,857	221,138	20.0	44,228	15.0	33,171	77,398
HI	4.6	3.3	40.5	47,184	22,392	24,792	4,356	29,148	2.5	729	2.5	729	1,457
ID	5.3	3.6	46.9	25,792	11,529	14,263	1,682	15,945	12.5	1,993	5.0	797	2,790
IL	5.7	2.2	162.5	673,612	185,971	487,641	60,971	548,612	17.5	96,007	15.0	82,292	178,299
IN	5.2	1.9	174.6	244,825	61,647	183,178	26,977	210,155	10.0	21,016	15.0	31,523	52,539
IA	3.5	1.7	109.4	92,788	24,484	68,304	7,506	75,810	0.0	0	12.5	9,476	9,476
KS	3.4	2.1	58.0	58,074	22,930	35,144	4,719	39,863	0.0	0	5.0	1,993	1,993
KY	5.9	2.7	118.5	137,816	35,129	102,687	11,606	114,293	20.0	22,859	12.5	14,287	37,145
LA	4.2	3.0	39.5	106,540	51,731	54,809	7,570	62,379	0.0	0	2.5	1,559	1,559
ME	8.2	4.3	89.9	53,029	18,275	34,754	5,302	40,056	35.0	14,020	10.0	4,006	18,025
MD	5.4	2.4	122.1	180,905	58,372	122,533	15,619	138,152	12.5	17,269	12.5	17,269	34,538
MA	7.9	4.4	61.0	476,884	209,700	267,184	50,005	317,189	35.0	111,016	7.5	23,789	134,805
MI	9.0	4.0	126.4	835,930	223,811	612,119	132,475	744,594	35.0	260,608	15.0	111,689	372,297
MN	4.4	2.6	68.3	175,392	63,667	111,725	17,785	129,510	0.0	0	7.5	9,713	9,713
MS	5.6	2.0	181.5	57,543	11,286	46,257	5,301	51,558	15.0	7,734	15.0	7,734	15,467
MO	5.9	2.8	114.6	225,707	63,097	162,610	23,401	186,011	20.0	37,202	12.5	23,251	60,454
MT	5.9	3.8	54.1	24,234	10,169	14,065	1,873	15,938	20.0	3,188	5.0	797	3,984
NE	3.8	1.7	126.7	46,781	11,864	34,917	4,434	39,351	0.0	0	15.0	5,903	5,903
NV	6.5	4.3	53.8	47,359	17,513	29,846	5,655	35,501	27.5	9,763	5.0	1,775	11,538
NH	6.6	1.9	244.1	44,462	7,817	36,645	1,819	38,464	27.5	10,578	15.0	5,770	16,347
NJ	7.9	4.5	77.1	651,407	279,263	372,144	98,957	471,101	35.0	164,885	7.5	35,333	200,218
NM	5.6	3.4	63.5	26,809	12,685	14,124	1,973	16,097	15.0	2,415	5.0	605	3,219
NY	6.8	3.7	86.5	1,254,189	556,466	697,723	161,046	858,769	30.0	257,631	10.0	85,877	343,508
NC	6.9	1.9	273.8	300,648	38,305	262,343	24,748	287,091	32.5	93,305	15.0	43,064	136,368
ND	3.4	3.0	12.5	11,007	6,657	4,350	477	4,827	0.0	0	0.0	0	0
OH	5.0	1.9	164.1	634,241	139,253	494,988	57,763	552,751	7.5	41,456	15.0	82,913	124,369
OK	4.1	2.5	63.9	65,177	23,380	41,797	7,060	48,857	0.0	0	5.0	2,443	2,443
OR	7.2	4.2	70.2	138,709	45,480	93,229	11,801	105,030	35.0	36,761	7.5	7,677	44,638
PA	7.5	3.3	127.1	970,603	304,602	666,001	62,540	728,541	35.0	254,989	15.0	109,281	364,270
PR	15.4	9.9	56.1	102,535	42,856	59,679	14,212	73,891	35.0	25,862	5.0	3,695	29,556
RI	9.6	4.3	122.8	88,393	30,496	57,897	12,142	70,039	35.0	24,514	12.5	8,755	33,269
SC	7.6	2.1	261.1	157,022	22,697	134,325	14,052	148,377	35.0	51,932	15.0	22,257	74,168
SD	3.0	1.7	71.5	9,424	3,192	6,232	569	6,801	0.0	0	7.5	510	510
TN	6.9	2.6	161.2	193,668	44,370	149,298	18,446	167,744	32.5	54,517	15.0	25,162	79,679
TX	2.2	1.1	97.1	175,391	61,874	113,517	20,200	133,717	0.0	0	10.0	13,372	13,372
UT	4.5	3.1	44.8	40,706	14,796	25,910	2,419	28,329	2.5	708	2.5	708	1,416
VT	8.2	4.2	96.0	28,446	11,434	17,012	3,319	20,331	35.0	7,116	10.0	2,033	9,149
VA	3.5	0.9	278.1	138,187	16,760	121,427	9.652	131,079	0.0	0	15.0	19,662	19,662
WA	8.5	5.9	43.6	199,536	110,542	88,994	20,324	109,318	35.0	38,261	2.5	2,733	40,994
WV	5.7	3.3	68.8	60,317	21,850	38,467	4,599	43,066	17.5	7,537	7.5	3,230	10,767
WI	5.6	2.6	115.9	259,864	80,576	179,288	13,058	192,346	15.0	28,852	12.5	24,043	52,895
WY	2.3	1.5	49.3	6,345	2,209	4,136	303	4,439	0.0	0	5.0	222	222
Total reimbursement													$3,189,901

LEGEND: T1 = percent reimbursement of extra costs according to IUR level; T2 = percent reimbursement of excess costs according to IUR increase; RE1 = reimbursement due to T1; RE2 = reimbursement due to T2; REIM = total reimbursement.
NOTE: US IUR = 6 pct; pct increase = 77; previous increase = 31 pct.

An interesting exception is Tennessee, which loses the same amount under both alternatives. (This plan might be renamed the Tennessee plan.) The schedule in the latest ICESA plan contains the optimal mix of both cost equalization and reinsurance for Tennessee—any more of either would cost the State significant amounts in reimbursements.

The earlier version of the ICESA plan (the Brodhead bill) was heavily weighted toward cost equalization, and the revised plan still contains a significant

TABLE 3. Reimbursement amounts and percentages, for a more reinsurance-oriented ICESA plan, and changes from the original ICESA plan, for 1975 ($ in thousands)

St	T1	Change	RE1 ($)	Change ($)	T2	Change	RE2 ($)	Change ($)	REIM ($)	Change (pct)	Change ($)
AL	25.0	0.0	31,602	0	15.0	0.0	18,961	0	50,564	0	0
AK	25.0	−5.0	3,429	−686	0.0	0.0	0	0	3,429	−17	686
AZ	25.0	0.0	26,531	−7,875	20.0	5.0	21,225	5,306	47,756	12	5,306
AR	25.0	−10.0	19,688	0	17.5	2.5	13,782	1,969	33,470	−15	5,906
CA	25.0	0.0	208,095	0	5.0	0.0	41,619	0	249,714	0	0
CO	0.0	0.0	0	0	20.0	5.0	12,502	3,126	12,502	33	3,126
CT	25.0	−7.5	55,172	−16,552	10.0	0.0	22,609	0	77,241	−18	16,552
DE	12.5	0.0	5,384	0	15.0	0.0	6,461	0	11,845	0	0
DC	0.0	0.0	0	0	12.5	0.0	5,307	0	5,307	0	0
FL	2.5	0.0	7,560	0	17.5	2.5	52,919	7,560	60,479	14	7,560
GA	20.0	0.0	44,228	0	25.0	10.0	55,285	22,114	99,512	29	22,114
HI	2.5	0.0	729	0	2.5	0.0	729	0	1,457	0	0
ID	12.5	0.0	1,993	0	5.0	0.0	797	0	2,790	0	0
IL	17.5	0.0	96,007	0	17.5	2.5	96,007	13,715	192,014	17	13,715
IN	10.0	0.0	21,016	0	20.0	5.0	42,031	10,508	63,047	20	10,508
IA	0.0	0.0	0	0	12.5	0.0	9,476	0	9,476	0	0
KS	0.0	0.0	0	0	2.5	0.0	1,993	0	1,993	0	0
KY	20.0	0.0	22,859	0	12.5	0.0	14,287	0	37,145	0	0
LA	0.0	0.0	0	0	2.5	0.0	1,559	0	1,559	0	0
ME	25.0	−10.0	10,014	−4,006	10.0	0.0	4,006	0	14,020	−22	4,006
MD	12.5	0.0	17,269	0	12.5	0.0	17,269	0	34,538	0	0
MA	25.0	−10.0	79,297	−31,719	7.5	0.0	23,789	0	103,086	−24	31,719
MI	25.0	−10.0	186,148	−74,460	15.0	0.0	111,689	0	297,833	−20	74,460
MN	0.0	0.0	0	0	7.5	0.0	9,713	0	9,713	0	0
MS	15.0	0.0	7,734	0	20.5	5.0	10,312	2,578	18,045	17	2,578
MO	20.0	0.0	37,202	0	12.5	0.0	23,251	0	60,454	0	0
MT	20.0	0.0	3,188	0	5.0	0.0	797	0	3,984	0	0
NE	0.0	0.0	0	0	15.0	0.0	5,903	0	5,903	0	0
NV	25.0	−2.5	8,875	−888	5.0	0.0	1,775	0	10,650	−8	888
NH	25.0	−2.5	9,616	−962	25.0	10.0	9,616	3,846	19,232	18	2,844
NJ	25.0	−10.0	117,775	−47,110	7.5	0.0	35,333	0	153,108	−24	47,110
NM	15.0	0.0	2,415	0	5.0	0.0	805	0	3,219	0	0
NY	25.0	−5.0	214,692	−42,945	10.0	0.0	85,377	0	300,569	−13	42,945
NC	25.0	−7.5	71,773	−21,532	25.0	10.0	71,773	28,709	142,546	5	7,177
ND	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
OH	7.5	0.0	41,456	0	17.5	2.5	96,731	13,818	138,188	11	13,818
OK	0.0	0.0	0	0	5.0	0.0	2,443	0	2,443	0	0
OR	25.0	−10.0	26,258	−10,503	7.5	0.0	7,877	0	34,135	−24	10,503
PA	25.0	−10.0	182,135	−72,854	15.0	0.0	109,281	0	291,416	−20	72,854
PR	25.0	−10.0	18,473	−7,389	5.0	0.0	3,695	0	22,167	−25	7,389
RI	25.0	−10.0	17,510	−7,004	12.5	0.0	8,775	0	26,265	−21	7,004
SC	25.0	−10.0	37,094	−14,838	25.0	10.0	37,094	14,838	74,189	0	0
SD	0.0	0.0	0	0	7.5	0.0	510	0	510	0	0
TN	25.0	−7.5	41,936	−12,581	17.5	2.5	29,355	4,193	71,291	−11	8,388
TX	0.0	0.0	0	0	10.0	0.0	13,372	0	13,372	0	0
UT	2.5	0.0	708	0	2.5	0.0	708	0	1,416	0	0
VT	25.0	−10.0	5,083	−2,033	10.0	0.0	2,033	0	7,116	−22	2,033
VA	0.0	0.0	0	0	25.0	10.0	32,770	13,108	32,770	67	13,108
WA	25.0	−10.0	27,329	−10,932	2.5	0.0	2,733	0	30,062	−27	10,932
WV	17.5	0.0	7,537	0	7.5	0.0	3,230	0	10,767	0	0
WI	15.0	0.0	28,852	0	12.5	0.0	24,043	0	52,895	0	0
WY	0.0	0.0	0	0	5.0	0.0	222	0	222	0	0
Total reimbursement											$2,948,430

LEGEND: T1 = percent reimbursement of extra costs according to IUR level; T2 = percent reimbursement of excess costs according to IUR increase; RE1 = reimbursement due to T1; RE2 = reimbursement due to T2; REIM = total reimbursement.

bias in that direction. However, it does strike more of a balance between the two approaches. The estimates here show that significant changes either way aid only a few States but decrease the grants for many more. Nonetheless, if the Commission's objectives for a catastrophic financing plan call for either more reinsurance or more cost equalization than the latest ICESA plan proposes, those objectives can be achieved by simply modifying the reimbursement schedules as outlined here, with very minor differences in total program costs.

Table 7 represents a comparison of various proposals for cost equalization and reinsurance.

A final note on the national trigger rate for cost reinsurance is appropriate. Some Commissioners have

TABLE 4. Reimbursement amounts and percentages for a more cost-equalization-oriented ICESA plan, and changes from the original ICESA plan, for 1975 ($ in thousands)

St	T1	Change	RE1 ($)	Change ($)	T2	Change	RE2 ($)	Change ($)	REIM ($)	Change (pct)	Change ($)
AL	25.0	0.0	31,602	0	10.0	−5.0	12,641	−6,320	44,243	−14	6,320
AK	30.0	0.0	4,115	0	0.0	0.0	0	0	4,115	0	0
AZ	25.0	0.0	26,531	0	10.0	−5.0	10,613	−5,306	37,144	−12	5,306
AR	40.0	0.0	31,501	3,938	10.0	−5.0	7,875	−3,938	39,376	0	0
CA	25.0	0.0	208,095	0	5.0	0.0	41,619	0	249,714	0	0
CO	0.0	0.0	0	0	10.0	−5.0	6,251	−3,125	6,251	−33	3,125
CT	32.5	0.0	71,724	0	10.0	0.0	22,069	0	93,793	0	0
DE	12.5	0.0	5,384	0	10.0	−5.0	4,307	−2,154	9,692	−18	2,154
DC	0.0	0.0	0	0	10.0	−2.5	4,246	−1,061	4,246	−20	1,061
FL	2.5	0.0	7,560	0	10.0	−5.0	30,239	−15,120	37,799	−29	15,120
GA	20.0	0.0	44,228	0	10.0	−5.0	22,114	−11,057	66,341	−14	11,057
HI	2.5	0.0	729	0	2.5	0.0	729	0	1,457	0	0
ID	12.5	0.0	1,993	0	5.0	0.0	797	0	2,790	0	0
IL	17.5	0.0	96,007	0	10.0	−5.0	54,861	−27,431	150,868	−15	27,431
IN	10.0	0.0	21,016	0	10.0	−5.0	21,016	−10,507	42,031	−20	10,507
IA	0.0	0.0	0	0	10.0	−2.5	7,581	1,895	7,581	−20	1,895
KS	0.0	0.0	0	0	5.0	0.0	1,993	0	1,993	0	0
KY	20.0	0.0	22,859	0	10.0	−2.5	11,429	−2,858	34,288	−8	2,858
LA	0.0	0.0	0	0	2.5	0.0	1,559	0	1,559	0	0
ME	40.0	5.0	16,022	2,002	10.0	0.0	4,006	0	20,028	11	2,002
MD	12.5	0.0	17,269	0	10.0	−2.5	13,815	−3,454	31,034	−10	3,454
MA	40.0	5.0	126,876	15,860	7.5	0.0	23,789	0	150,665	12	15,860
MI	40.0	5.0	297,838	37,230	10.0	−5.0	74,459	−37,230	372,297	0	0
MN	0.0	0.0	0	0	7.5	0.0	9,713	0	9,713	0	0
MS	15.0	0.0	7,734	0	10.0	−5.0	5,156	−2,578	12,889	−17	2,578
MO	20.0	0.0	37,202	0	10.0	−2.5	18,601	−4,650	55,803	−8	4,650
MT	20.0	0.0	3,188	0	5.0	0.0	797	0	3,984	0	0
NE	0.0	0.0	0	0	10.0	−5.0	3,935	−1,968	3,935	−13	1,968
NV	27.5	0.0	9,763	0	5.0	0.0	1,775	0	11,538	0	0
NH	27.5	0.0	10,578	0	10.0	−5.0	3,846	−2,284	14,424	−14	2,284
NJ	40.0	5.0	188,440	23,555	7.5	0.0	35,333	0	223,773	12	23,555
NM	15.0	0.0	2,415	0	5.0	0.0	805	0	3,219	0	0
NY	30.0	0.0	257,631	0	10.0	0.0	85,877	0	343,508	0	0
NC	32.5	0.0	93,305	0	10.0	−5.0	28,709	−14,355	122,014	−11	14,355
ND	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
OH	7.5	0.0	41,456	0	10.0	−5.0	55,275	−27,638	96,731	−22	27,638
OK	0.0	0.0	0	0	5.0	0.0	2,443	0	2,443	0	0
OR	35.0	0.0	36,761	0	7.5	0.0	7,877	0	44,638	0	0
PA	40.0	5.0	291,416	36,427	10.0	−5.0	72,854	−36,427	364,270	0	0
PR	40.0	5.0	29,556	3,694	5.0	0.0	3,695	0	33,251	12	3,694
RI	40.0	5.0	28,016	3,502	10.0	−2.5	7,004	−1,751	35,020	5	1,751
SC	40.0	5.0	59,351	7,419	10.0	−5.0	14,838	−7,419	74,188	0	0
SD	0.0	0.0	0	0	7.5	0.0	510	0	510	0	0
TN	32.5	0.0	54,517	0	10.0	−5.0	16,774	−8,388	71,291	−11	8,388
TX	0.0	0.0	0	0	10.0	0.0	13,372	0	13,372	0	0
UT	2.5	0.0	708	0	2.5	0.0	708	0	1,416	0	0
VT	40.0	5.0	8,133	1,017	10.0	0.0	2,033	0	10,166	11	1,017
VA	0.0	0.0	0	0	10.0	−5.0	13,108	−6,554	13,108	−33	6,554
WA	40.0	5.0	43,727	5,466	2.5	0.0	2,733	0	46,460	13	5,466
WV	17.5	0.0	7,537	0	7.5	0.0	3,230	0	10,767	0	0
WI	15.0	0.0	28,852	0	10.0	−2.5	19,235	−4,808	48,086	−9	4,808
WY	0.0	0.0	0	0	5.0	0.0	222	0	222	0	0

LEGEND: T1 = percent reimbursement of excess costs according to IUR level; T2 = percent reimbursement of excess costs according to IUR increase; RE1 = reimbursement due to T1; RE2 = reimbursement due to T2; REIM = total reimbursement.

expressed the view that any such program should be for catastrophic periods of unemployment. And, while not defining "catastrophic" precisely, they have argued that this implies a trigger rate higher than the 4.5 percent currently utilized by the EB program.

A level of 5 percent for the annual national insured rate has been suggested as an approximation of catastrophic levels of insured unemployment. A 5 percent trigger rate for the ICESA plan would have kept the program from paying any benefits in 1967, when the annual IUR was only 4.5 percent (a decrease of 25 percent from 1975). This would have resulted in reinsurance program savings of $0.9 billion in grants that would *not* be payable for 1976. (The savings is

TABLE 5. Cost trade-offs between the revised ICESA plan and a more insurance-oriented plan for 1975 ($ in thousands)

	IUR (pct)	Base-period IUR (pct)	Percent increase in IUR	Grant difference from revised ICESA plan
States with increased grants				
Georgia	6.0	1.5	298.5	+$ 22,114
Ohio	5.0	1.9	164.1	13,818
Illinois	5.7	2.2	162.5	13,715
Virginia	3.5	0.9	278.1	13,108
Indiana	5.2	1.9	174.6	10,508
Florida	4.5	1.8	146.7	7,560
North Carolina	6.9	1.9	273.8	7,177
Arizona	6.4	2.2	184.3	5,306
Colorado	3.3	1.2	174.5	3,126
New Hampshire	6.6	1.9	244.1	2,844
Mississippi	5.6	2.0	181.5	+$ 2,578
Total increase for States with gains				$101,854
States with decreased grants				
Minnesota	9.0	4.0	126.4	−$ 74,460
Pennsylvania	7.5	3.3	127.1	72,852
New Jersey	7.9	4.5	77.1	47,110
New York	6.8	3.7	86.5	42,945
Massachusetts	7.9	4.4	81.0	31,719
Connecticut	7.0	3.6	96.3	16,552
Washington	8.5	5.9	43.6	10,932
Oregon	7.2	4.2	70.2	10,503
Tennessee	6.9	2.6	161.2	8,388
Puerto Rico	15.4	9.9	56.1	7,378
Rhode Island	9.6	4.3	122.8	7,004
Arizona	7.9	3.1	155.1	5,906
Maine	8.2	4.3	89.9	4,006
Vermont	8.2	4.2	96.0	2,033
Nevada	6.5	4.3	53.8	888
Arkansas	6.8	8.3	−18.4	686
Total decrease for States with losses				−$343,375
Net difference				−$241,521

TABLE 6. Cost trade-offs between the revised ICESA plan and a plan more oriented toward cost equalization, for 1975 ($ in thousands)

	IUR (pct)	Base-period IUR (pct)	Percent increase in IUR	Grant difference from revised ICESA plan
States with increased grants				
New Jersey	7.9	4.5	77.1	+$23,555
Massachusetts	7.9	4.4	81.0	15,860
Washington	8.5	5.9	43.6	5,466
Pennsylvania	7.5	3.3	127.1	3,694
Maine	8.2	4.3	89.9	4,006
Rhode Island	9.6	4.3	122.8	1,751
Vermont	8.2	4.2	96.0	1,017
Total increase for States with gains				+$55,349
States with decreased grants				
Ohio	5.0	1.9	164.1	−$ 27,638
Illinois	5.7	2.2	162.5	27,431
Florida	4.5	1.8	146.7	15,120
North Carolina	6.9	1.9	273.8	14,355
Georgia	6.0	1.5	298.5	11,057
Indiana	5.2	1.9	174.6	10,507
Tennessee	6.9	2.6	161.2	8,388
Virginia	3.5	0.9	278.1	6,554
Alabama	6.4	2.7	138.9	6,320
Arizona	6.4	2.2	184.3	5,306
Wisconsin	5.6	2.6	115.9	4,808
Missouri	5.9	2.8	114.6	4,650
Maryland	5.4	2.4	122.1	3,454
Colorado	3.3	1.2	174.5	3,125
Kentucky	5.9	2.7	118.5	2,858
Mississippi	5.6	2.0	181.5	2,578
New Hampshire	6.6	1.9	244.1	2,284
Delaware	5.4	2.2	143.0	2,154
Nevada	3.8	1.7	126.7	1,968
Iowa	3.5	1.7	109.4	1,895
District of Columbia	3.8	1.7	116.3	1,061
Total decrease for States with losses				−$163,511
Net difference				−$108,162

also $0.9 billion less than the two alternative schedules presented here.)

Raising the trigger rate would also represent more reinsurance as more States are likely to experience larger percentage increases in their IUR's at higher levels of national unemployment.

Notes

1. Saul Blaustein and Paul Kozlowski, *Interstate Differences in Unemployment Insurance Benefit Costs* (Kalamazoo, Mich., The W. E. Upjohn Institute for Employment Research, 1978); and Robert Hutchens, *Analyzing Interstate Differences in Unemployment Insurance Expenditures* (Ithaca, N.Y., Cornell University Institute for Industrial and Labor Relations, 1979).

2. A summary of these studies can be found in David Hamermesh, *Jobless Pay and the Economy* (Baltimore, The Johns Hopkins University Press, 1977).

TABLE 7. Comparison of key features of major cost equalization and reinsurance proposals

	H.R. 3937 (1979) (Brodhead)	Variant of Brodhead[1]: More cost equalization	Variant of Brodhead[1]: More reinsurance	S. 825 (1979) (Javits)	Cal Tax plan	Ohio plan
Reinsurance/cost equalization ranking (1=plan with most emphasis on reinsurance; 6=plan with most emphasis on cost equalization)	3	4	2	6	1	5
National trigger:						
Required	Yes	Same	Same	No	No	Yes
Type	Annual IUR	Same	Same	NA	NA	Annual HH
Level	4.5 pct or 25 pct increase	Same	Same	NA	NA	5.0 pct
Base period	5 of last 7, excl. high and low IUR	Same	Same	3 years of last 5 with lowest cost	2 years of last 5 with highest IUR's	None
State eligibility						
U-rate	4.5 IUR	Same	Same	6.0 IUR	6 pct IUR or 8 pct TUR & IUR>avg. of 2 high yrs.	None, all States receive grants
Percent change	25 inc.	Same	Same	None	None	None
Reimbursement rate:						
U-rate	2.5 pct of excess costs for each .2 pct over 4.5 IUR, max 35 pct	Same, but max at 40 pct	Same, but max at 25 pct	6 to 7 pct; 50 pct of excess costs, 7 to 8 pct: 67 pct, 8+: 75 pct	30 pct of excess costs. Excess costs are defined below	Reimbursement is proportional to State's share of the nation's total unemployment, out of a congressionally mandated fixed amount of dollars for the year.
Maximum reimbursement	50 pct of excess costs	Same	Same	75 pct	30 pct	
Treatment of EB	All excess costs	Same	Same	Incl. with regular benefits	Incl. with regular benefits	NA
Funding source	FUTA	Same	Same	General revenues	FUTA	General revenues
No. of States eligible and cost:[2]						
1975	51 $3.2B	51 $3.1B	51 $2.9B	43 $6.2B	36 $1.5B	52 $3.1B
1976	51 $0.9B	51 $0.9B	51 $0.9B	31 $3.1B	1 $0.1B	52 $0.9B

LEGEND: IUR = insured unemployment rate; TUR = total unemployment rate; HH = head of household unemployment rate.

[1] Cost equalization basically refers to grant schemes that determine eligibility for and amount of payments on the basis of the absolute level of a State's unemployment rate. Reinsurance basically refers to grant schemes that determine eligibility for and amount of payments on the basis of the relative change in a State's unemployment rate.

[2] The cost of any proposal can easily be increased or decreased by altering the reimbursement rate.

NOTES: Under the Cal Tax plan, excess costs are calculated as follows. Divide the average of the two highest base-period IUR's by the grant-year IUR; subtract this fraction from 1; multiply the grant-year benefit costs by this remainder. The product is the amount of excess costs. Under the Javits plan, if the IUR exceeded 6 percent in all of the preceding 5 years, the base period is the one with the lowest cost.

Financing Extended Benefits and Reinsurance: General Revenue Versus the Payroll Tax

Joseph E. Hight

This report discusses the economic implications of a shift from using payroll taxes to using general revenues to finance a portion of unemployment insurance (UI) benefits. The report includes specific examination of three issues: (1) canceling the Extended Unemployment Compensation Account (EUCA) debt, in effect financing the deficit of the 1975–77 Federal or State shares of extended and supplemental benefits from general revenues; (2) changing the method of financing the Federal and/or State share of extended benefits and supplemental benefits from payroll taxes to general revenues; and (3) financing a UI reinsurance plan. The discussions are limited to economic implications and provide no explicit analyses of UI program implications.

General Economic Impact

Each of the issues discussed here involves a possible shift from a payroll tax to the general revenue taxes. Hence, the general economic forces act similarly for all of the issues but vary with a differential impact of these two revenue sources on each issue. The economic elements at play include prices, wages, employment, and income distribution among both individuals and States.

Prices and employment

Shifting the financing of a portion of UI benefit costs—whether extended benefits, Federal supplemental benefits, or reinsurance—to general revenues implies that a lower payroll tax would be required to finance the UI program. This would result in lower unit-labor costs. The lower labor costs could at first increase profits, but through competition in product markets they would lead to price reductions or smaller price increases than otherwise would have occurred.

The decrease in payroll costs also would lead to increased employment, as business strove to meet increased demand resulting from lower prices and to take advantage of reduced labor costs. Because the UI payroll tax is levied against a limited wage base (the tax is applied only to the first $6,000 in wages for each employee), the lower-wage, lower-skilled segment of the labor force would benefit most from an increase in jobs.

A lower payroll tax also could lead to higher wage rates than would be paid in the absence of the tax reduction. Any wage increases would, of course, preclude the price and employment effects discussed above. However, a recent study has concluded that, at most, one-third of a payroll tax is reflected in wages, with two-thirds reflected in prices or profits, or both.[1]

Profits can increase when payroll taxes are reduced, either because prices stay the same and the lower payroll costs are added to the profit margin or because prices are lowered, thereby stimulating sales and added profits at the same profit margin. The latter case would be more likely, as the competitive forces are stronger in product markets.

The favorable effects of lower payroll taxes have to be viewed in relation to possible effects of offsetting the revenue loss by higher income taxes, or an increased Federal deficit, or by a reduction in other types of Federal expenditures. If personal and corporate income taxes were raised sufficiently to cover the costs of UI benefits no longer covered by a payroll tax, these increased taxes could reduce the supply and demand of labor, resulting in reduced employment. Similarly, these increased income taxes could adversely affect employment by reducing the supply of investment capital. Alternatively, if income taxes were not increased to offset the decline in payroll taxes, this could add to aggregate consumption demand and inflationary pressures.

It should be emphasized, however, that reduction of the payroll tax would have a net favorable effect on the economy. The more direct effect via payroll costs would probably dominate the effects felt through increased income taxes or an increased Federal deficit.[2]

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Income distributions

Other differential effects of financing UI benefits from general revenues rather than from the payroll tax depend on the distribution of program costs across income levels and across States. The predominant sources of general revenues—personal and corporate income taxes—are generally progressive taxes. Most of the payroll tax for UI, although directly assessed against employers, is probably borne by consumers in the form of higher prices and by labor in the form of lower wages, with lower-income consumers perhaps paying the greater share of their income than occurs with personal or corporate income tax. Hence, a change to general-revenue financing would shift costs toward higher-income individuals and States.

Canceling the EUCA Debt

In 1979 the EUCA debt was $8.7 billion. Approximately $600 million of this was incurred prior to 1975, the remainder between January 1975 and March 1977. This reflects approximately $2.8 billion in expenditures for the Federal share of extended benefits and approximately $5.3 billion for supplemental benefits. Consequently, canceling this debt has been referred to as "retroactive adjustment in financing Federal Supplemental Benefits and Extended Benefits." [3] If only that portion of the EUCA debt attributable to Federal Supplemental Benefits were canceled, the payroll tax would not be reduced until FY 1983. If none of the debt were canceled, the tax would not be reduced until FY 1986.

Relieving the UI trust fund of the EUCA debt would have no direct effect on the national economy. However, a 1976 amendment to the Federal Unemployment Tax Act (FUTA) raised the Federal UI tax rate by 0.2 percentage points, to remain in effect until the EUCA debt is paid. It is through this increased tax rate that the debt has an economic impact: as long as the debt is outstanding, Federal revenues will be higher than they otherwise would be, as cancellation of the debt would cause the Federal UI tax rate on covered payrolls to decrease by 0.2 percentage points (a 29 percent reduction), thereby reducing Federal revenues.

A lower Federal UI tax rate would affect both the Federal budget and the national economy. First, a lower rate would increase the Federal budget deficit by about $1 billion annually. Thus, if the full EUCA debt were canceled immediately, the $29 billion deficit for FY 1980 would increase initially by 3.4 percent; the final effect would actually be smaller, depending on subsequent employment and income effects caused by the rate reduction. Assuming no offsetting decrease in government expenditures, the reduction would add to both aggregate demand and inflationary pressures.

However, the inflationary pressures caused by an increased Federal deficit would be more than offset by the reduction in payroll costs resulting from the reduced payroll tax, as the lower payroll costs would lead to price reductions. According to a recent study by the Congressional Budget Office, the net effect of a billion-dollar reduction in employer payroll taxes would be an increase of 20,000 to 30,000 in average annual employment and a decrease of .05 to .07 percent in prices.[4]

In addition to price and employment effects, forgiveness of the EUCA debt would affect the distribution of the costs of the supplemental and extended benefit programs among the States. A recent study compared the pattern and the amount of the interstate subsidies that result when the Federal share of 1972–76 extended benefit costs are funded through payroll taxes with the pattern and amount resulting when general revenues are used.[5] (In that study, supplemental benefit costs were not considered. Although including these costs would increase the size of the subsidies, the pattern of the subsidies should remain substantially unchanged.) Study results showed that net subsidies, received by 15 States, were highly concentrated in the Northern industrialized States. While this pattern was the same under both payroll-tax and general-revenue financing, the level of subsidies was higher under the payroll tax ($750 million versus $630 million).

In contrast to the relative concentration of subsidies received, subsidies were paid by 37 States, with the larger net payments tending to come from Southern States. The pattern was similar for both payroll-tax and general-revenue funding. In summary, the study indicates that there was little difference in the pattern of the implicit interstate subsidies of funds for extended benefits when financed under general revenues rather than a payroll tax, though the size of the subsidies was somewhat less with general revenues.

Current and Future General-Revenue Financing

In contrast to past Federal expenditures for extended and supplemental benefits, the financing of such current and future benefits could be changed from payroll taxes to general revenues without increasing the Federal deficit: the change could include an increase in income taxes (or smaller future decreases) to offset these costs.

The economic benefits derived from a reduction in payroll costs would probably outweigh the more indirect costs of increased income taxes. The reduction in payroll taxes would reduce prices and increase employment, particularly low-wage employment. The increase in income taxes would have offsetting effects, but these would be less direct and probably not as strong. The magnitude of the net effect would, of course, depend on the size of the tax, which would vary with the level of paid benefits and the period desired to generate revenues equal to these costs.

During 1974–78, if the increased costs needed to finance the Federal share of extended and supplemental benefits had been financed through an increased payroll tax, the unemployment effects would have been great. In that period, an additional $8 billion in payroll tax revenues would have been required to fully finance the Federal share of these benefits, an average of $1.6 billion per year over the 5-year period. From 1974 to 1977, with a $4,200 tax base, the tax rate would have had to average 1.1 percent, rather than the 0.5 percent it actually was. In 1978, with a $6,000 tax base, the tax rate would have been 0.9 percent. Taking into account the resulting disemployment effects—lower taxable wages—these rates would have had to be still higher. The Congressional Budget Office estimates that such payroll tax increases would have reduced average employment by from 32,000 to 48,000 per year and would have increased the gross national product (GNP) price deflator by about 0.1 percent.[6] This burden would have had unfortunate timing, for it would have been imposed at the depth of the recession. Actually, the extra costs were financed from general revenues, through deficit financing.

In addition to these price and employment effects, financing the Federal share of future extended and supplemental benefits through the payroll tax would change the size of the interstate transfers that can result from the program. If the 1972–76 pattern were to repeat itself, the size of these interstate transfers would be reduced under general-revenue financing.

The net employment and price effects of shifting to general-revenue financing would also be accompanied by favorable effects on income distributions. By shifting to general revenues, the burden of financing extended and supplemental benefits would be shifted to higher-income persons and States.

Financing of Reinsurance

One objective of any reinsurance system for UI is to increase the countercyclical or "automatic stabilizing" properties of the program.[7] The current UI funding system tends to produce changes in State payroll tax rates that destabilize the economy. In the aftermath of relatively steep recessions, State trust fund balances are greatly reduced and, in recent times, have become depleted. This has led to increased payroll tax rates during the early stages of a recovery, in some cases by action of State legislatures and in other cases according to automatic increases in tax schedules. The resulting increase in payroll costs imposes a drag on economic recovery and leads to slower growth in employment.

A reinsurance system, especially one triggered by national unemployment rates, could alleviate this destabilizing effect. Such a system could be financed by either a payroll or a general-revenue (income) tax.

Under payroll-tax financing, the tax rate would remain level over several years, regardless of the level of benefits being paid in any given year. In years with low unemployment and little or no reinsurance payments, the revenues from the tax would be credited to a special account in the UI trust fund. These revenues would be part of total Federal revenues and therefore available to finance general government expenditures or to reduce the government deficit.

In times of high unemployment, reinsurance grants would be made to the State UI trust fund accounts to help finance the increased level of benefit costs. This would alleviate the tendency for State UI tax rates to increase in the aftermath of the recession. In essence, the system would substitute a steady Federal payroll tax for the more variable State taxes as a portion of regular UI benefit costs and, at the same time, decrease the variability of the State taxes.

A similar result could be achieved using general-revenue financing for reinsurance. The objective would be to substitute general revenues for a portion of the State UI payroll taxes, reducing or eliminating their destabilizing movements. In times of high unemployment, reinsurance grants from general revenues to State trust fund accounts would alleviate the need for a rise in the State tax rates after the recession. In times of lower unemployment, general revenues could be credited to a special account in the UI trust fund.

Under general-revenue financing, general-revenue tax rates would have to rise enough to offset the deferred increases in the State taxes, otherwise the Federal Government debt would increase.[8] If it is assumed that this small addition to general-revenue taxes will be spread throughout the personal income tax schedule in effect each year, a more sensitive countercyclical effect than that of payroll-tax financing would result, as these taxes move countercyclically. (When employment and incomes are high, more people are at the higher tax rates and more revenue is generated; the reverse is true when employment and incomes are low.)

Effects of payroll-tax versus general-revenue financing of reinsurance (other than the countercyclical effects) would be similar to those discussed in the previous sections of this report. Payroll-tax financing would raise payroll costs, putting upward pressure on prices and downward pressure on employment. General-revenue financing would shift the burden of UI costs toward higher income classes. The distribution of the costs of reinsurance among the States would be according to (1) each State's contribution to general revenues under the general-revenue financing arrangement and

(2) each State's share of total covered employment under the FUTA.

Conclusions

The eventual impact of general-revenue versus payroll-tax financing depends primarily on the incidence of the different taxes. The payroll tax raises payroll costs directly, affecting prices and employment adversely. The payroll tax also tends to fall more heavily than general-revenue taxes on lower-income groups. Also, substituting general-revenue financing would reduce the size of interstate transfers resulting from the extended benefits program and any future Federal Supplemental Benefits.

In addition, financing the Federal share of past extended and supplemental benefits out of general revenues (that is, canceling the FUTA debt) would lower the payroll-tax rate by 0.2 percentage points. This decrease would cause a slight increase in the Federal deficit 8 years sooner than it would otherwise occur. Finally, financing any future reinsurance program from general revenues rather than through the FUTA payroll tax would probably increase the countercyclical sensitivity of the tax system.

Notes

1. See Daniel S. Hamermesh, "New Estimates of the Incidence of the Payroll Tax," *Southern Economic Journal,* April 1979, pp. 1208–19.

2. See *Aggregate Economic Effects of Changes in Social Security Taxes* (Washington, D.C., Congressional Budget Office, August 1978). This study analyzes the net effect of a change in the payroll tax and an offsetting change in income taxes.

3. See *First Interim Report of the National Commission on Unemployment Compensation* (Rosslyn, Va., NCUC, November 1978).

4. *Aggregate,* p. 27.

5. Study by Walter Burnes and Gary Reed (U.S. Department of Labor, Office of the Assistant Secretary for Policy, Evaluation and Research, 1979).

6. *Aggregate,* p. 27.

7. A second objective is, of course, to relieve the State programs from having to plan for the relatively infrequent years of extremely high costs.

8. Alternatively, other government expenditures could be reduced.

The Federal Budget: Removal of State Unemployment Trust Funds

Peter Henle

Unemployment insurance (UI) is a Federal-State program. Unlike other such programs, the receipts and expenditures under both the Federal and the State aspects of the program are included in the unified Federal budget. No major objections to this, the current budget treatment of UI arose until recent years, when a combination of rising UI expenditures together with greater political pressure for reducing the Federal Government's deficit led both the Congress and executive branch to propose a series of program changes designed to reduce spending. Among these proposals have been the following:

- a dollar-for-dollar offset from any individual's UI benefits for any retirement benefits currently received;
- the end of the national trigger for extended benefits; and
- an administrative change in the method of calculating national and State triggers by excluding extended benefits in determining the UI rate.

These proposals, although spurred by budget-conscious legislators, have raised questions about future directions of the UI program.

Recent events also have led to a proposal that the individual State trust fund accounts be removed from the unified Federal budget. (It is generally agreed that the Federal share of extended benefits, Federal loans to the States, and other benefits financed directly by the Federal payroll tax, or general revenues would, in all cases, continue to be included in the unified Federal budget.) Telling, but not necessarily conclusive, arguments can be made on both sides of this issue. No doubt the 2.7 percent Federal tax on employer payrolls (even though currently not paid because it is credited to all employers for participating in an acceptable State system) forms the basis for the national program. It is also true that the State tax receipts are handled by the U.S. Treasury. On the other hand, most major policy changes affecting the flow of tax receipts and benefit expenditures are the result of State, not Federal, law. Moreover, certain Federal agencies, most of them involved in lending or insurance operations, are not currently included in the unified Federal budget, even though the Treasury handles some or all of their accounts. Thus, there seems to be ample rationale for removing the State UI trust funds from the unified Federal budget, even though the trend in recent years has been toward including rather than excluding marginal agencies under the unified budget.

If such a change is made, it could be implemented by administrative or congressional action. The first is simpler, but the Office of Management and Budget undoubtedly would be reluctant to take this step unless the two Congressional Budget Committees gave their consent. Congressional action in these cases has not been unusual. In recent years a number of agencies have had their budget status determined (and sometimes redetermined) by the Congress.

If a simple transfer of the State trust funds is not made, other decisions made by the Congress regarding the structure of the UI program (perhaps as a result of the report of the National Commission on Unemployment Compensation) could pave the way for a change in budget status. For example, a decision allowing the States to keep receipts from the State employer payroll tax would certainly suggest that these funds no longer need be included in the unified Federal budget.

Finally, the change in fund placement would carry some implications for the Federal-State balance in the UI program. It would certainly bring greater State scrutiny of the program's spending since, after the shift, receipt and benefit expenditures almost certainly would be included in State budgets.

Historical Background

The unemployment compensation (UC) program originated as an element of the 1935 legislation to establish

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a Federal retirement-benefits program, the Social Security Act. Originally, the UI program was set forth in Title III of the Act. Today it comprises Titles III, IX, and XII of a longer, amended Social Security Act.

Financing of the original UI program was designed less for its practical application than for its constitutionality. At that time, the conservatively bent Supreme Court had ruled unconstitutional a number of President Roosevelt's New Deal proposals. In fashioning the social security (including UI) proposals, special efforts were made to circumvent the constitutional roadblocks the Court had erected. Thus, the UI program was designed as a Federal-State partnership, in contrast to the completely Federal program for retirement benefits. The basic authority for the UI program rested on the Federal Government's taxing power, rather than on its authority to regulate interstate commerce.

From this thinking, the basic Federal payroll tax on employers that is the basis of the Federal-State UI system was born. However, to fit this Federal tax into a Federal-State program, the legislation provided that all employers who contributed to a federally approved State program would receive a tax credit equivalent to the largest portion of the Federal tax that would otherwise apply. Since the original legislation provided relatively minimal Federal requirements for an acceptable State program, all States have qualified and have remained qualified under the law. Thus, employer contributions to their State program serve as a substitute for the Federal tax they would otherwise pay.

Yet, an effective Federal payroll tax (currently 0.7 percent of the first $6,000 of each employee's annual earnings from a given employer) is part of the UI system. Of this total, 0.45 percent of payroll is allocated to the State governments and to the Federal agencies involved, to pay for the administrative expenses of both the UI program and the employment service, while the remaining 0.25 percent of payroll is allocated to finance the Federal share of the extended benefits program and other unemployment benefit programs which the Congress may designate.

A key aspect of the original legislation was the special handling of the employer taxes (or contributions) to each State's UC program. Since these contributions were to be the sole financing source for paying benefits and could not be used for any other purpose, it was important that they be separated from other State revenues and carefully administered. To accomplish this the legislation required that each State deposit its receipts from employers in an individual State trust fund to be maintained at and administered by the U.S. Treasury. The U.S. Treasury was to hold these funds "in trust" for each State, to be transferred on demand to the States solely for the purpose of paying UI benefits. This arrangement was somewhat comparable to the Federal trust fund established at the same time to pay benefits to retiring employees.

For the first 20 years of the program, these trust fund moneys were not reflected in the annual budget of the Federal Government. The budget document did discuss the trust funds and provide information annually on the taxes received, the benefits paid, and the net balances, but these totals were not included in the basic Federal budget totals for Federal spending and Federal receipts. The thought was that these UI contributions (as well as contributions to the social security trust funds) were simply held "in trust" by the Federal Government for the States. In a similar fashion, the social security trust fund was considered the property of the employers and the employees who made the contributions. Therefore, there was no need to include the flow of funds into and out of these trust funds with the normal Federal tax receipts or expenditures.

The typical language used to explain the trust funds and their budget treatment was the following:

> The budget totals do not include transactions involving funds held in trust by the Federal Government. Trust fund receipts are used only for the purposes for which the trusts are established, and are not available for the general purposes of the Government. Nevertheless, activities carried on through trust funds are significant parts of the Government's program.[1]

In addition to accounting for the trust fund separately, each annual budget typically included a brief discussion of a constructed additional set of accounts that included trust funds, and was given the title *Federal Receipts From and Payments to the Public.* The value of this statement of "consolidated cash" was explained as follows:

> Basically, the statement of receipts from the public and payments to the public (often called the consolidated cash budget) represents a consolidation of the administrative budget and trust fund receipts and expenditures. . . .
>
> Thus, the statement of Federal payments to and receipts from the public is much more inclusive than the administrative budget. It portrays the financial dimensions of the Government's overall program. It is the best measure for analyzing the cash needs and borrowing requirements of the Federal Government.[2]

Gradually the number and size of the trust funds expanded. In the 1950's the new interstate highway program was financed through a trust fund. The social security program spawned a separate trust fund for disability payments and, later, a separate trust fund for medical insurance for the aged. Moreover, the trust funds seemed less inviolate as the Congress periodically enacted changes in the applicable tax rates, benefit levels, or other conditions surrounding the use of these moneys. In presenting the budget, the table entitled "Federal Receipts From and Payments to the Public" officially became the "consolidated cash budget" designed to show the total transactions of all the Federal accounts.

For the fiscal year 1967 budget, trust fund receipts were estimated to be $45.6 billion, almost 30 percent of receipts in the consolidated cash budget, and expenditures were estimated to be $39.6 billion, almost 25 percent of expenditures in the consolidated cash budget. Consequently, the administrative budget without the trust funds was quite deficient in reflecting overall Federal receipts and expenditures. The result was that debates over the economic impact of the budget and the budgetary practices of the Federal Government became focused as much or more on the "consolidated cash budget" as on the regular administrative budget.

In addition, a special national income accounts budget was prepared to show more precisely the effect of the budget on the economy. All these budgets naturally led to considerable confusion within the Congress and the public. In particular, many prominent economists felt that, unless the budget included the trust fund receipts and expenditures, the budget would have little economic significance.

In 1967, responding to this situation, President Johnson appointed a President's Commission on Budget Concepts to review the entire structure and composition of the Federal budget:

> Tradition and precedent have played an important role over the years in the shaping of our budgetary rules and presentation. The fact is that today all are agreed that some of our traditional budget concepts do not adequately portray how the Federal Government's activities affect the health of the American economy and the lives of American people.[3]

Those serving on the 16-member Commission included two Senators, two Congressmen, the Secretary of the Treasury, the Director of the Bureau of the Budget, past officials from these agencies, and public members from fields of accounting, economics, tax policy, and journalism. The Commission's unanimous report was delivered to the President on October 10, 1967, and many of its recommendations were incorporated into the FY 1969 Budget, issued in January 1968.

The Commission's report outlined the various criticisms that the prevailing budget presentation had received, highlighting the confusion of using the different budget concepts. Its chief recommendation was that the Federal Government present a single, unified budget based on "complementary rather than competing concepts," and that it be referred to as "The Budget of the United States" consistently in all publication and legislation.

This unified budget would specifically include the financial operations of all the trust funds. The Commission emphasized the importance of the trust funds to the budget:

> The inclusion or exclusion of trust funds represents one of the most important budget boundary questions. The exclusion of the trust funds from the present administrative budget is the largest single difference between that measure and either the consolidated cash budget or the Federal sector of the national income accounts, and has been the major reason for increasing dissatisfaction with the administrative budget . . . after careful consideration, the Commission recommends that:
>
>> The budget should include the receipts and expenditures of trust funds. This recommendation fully recognizes that individual trust funds must be accounted for separately, and that their activities must be reported on in a way which allows the identity and integrity of trust fund transactions and balances to be preserved.[4]

The more important points mentioned in the discussion in support of this recommendation are the following:

> In theory, trust funds do not belong to the Federal Government; the Federal Government acts only as trustee for them. . . .
>
> There has never been a question of the Federal Government's responsibility for determining the size and shape of the major trust fund programs, or for altering or redirecting these programs by appropriate changes in legislation. In fact, legislation changing contribution formulas or tax rates affecting trust fund revenues, or changing benefit and grant formulas affecting trust fund expenditures, has come to be expected with increasing frequency. Legislative changes affecting one or another of the major trust funds occur almost every year. Rather than removing funds from the influence of the Administration or the Congress, the trust fund technique, in the case of major trust funds, earmarks certain expenditure programs for financing by specific taxes or other revenue sources. This couples the benefits and costs of these programs more closely, and it also lends a degree of assurance to beneficiaries and grantees that trust fund benefit or grant schedules once established will be protected. . . .
>
> With the passage of time, trust fund activities have loomed larger in both absolute and relative magnitude in the total picture of Federal Government receipts and expenditures. Receipts, expenditures, and the surplus or deficit in Federally owned funds, therefore, have correspondingly less significance. It is clear to the Commission that the current surpluses of trust funds must be considered in calculating the effect of Federal Government activities on the level of income and employment, in managing Treasury cash balances, in deciding on Treasury cash borrowing needs, and in program evaluation.[5]

This report and a discussion of the issue in an accompanying volume of staff papers makes it quite clear that no special attention was paid to the UI program or, for that matter, to any of the individual trust funds. (The entire section of the report dealing with the trust funds is included in Appendix A.) Thus, there was no consideration whether the strong element of State participation in UI should in any way call for special treatment in the Federal budget. Moreover, individuals active in UI administration during this period do not recall any special attention to this issue or any Department of Labor comment on the change being made in the budget classification of the UI program.

Since 1968, there have been a number of changes in the UI program. Federal responsibility, for example, has increased with the development of the extended benefits program, jointly financed by Federal and State contributions. In response to the severity of the 1974–75 recession and the slow recovery which followed, an additional supplementary benefits program entitled "Federal Supplemental Benefits" was completely federally financed.

During these years, State programs have also been modified with changes in State laws governing benefit formulas, eligibility, tax base and rates, and so on; but throughout this period the Federal budget treatment of the program has remained the same.

Current Financing Arrangements

Currently, all UI trust funds are part of the unified Federal budget. They are treated in the budget document on a consolidated basis, although there is no single UI trust fund, but rather a series of trust accounts devoted to individual purposes within the UI program:

- fifty-three Individual State Trust Fund Accounts (one for each State plus the District of Columbia, Puerto Rico, and the Virgin Islands) with the receipts from State taxes on employers (two States also tax employees) balanced against the State payments of UC benefits to unemployed workers;
- an Employment Security Administration Account, which receives receipts from the Federal payroll tax of 0.45 percent of the first $6,000 of each employee's earnings for the administration of both UC and the employment service at both the State and Federal levels;
- an Extended Unemployment Compensation Account, which receives receipts from the Federal payroll tax of 0.25 percent of the first $6,000 of each employee's earnings and from which the Federal share of the extended benefits program is paid; and
- a Federal Unemployment Account, which receives advances from the Treasury and provides loans to the State accounts when States are unable to meet their obligations.

Currently, the net transactions of all the accounts in the UI trust fund are reflected in the unified budget. Separate data regarding the trust fund and a discussion of developments during the current year and those projected for the budget year are provided in "Special Analysis C" of the *Supplementary Budget Volume.* Other major trust funds included in "Special Analysis C" include the various social security trust funds, railroad employees' retirement fund, Federal employees' retirement funds, highway trust fund, airport and airway trust fund, State and local government fiscal assistance trust fund, and foreign military sales trust fund.

As a whole, FY 1980 trust funds currently are estimated to receive a total of $222 billion in revenue and to pay out $204 billion. Thus, trust funds make up roughly 42 percent of total receipts and 36 percent of total expenditures in the FY 1980 budget. As of February 1980 the trust funds as a whole are estimated to report a surplus of $18 billion, compared with a $58 billion deficit for the rest of the unified budget.

The UI trust funds as a group rank fourth in size behind the social security retirement trust funds, the health insurance trust funds, and the Federal employees' retirement trust fund. In the years of the unified budget, the UI funds have increased in receipts from $3.8 billion to $16 billion and in expenditures from $2.6 billion to $17 billion. Table 1 presents actual, estimated, and projected operating data for the UI program during 1950–81.

The following discussion of possible changes in the treatment of the UI trust funds in the budget focuses exclusively on the individual trust fund accounts for all the States. There is general agreement that the other accounts financed either by the Federal UI tax or through general revenues would continue, except under a major transformation of the Federal-State system, within the unified Federal budget. For FY 1980 the individual State accounts are estimated to receive a

TABLE 1. Operating data for the unemployment compensation program, select years 1950–81

Calendar year	Employer taxes			Benefits paid		
	Federal	State	Total	Regular UI	Other [1]	Total
1950	0.2	1.2	1.4	1.4	—	1.4
1955	.3	1.2	1.5	1.4	0.1	1.5
1960	.3	2.3	2.6	2.7	.2	2.9
1965	.4	3.1	3.5	2.2	.1	2.3
1968 [2]	—	—	—	—	—	—
1970	.4	2.6	3.0	3.8	.4	4.2
1975	1.3	5.2	6.5	11.8	6.1	17.9
1976	1.9	7.5	9.4	9.0	7.2	16.2
1977	2.1	9.2	11.3	8.4	4.6	13.0
1978	2.8	11.5	14.4	8.0	1.6	9.6
1979 [3]	3.1	12.4	15.5	8.7	1.3	10.0
1980 [4]	3.2	12.7	15.9	12.6	2.8	15.4
1981 [4]	3.4	14.1	17.5	14.0	3.0	17.0

[1] Includes extended benefits, Federal supplementary benefits, benefits to Federal employees, ex-servicemen's, trade adjustment benefits, and so on.
[2] First year of the "unified" budget.
[3] Estimated.
[4] Projected.
SOURCE: U.S. Department of Labor.

TABLE 2. Status of State UI trust funds, select years 1950–81

Calendar year[1]	Contributions	Outlays	Net change	Balance at end of year
1950	1.2	1.4	−0.2	7.0
1955	1.2	1.4	−0.2	8.3
1960	2.3	2.7	+0.6	6.4
1965	3.1	2.2	+0.9	8.2
1970	2.6	3.8	−1.2	11.9
1975	5.2	13.0[2]	−7.8	3.1
1976	7.5	10.1[2]	−2.6	0.9
1977	9.2	9.2[2]	—	0.9
1978	11.5	8.4[2]	+3.1	4.5
1979[3]	12.4	8.9[2]	+3.5	9.3
1980[4]	13.4	12.2[2]	+1.2	—
1981[4]	14.7	14.9[2]	−0.2	—

[1] 1980 and 1981, fiscal years.
[2] Includes State share of extended benefits.
[3] Actual.
[4] Projected.
SOURCE: U.S. Department of Labor.

total of $13.4 billion in employee payroll taxes and to pay out $12.2 billion in benefits with a surplus of $1.2 billion. A brief statistical summary of the State accounts as a whole is given in Table 2.

UI as Target Under Current Treatment

In the early days of the unified budget, the budget treatment of UI drew no special attention. Only as public attention became more focused on public spending in general and on the Federal budget deficit in particular has UI become the center of some budget controversies.

Continuing increases in the Federal budget during the 1970's focused greater attention on the budget process as a whole, and more specifically, on the way the Federal budget was processed in the Congress. Discussions of this issue led to the Congressional Budget Reform Act of 1974, which provided the Congress with new tools and added responsibility for dealing with the budget. Currently, the annual process of forcing the Congress to agree on the totals for budget receipts and expenditures has put all spending, including trust funds, into the budget review process. The Congressional Budget Act created the new House and Senate budget committees as well as the jointly supervised Congressional Budget Office. All this has meant stronger institutional support for closer scrutiny of the Federal budget. Add to this the high deficit generated during the recent recession and the net result has been more intense efforts by both the executive and legislative branches to reduce Federal spending as reflected in the unified budget.

During this same period, the UI program has been subject to severe strains. The deep recession of 1974–75 and its aftermath—unemployment peaked nationally at 9 percent in March 1975—caused all States to register major increases in claims, with many industrial States, particularly in the Northeast and Midwest, forced to borrow large sums from the Treasury to pay their committed benefits. Total benefits paid reached $18 billion in 1975 although they have receded since then to an estimated $10 billion for 1979. (See Table 1.)

The combination of more visible spending under the UI program, together with the knowledge that any reduction in benefits paid would improve the Federal deficit, has, in the view of some observers, been responsible for special efforts to limit spending for UI. These factors have given such moves greater support and credibility than in the past.

Such efforts led to four major developments:

First, a 1976 law was passed to reduce UC benefits by an amount the individual is receiving as a pension or retirement benefit. This legislation took effect April 1, 1980.

Second, on December 19, 1979, legislation (H.R. 4612) was proposed to the Senate by the Senate Finance Committee to limit the UI program in several ways:

- Elimination of the national trigger for the extended benefit program. This is estimated to save $300 million for FY 1980.
- Modification of the optional State trigger level for extended benefits. This is estimated to save $10 million in FY 1980 and $90 million in subsequent years.
- Limitation of benefits to ex-servicepersons to those with at least one year of service (rather than 90 days). This is estimated to save $25 million in FY 1980, increasing gradually to $44 million in 1984.
- Encouragement to States not to provide benefits for the first week of unemployment. This is estimated to save $10 million in 1980, increasing to $25 million in 1984.
- Provision of incentives for Federal agencies to contest improper benefit claims under the program for unemployed Federal employees. This is estimated to have no savings in FY 1980, but savings beginning in FY 1981 of $10 million increasing to $15 million in FY 1984.

These proposals were specifically linked to the budget process, for they resulted from the Senate Finance Committee's allocation of budgetary totals assigned to programs under its jurisdiction by the Second Concurrent Budget Resolution for FY 1980 (*S. Cong. Res. 53*) adopted in November 1979.

Third, an administrative change was announced by the Department of Labor (in the *Federal Register*, January 4, 1980) that, beginning February 3, a new procedure would become effective for calculating the

State and national UI rates which govern the setting of the "on" and "off" triggers for extended benefits. In the past, claims for extended benefits and for additional compensation were included along with the claims for regular benefits in the number of those unemployed. The amendment would change the procedure so that only weeks claimed for regular benefits would be included in the trigger calculation. The savings expected from this change are estimated to be $225 million in FY 1980 and $900 million in FY 1981.

Finally, each year, as part of the process of budget preparation, projections must be made of the expected unemployment claims for the forthcoming fiscal year. These are typically based on the administration's official projection of the economy, including the trend for the national unemployment rate. However, for the purposes of the UI budget, these have to be translated into UI rates. In this process, which is uncertain at best, there may be a tendency on the part of Federal agencies, particularly the Office of Management and Budget, to accept optimistic (perhaps overly optimistic) projections, which produce more favorable budget figures.

No doubt, these recent steps have greatly concerned many traditional supporters of the UI program. For example, the National Commission on Unemployment Compensation has unanimously taken tentative action recommending that the State UI accounts be taken out of the unified Federal budget. The Interstate Conference of Employment Security Administrators is also considering the issue. These groups have been particularly concerned by the manner in which the placement of the UI program within the unified Federal budget seems to have attracted relatively restrictive Federal legislation.

Pros and Cons of Changing the System

In recent years proposals to change the UI system have been stimulated by the fact that UI finances are part of the unified Federal budget. Some of these changes may be desirable in any case, but the charge is made that changes are being adopted for their effect on the budget, not for their intrinsic value. Thus, it becomes particularly important to analyze the rationale for the current placement of the UI program in the Federal budget. Discussions with staff of the Office of Management and Budget, the Department of Labor, and the Congressional Budget Committees bring out the following points in support of the current arrangement:

- Underlying the entire State program is the original Federal payroll tax on employers. This tax, in turn, is now credited to employers providing they participate in a State program meeting certain minimum Federal requirements. Nonetheless, without Federal tax there would be no UI program.
- The 53 individual State accounts are maintained in the U.S. Treasury. Tax receipts to each of these State accounts and benefit payments from each of these accounts flow through the U.S. Treasury. The transactions require close coordination between State officials and officials of the U.S. Treasury (for example, deposits are received from 20 to 25 States daily). The Treasury provides the States with certain services, including assured security for the funds, investment in U.S. securities, payment of interest, and interest-free loans.
- The Federal Government is committed to support the individual State accounts, so that, as during the recent recession, if a State's funds become inadequate to meet current commitments, advances from general revenues are made from the U.S. Treasury.
- The unified Federal budget provides the only opportunity for a legislative body to review the UI program's budget receipts and expenditures. There appears to be little, if any, discussion of UI in the individual State budgets.

Several arguments rebut these points:

- Basic decisions on size and scope of individual State programs rest almost exclusively in the hands of the State Legislatures. Federal requirements are limited, requiring, for example, provisions for basic coverage, payment through the Employment Service or other approved agencies, interstate claims, payment of extended benefits, and no denial of claims because of pregnancy, participation in a training program, a labor dispute, or a quit due to substandard working conditions. Essentially, State law affects the benefit levels, duration, tax rate and tax base (above the federally set minimum), methods for distributing the tax among different classes of employers, eligibility and disqualification requirements, and the administrative mechanism for payment of benefits.
- The major part of the Federal tax (2.7 percent of the 3.4 percent rate) can be regarded as a historical accident. It never comes into operation.
- The operations of the Treasury maintaining the various individual State accounts, while important, do not require that the accounts be included in the unified budget. The Treasury also handles accounts of a number of "off-budget" lending agencies.
- The Federal commitment to support the UI program is quite real, but it is questionable whether this need affects the placement of State moneys in the Federal budget. When and if Federal funds are advanced from general revenues, these would justifiably be reflected in the Federal budget. The same would be true of repayments of those advances.
- Currently, State budgets do not examine the budget implications of the State UI program, but this is largely because the budget review is centered in

the Federal budget. If a change were made, States should, and almost certainly would, provide more complete budget review of the receipts and expenditures of their individual program.

Analysis of this issue has to focus on the nature of the Federal-State partnership in the UI program. Federal legislation was required to develop a nationwide UI program, but the degree of Federal presence in the program has always been somewhat controversial. While the Federal Government initiated the program, subsequently most major policy changes have occurred as a result of changes in State law. Efforts made in the 1950's and 1960's to enact additional Federal standards (for example, concerning level and duration of benefits) did not succeed. Current efforts to impose Federal standards move in the opposite direction, to limit rather than expand the scope of the program.

As previously indicated, the original structure of the program, including the Federal tax law, was dictated more by questions of constitutionality than by considerations of administrative effectiveness. If the UC program had been structured on a Federal State matching grant basis as a number of other income maintenance programs currently provide, the Federal share of the program would be in the Federal budget, but each State's share would be in the individual State budgets. This occurs, for example, in the Aid to Families with Dependent Children or Medicaid programs, where the States contribute roughly 45 percent of the total cost.

Moreover, the UI program appears to be unique in its budget treatment. Questioning of knowledgeable budget staff both at the Office of Management and Budget and the Congress failed to identify any other program in which expenditures basically under the jurisdiction of the States are included in the Federal budget. The unified budget reflects many different types of Federal-State cooperative programs, but only the Federal grants, not the State contribution.

The present budget treatment can lead to certain misunderstandings or disortions in the decisionmaking process regarding Federal spending. Even though trust fund moneys are not available for any program except UI benefits, when the UI trust funds have a large surplus, spending by other programs may be encouraged. Moreover, the inherent nature of the UI trust funds is quite cyclical, with large deficits in recessions and surpluses in more prosperous years. This cyclical character adds an additional possible element of misunderstanding of the total figures for receipts and spending listed in the unified Federal budget.

The strongest argument for inclusion of the UI program in the unified budget seems to be that the individual State trust fund accounts are maintained at and managed by the U.S. Treasury. If the Federal budget is to include all Treasury transactions, the UI program accounts would have to be included. However, even the unified budget does not include all Federal agencies. A number of such agencies, largely lending agencies or joint public/private entities, are not included in the budget even though their financial operations or many aspects of them flow through the U.S. Treasury. Examples are the relatively new Federal Financing Bank and the Pension Benefit Guaranty Corporation.

In summary, the UI program's policy levers are largely centered in the individual States rather than the Federal Government, but its financial flow is centered in the U.S. Treasury; this provides the basis for its inclusion in the unified Federal budget. Ample rationale exists for removing the program from the Federal budget, but a number of practical considerations might affect such an effort:

- The State UI accounts are currently operating in surplus. For the year FY 1979 the surplus amounted to over $3 billion. If the State accounts had been removed from the unified budget for that year, the Federal budget deficit of $27.7 billion would have been about $31 billion. For FY 1980 the surplus in the UI State accounts is expected to be $1.2 billion and for FY 1981 a small deficit is expected ($0.2 billion). These projections are based on the expectations of a mild recession, and a more serious recession would lower or even erase the FY 1980 surplus. If any change in budget accounting is made, it would seem more acceptable for this to take place in a year when the change would not raise the size of the budget deficit.
- The current tendency, both in the Congress and in the executive branch, is to make the Federal budget more inclusive rather than less inclusive. Thus, any effort to remove the UI program from the Federal budget would run counter to the general trend.
- Strong efforts are being made to limit Federal expenditures to a certain percentage of the gross national product. The Senate has already expressed support of such a limit, and House action is expected on this issue in 1980 on H.R. 6021, introduced by Chairman Giaimo of the House Budget Committee. If such a limit were imposed, some lawmakers might be interested in removing certain programs from the unified budget, including possibly the UC program.

Removing UI From the Federal Budget

Removal of the State UI accounts from the unified Federal budget could be achieved by either of two approaches: (1) by an administrative change initiated by the Office of Management and Budget or (2) by congressional action.

Administrative change is simpler. The UI system was brought under the unified budget in 1968 through administrative action, and presumably this action could be reversed in the same way. However, major changes in the budget process have taken place since then, and the Congress is more closely involved in decisions affecting the composition of the budget. Although the administration has the authority to make the change, it is unlikely to initiate such action unless it has received the concurrence of the House and Senate Budget Committees. Moreover, as previously indicated, these agencies are more interested in expanding, rather than contracting, the scope of the unified budget: since 1968, no agency has been removed from the unified budget by administrative action.

The second approach, congressional action, would not be breaking new ground. In the recent past the Congress has determined the budget location of several agencies. For example, in establishing the new Federal Financing Bank and also the Pension Benefit Guaranty Corporation, the Congress decreed that their activities would be "off-budget." With respect to a Housing and Urban Development (HUD) program relating to housing assistance for elderly or handicapped low-income persons, the Congress decreed in the Housing and Community Act of 1974 that the program's receipts and disbursements would be "off-budget." But more recently, the HUD Appropriation Acts for FY 1978 and FY 1979 included an amendment keeping the program within the unified budget. Such an amendment is effective only for the year concerned; to keep the program within the budget would require a similar amendment annually. Other agencies whose inclusion or exclusion from the budget has been congressionally determined are the Export-Import Bank (formerly out, now in), the U.S. Railway Association (formerly out, now largely in), and the U.S. Rural Electrification and Telephone revolving funds. (Appendix B discusses the section of the FY 1981 Budget on off-budget activities.)

By administrative or congressional action, the change could be made without any other modification of the Federal-State UI system. In effect the administration or the Congress would be saying that, upon further reflection, the decision to include State UI receipts and expenditures within the unified budget was not wise in view of the basic State character of the program.

If, however, this argument does not prevail and the decision is reached that, as currently structured, the UI program must be retained within the Federal budget, then other changes could be contemplated that might simultaneously remove the State UI moneys from the Federal budget. Among the possible changes would be to allow (or require) the States to retain their individual trust fund balances rather than place them with the U.S. Treasury. Some Federal limitations would undoubtedly have to accompany this grant of authority, for the funds would have to be separately maintained and used only for payment of UI benefits. Probably some type of control would be necessary over the type of investments (perhaps restricted to Federal or Federal and State debentures). In reality, the retention of State moneys within each State would clearly obviate the need for the program funds to be reflected in the unified Federal budget. Under such circumstances, however, it seems unlikely that the States should be entitled to some of the services they now receive from the Treasury, such as interest-free loans.

More fundamental structural changes in the UI program could also be considered and, along with such changes, the role of the UI finances in the Federal and State budgets. Such changes could well alter the Federal-State balance in the program. In fact, merely removing State funds from the Federal budget might be regarded as changing the Federal presence in the program.

Possible Implications

The shift of State UI moneys out of the Federal budget appears to be quite simple, but it could have some additional implications.

Who would review the projected State UI budgets? Since the Federal-State UI system would remain a governmental activity, its revenues and expenditures should be publicly accountable through legislative representatives—Federal or State. In the past, the program's inclusion in the Federal budget has meant a degree of Federal supervision. If a key element of the program is to be removed from the Federal budget and, thus, to a certain degree from Federal executive and legislative scrutiny, then State legislative bodies must likely become more actively involved. A 10-State budget survey revealed a wide variety of current treatment of the UI program. In a number of States the administrative funds, which are entirely federally financed, are included in the State operating budget, both as a Federal grant and as a State expenditure for administration. This allows the State officials and State Legislature to review the agency's plans for operating an effective program. Very few, if any, State budgets, however, review the larger sums involved in the payment of benefits. This situation almost certainly would shift if the sums involved were no longer included in the unified Federal budget.

Would the shift in budget status involve changes in the relationship between the Labor Department, the Office of Management and Budget, and the States? If the change simply involves the State accounts, Federal funds would still be responsible for 100 percent of State administrative cost and Federal agencies would still be responsible for reviewing State administration and providing basic regulation. However, possible complications might be involved, because any increase in tax receipts or any reduction in program expenditures would not be reflected in the budget balance of the Federal Government but rather in the States. This might mean, for example, that the Labor Department or the Office of Management and Budget would not be as interested in authorizing higher administrative outlays for the States for more thorough tax audits or eligibility reviews, for, if these were successful, the additional taxes collected or the lower level of expenditures would only result in savings to the States rather than in the Federal budget. This suggests that a change in budget status could lead eventually to a Federal-State sharing of administrative costs.

Notes

1. *The Budget in Brief for the Fiscal Year Ending June 30, 1963,* p. 57.
2. Ibid., p. 56.
3. *President's Statement,* March 3, 1967.
4. *Report of the President's Commission on Budget Concepts,* p. 25.
5. Ibid., pp. 26–27.

Appendix A: Report of the President's Commission on Budget Concepts 1967

Chapter 3: Coverage of the Budget

In the private sector of the economy, the efficient allocation of resources is best performed in a decentralized fashion by the disciplines of the marketplace. In the public sector, however, it is the budget process which performs the resource allocation function.

To work well, the governmental budget process should encompass the full scope of programs and transactions that are within the Federal sector and not subject to the economic disciplines of the marketplace. This, however, poses practical questions as to precisely what outlays and receipts should be in *the budget* of the Federal Government. The answer to this question is not always as obvious as it may seem: the boundaries of the Federal establishment are sometimes difficult to draw.

Providing for national security or collecting census data are obviously activities of the Federal Government which should clearly be in "the budget." It is equally clear that the housewife's purchase of groceries or a private corporation's borrowing from a commercial bank represent transactions outside the Federal sector. Between these obvious extremes, however, are a wide variety of activities ranging from those clearly within the Federal domain to those clearly outside the Federal establishment. Should the activities of enterprises owned jointly by the Government and the private sector of the economy be included in the budget? What about clearly Government agencies, such as the Federal Reserve System, which are not by law (or by logic) subject to the standard annual congressional and executive branch budgetary disciplines? What about privately owned agencies which were established by the Federal Government in pursuit of public policy objectives but from which all government capital has now been withdrawn, such as the Federal home loan banks or Federal land banks? It is difficult to draw a boundary line in some of these cases without having programs included in the budget that do not seem greatly different from other excluded items.

Even for programs clearly within the scope of government, questions remain about *how* to include their transactions in the budget. For instance, are seigniorage revenues (coinage profits) a receipt, or a means of financing a deficit? Should the budget itself concentrate on current account transactions, with outlays for durable assets or recoverable loans handled in a separate capital budget? A number of difficult-to-classify transactions are discussed in this chapter, and others in chapters which follow.

The Commission's *major* recommendations with respect to coverage of the budget are:

- *The budget should, as a general rule, be comprehensive of the full range of Federal activities. Borderline agencies and transactions should be included in the budget unless there are exceptionally persuasive reasons for exclusion. Specifically, the budget should include the transactions of the Federal trust funds which are now outside the administrative budget (although the Commission believes that the identity and integrity of trust funds should be maintained);*
- *Most agencies and transactions now included in the consolidated cash budget should continue to be reflected in the budget. However, the Commission recommends exclusion from the budget of those Government-sponsored activities which are now completely privately owned, and local receipts and expenditures of the District of Columbia Government;*
- *The purchase of physical assets should not be set up as a separate capital budget, but should be included in the unified budget.*

THE FEDERAL GOVERNMENT'S BOUNDARY LINES

A full discussion of issues involved in delineating the outer boundaries of the Federal Government could easily carry into quite esoteric matters of philosophy and political theory. However, it quickly became clear to the Commission that the problem of defining the Federal Government's scope, for the purposes of this report, centered on whether a few key agencies and programs should be included or excluded.

In making the decisions about whether or not to include programs in the budget, the Commission has asked several questions: Who owns the agency? Who supplies its capital? Who selects its managers? Do the Congress and the President have control over the agency's program and budget, or are the agency's policies the responsibility of the Congress or the President only in some broad ultimate sense? The answer to no one of these questions is conclusive, and at the margin, where boundary questions arise, decisions have been made on the basis of a net weighing of as many relevant considerations as possible. In general, the Commission recommends a comprehensive budget, with very few exclusions. The following sections of this chapter put forth the reasoning underlying the conclusions of the Commission with respect to coverage.

Trust funds. The inclusion or exclusion of trust funds represents one of the most important budget boundary questions. The exclusion of the trust funds from the present administrative budget is the largest single difference between that measure and either the consolidated cash budget or the Federal sector of the national income accounts, and has been the major reason for increasing dissatisfaction with the administrative budget. For a variety of reasons, discussed more fully below, and after careful deliberation, the Commission recommends that:

The budget should include the receipts and expenditures of trust funds. This recommendation fully recognizes that individual trust funds must be accounted for separately, and that their activities must be reported on in a way which allows the identity and integrity of trust fund transactions and balances to be preserved.

The trust fund programs have grown rapidly since the 1930's when most of the large funds were established. The exclusion of this large and growing volume of Federal activity from the administrative budget was an important reason for the development of the consolidated cash budget concept. In recent decades, considerable significance has been attached to the difference between the *Federally owned funds* included in the administrative budget, and the *trust funds* which were excluded. In theory, trust funds do not *belong* to the Federal Government; the Federal Government acts only as *trustee* for them. Old-age and survivors insurance, unemployment insurance, Federally aided highway construction, medicare, and civil service retirement represent some of the important and sizable programs handled through trust funds, rather than through Federally owned funds.

There has never been a question of the Federal Government's responsibility for determining the size and shape of the major trust fund programs, or for altering or redirecting these programs by appropriate changes in legislation. In fact, legislation changing contribution formulas or tax rates affecting trust fund revenues, or changing benefit and grant formulas affecting trust fund expenditures, has come to be expected with increasing frequency. Legislative changes affecting one or another of the major trust funds occur almost every year. Rather than removing funds from the influence of the administration or the Congress, the trust fund technique, in the case of major trust funds, earmarks certain expenditure programs for financing by specific taxes or other revenue sources. This couples the benefits and costs of these programs more closely, and it also lends a degree of assurance to beneficiaries and grantees that trust fund benefit or grant schedules once established will be protected.

The partial isolation from the budget and appropriations processes that results from financing programs through trust funds has its warm defenders and severe critics. The major criticism comes from those who want the budget process to embrace more fully and flexibly the relative costs and effectiveness of alternative approaches to program objectives and social needs.

With the passage of time, trust fund activities have loomed larger in both absolute and relative magnitude in the total picture of Federal Government receipts and expenditures. Receipts, expenditures, and the surplus or deficit in Federally owned funds, therefore, have correspondingly less significance. It is clear to the Commission that the current surpluses of trust funds must be considered in calculating the effect of Federal Government activities on the level of income and employment, in managing Treasury cash balances, in deciding on Treasury cash borrowing needs, and in program evaluation.

The Commission *does not* recommend eliminating the concept of separate trust fund accounting. In many instances, in fact, it sees merit in earmarking specific revenue sources for well-defined programs of a long-run character. The need to respect the integrity of trust funds, and the requirements of control and accountability, in turn require the continued availability of trust fund receipt and expenditure figures separate from those of other funds. However, the Commission believes that the principal significance of trust funds for program decisions lies in an analysis of receipts and expenditures (cost and benefits) of the individual funds rather than in the totals for all trust funds combined, or the totals for Federally owned funds excluding trust funds.

The Commission feels it is important to emphasize budget totals which are inclusive of trust fund transactions. It does not object to the provision in the budget document of separate summary figures for the Federally owned funds, particularly during the period of transition to the new budget concepts, for the use of those whose main attention in the past has been to the administrative budget totals. However, in order to further the concept of a unified budget, *The Commission recommends strongly that the President's budget presentation give no attention to a surplus or deficit calculated on the basis of the administrative budget.*

The Commission has carefully considered the administrative, accounting and other consequences of eliminating any separate, independent prominence to figures for the Federally owned funds taken as a group—the administrative budget—and it finds no serious obstacles in the way of fully implementing its recommendation within a relatively short period of time.

The surplus or deficit in the administrative budget is a misleading guide for measuring the fiscal impact of the budget on the economy. The administrative budget does not portray or price out the President's full program, nor does the administrative budget alone accurately measure congressional action on the President's requests. Congressional responsibility for trust fund receipts and expenditures is just as great as for Federally owned funds, since it can and does enact trust fund legislation with considerable frequency, although there is less flexibility available to the Congress to reduce trust fund expenditures.

One implication of the Commission's recommendation on trust funds is that some redefinition of appropriations for the trust funds would be desirable. As pointed out in Chapter 2, the Commission recommends that the tabulation of the Congressional appropriations in the President's budget be as consistent as possible, in terms of scope and definition, with the tabulation of budget expenditures. If the budget is to include trust funds, therefore, two changes in the tabulation of appropriations requested and enacted would be desirable:

First, indefinite trust fund appropriations should be related to obligations expected to be incurred by the trust funds during the fiscal year, rather than being mechanically tied to trust revenues as they now are. If legislation is thought to be required to accomplish this change, the Commission would strongly endorse such legislation;

Second, an adjustment in arriving at overall appropriations totals should be made to eliminate interfund and intragovernmental transactions, comparable to the adjustments which are now made in tabulating overall budget expenditures.

The Commission has no specific recommendations to make for changes in the coverage of the trust funds, although it recognizes that a study of these funds may be appropriate, for other than budget concept purposes, because of the way the various funds have developed over the years. But since the activities involved would, under the Commission's recommendations, be included in the budget whether or not financed through trust funds, any such re-examination would not affect the budget totals.

Federal Reserve System. The Federal Reserve System is a government instrumentality which Congress has established principally to execute its responsibilities with regard to the Nation's money supply.

The Federal Reserve System is responsible to the Congress, and reports annually to the Congress on the results of its operations. Discussions about the independence of the Federal Reserve System are concerned with its position *within* the Federal Government—not whether it is independent *of* the Federal Government. The System is clearly a Federal Government operation.

Each of the three present budget concepts includes as a receipt the payment to the Treasury of excess Federal Reserve profits. Apart from this receipt, none of the three budgets includes receipts and expenditures of the Federal Reserve System arising from its lending and other activities. Inclusion of the Federal Reserve banks in the Federal budget might jeopardize the vital flexibility and independence of the monetary authorities. Moreover, projections of System operations for a forward period—as would be required if included in the budget—do not appear feasible at the present time. The nature and economic significance of Federal Reserve bank "receipts" and "expenditures" are different from those of most other government programs and activities.

Appendix B: The Budget for Fiscal Year 1981: Off-Budget Entities

Fiscal activities outside the Federal budget

The budget does not include a number of fiscal activities of the Federal Government that result in spending similar to budget outlays. One major exclusion, the outlays of off-budget Federal entities,[3] is discussed in some detail below. This is followed by a discussion of the Government-sponsored enterprises, which are outside the budget because of their private ownership.[4] Taxation and tax expenditures, which also have significant effects on the economy, are discussed subsequently. The regulation of economic activity can also have economic effects similar to budget spending by requiring the private sector to make expenditures for specified purposes, such as safety and pollution control. While important, these effects cannot be quantified satisfactorily at the current time and therefore are not discussed in this section.

Loan guarantees, which also allocate economic resources toward particular uses, provide credit to borrowers at more favorable terms than would otherwise be available in the private market. Beginning this year, the administration has established a set of budget-type controls on much of the Government's direct loan and loan guarantee activity. The credit control system and the estimated amounts of lending, including loan guarantees, are discussed in Parts 2 and 5 of this *Budget.*

Outlays of off-budget Federal entities. Off-budget Federal entities are federally owned and controlled, but their transactions have been excluded from the budget totals under provisions of law.[5] Therefore, their fiscal activities are not reflected in either budget outlays or the budget surplus or deficit, appropriation requests for their programs are not included in the totals of budget authority for the budget, and their outlays are not subject to the ceilings set by the congressional budget resolutions. As shown in the table on page 340, the outlays of the off-budget Federal entities are added to the budget deficit to derive the total Government deficit that has to be financed by borrowing from the public or by other means. When off-budget outlays are financed by Treasury borrowing, the additional debt is subject to the statutory debt limit; when financed by the entities' own borrowing, it is not. In either case the additional debt is part of the gross Federal debt.

The concept of the unified budget, currently used as a foundation for the budget of the Federal Government, was adopted beginning with the 1969 budget. It combined the administrative budget with the substantial trust fund transactions of the Federal Government. The first departure from the unified budget concept occurred in August 1971, when the Export-Import Bank was excluded by statute from the budget. Further departures followed. The Postal Service fund, the Rural Telephone Bank, the lending transactions that became the Rural Electrification and Telephone revolving fund, and the Housing for the Elderly or Handicapped fund were removed from the budget. The Federal Financing Bank, the U.S. Railway Association, and the Pension Benefit Guaranty Corporation were established off-budget. The Exchange Stabilization Fund had always been outside the unified budget, although until 3 years ago it was classified as a deposit fund instead of an off-budget Federal entity.[6]

In the past 4 years the trend toward increasing the number of off-budget Federal entities has been reversed. The Export-Import Bank was returned to the budget by statute on October 1, 1976, and the Housing for the Elderly or Handicapped fund was returned to the budget by statute a year later. In 1978 Congress enacted legislation proposed by the administration to include in the budget the administrative expenses previously paid by the Exchange Stabilization Fund. The interest collections of the fund were put on-budget by administrative action at the same time, and in the current budget the actual profits and losses realized from foreign exchange transactions are being put on-budget.[7] To the extent feasible the budget outlays and deficits of previous years have been revised to include these three entities so that the series measuring budget transactions over time would be as consistent as possible. Legislation has also brought most of the transactions of the U.S. Railway Association into the budget. Almost all of the Association's current activity is for assistance to Conrail, and since the start of this program in 1976 the purchase of Conrail securities has been included in the budget by law.

Despite the exclusion of the off-budget entities from the budget, some of the outlays related to their operations are nonetheless included in the budget totals. The budget totals include the subsidy paid to the Postal Service fund and the administrative expenses of the Rural Electrification lending programs and the U.S. Railway Association. Moreover, while the budget authority and outlays of off-budget Federal entities are excluded from the budget totals, some of their activities are subject to Presidential and congressional review. For example, limits on the amount of new lending for the rural electrification program financed by the Rural Electrification and Telephone revolving fund are set annually by law; the outstanding debt and annual borrowing of the Postal Service are limited by statute; and the budget program of the Pension Benefit Guaranty Corporation is approved in an appropriation act.

As part of its energy program the administration has proposed to create an independent Energy Security Corporation outside of the budget in order to help private industry finance the development of oil substitutes. Although the Corporation is itself off-budget, its funding is to be included in the budget totals. The funds for carrying out the Corporation's activities are proposed to come from direct appropriations of the Treasury. The Treasury will make direct loans to the Corporation,[8] and the Treasury outlays for this purpose will be included in the budget totals. These budget outlays will at the same time count as income to the Corporation and, consequently, as offsets to the Corporation's own off-budget outlays. Since the Corporation will acquire funds only as needed, its net off-budget outlays will be approximately zero.[9]

Even though the exclusion of off-budget Federal entities from the budget results from provisions of law, the Congress has expressed concern about this practice. The Congressional Budget Act of 1974 calls for the Committees on the Budget of the House of Representatives and the Senate to study on a continuing basis those provisions of law that exclude any outlays of Federal entities from the budget and to report to their respective Houses their recommendations for terminating or modifying such provisions. In 1976, the House Budget Committee held hearings and then adopted a report recommending that the budget include the administrative expenses of the Exchange Stabilization Fund and the outlays of all other off-budget Federal entities except the Federal Financing Bank. At that time the Committee deferred judgment about the Federal Financing Bank.[10] The House Budget Committee subsequently supported legislation to include the Federal Financing Bank in the budget and renewed its recommendation to include the other off-budget entities.[11] The first and second congressional concurrent resolutions on the budget for 1980 recommended that a way be found within the congressional budget process to relate accurately the outlays of off-budget Federal entities to the budget.

Except for the Postal Service and the Pension Benefit Guaranty Corporation, the excluded outlays of the off-budget Federal entities are incurred for carrying out loan programs. These programs are of the same nature as the direct loan programs in the budget. The outlays of the off-budget loan programs are approximately equal to the difference between new loans disbursed and repayments of principal. For example, during 1981, new loans disbursed by the excluded programs are estimated to be $25.6 billion and repayments $8.9 billion, for an increase in loans outstanding of $16.6 billion. This is about the same as the estimated outlays of these programs, which are $16.5 billion. The difference is due to such factors as administrative expenses and interest paid and received.

Like direct loans in the budget, the loans of the off-budget entities are designed to allocate economic resources toward particular uses. Part 5 of the *Budget*, "Meeting National Needs: the Federal Program by Function," shows the outlays of the off-budget Federal entities by function and discusses some of their more significant activities.

Outlays of off-budget Federal entities
(in billions of dollars)

Off-budget Federal entity	1979 act.	1980 est.	1981 est.	1982 est.	1983 est.
Federal Financing Bank ...	13.2	16.4	16.3	15.0	11.8
Rural Electrification and Telephone revolving fund	—*	—	—	—	—
Rural Telephone Bank	.1	.2	.1	.1	.2
Pension Benefit Guaranty Corporation	—*	—*	—*	—*	—*
Postal Service fund	—.9	.2	1.6	—.1	.9
U.S. Railway Association ..	.1	.1	.1	.1	.1
Energy Security Corporation	—	—	—	—	—
Total	12.4	16.8	18.1	15.1	12.9

* $50 million or less.

As the table above shows, the Federal Financing Bank (FFB) accounts for most of the off-budget outlays. Among the other off-budget Federal entities, only the Postal Service fund in some years, such as 1981, has comparatively large outlays. The outlays of the Postal Service fund are calculated with an offset for the subsidy that it receives, included in the budget, which is mostly for public service costs and the revenue forgone from carrying certain mail at free or reduced rates. This subsidy is estimated to be $1.6 billion in 1981.

The FFB's outlays do not come from programs that the FFB operates itself. Instead, the FFB assists other programs within the Government by purchasing their debt securities or purchasing obligations that they have guaranteed. The outlays of the FFB include only its purchase of guaranteed obligations, not its purchase of Federal agency debt. An agency's outlays increase when it spends the proceeds of borrowing from the FFB, so FFB outlays must exclude this borrowing transaction in order to prevent double counting.

The FFB buys two types of guaranteed obligations, newly originated loans and loan assets. When the FFB buys newly originated guaranteed loans, it is FFB that makes the loan, with the loan being guaranteed by another agency. Thus, the newly originated guaranteed loans are converted into direct Federal loans outside the budget.

Loan assets are loans that an agency has made in the past. According to law, the category of loan assets also includes certificates of beneficial ownership issued by the Farmers Home Administration and Rural Electrification and Telephone revolving fund. These certificates are securities backed by loans that the agency continues to hold and service.[12]

The sales of loan assets are treated as offsets to the outlays of the agency that sells them, so if the selling agency is in the budget its loan asset sales reduce the amount by which the direct loans of Federal agencies add to budget outlays. When the FFB buys loan assets, it in effect converts direct loans that have already been made by another agency into off-budget direct loans of the FFB.

The table on the next page attributes FFB outlays to the agencies and programs that it assists by purchasing guaranteed loans and loan assets. FFB outlays attributed to an agency or program equal gross FFB loans (of either type) less repayments. The remainder of FFB outlays consists of administrative expenses, the transfer of surplus to the general fund, and interest paid on borrowings from Treasury, offset by interest received on its holdings of loans and debt. The attribution of FFB outlays by function is shown as a memorandum entry to the tables throughout Part 5, and a complete listing is given at the end of Part 8.

As shown in this table on attributions, FFB assists a wide variety of programs by its purchases of guaranteed loans and loan assets. The largest part of FFB's outlays over the period as a whole, and in some years over half of its outlays, are attributable to its purchases of certificates of beneficial ownership from the Farmers Home Administration. Since the Farmers Home Ad-

Attribution of Federal financing bank outlays

Description	1979 actual	1980 estimate	1981 estimate	1982 estimate	1983 estimate
Outlays from direct loans, by agency or program:					
Farmers Home Administration; certificates of beneficial ownership	8,805	5,790	8,450	3,227	2,815
Rural Electrification and Telephone revolving fund:					
Certificates of beneficial ownership	586	760	845	945	801
New originations	1,735	3,400	3,900	4,397	5,978
Foreign military credit sales	1,293	2,420	1,990	2,270	1,020
Low rent public housing	—	1,557	−50	2,946	512
Community development	5	162	264	247	56
Health maintenance organizations	20	114	138	168	51
Student Loan Marketing Association [1]	530	670	−215	90	375
Amtrack and other railroad programs	−25	305	241	235	−51
Export-Import Bank: export guarantees	—	50	350	500	340
National Aeronautics and Space Administration	184	132	101	—	—
Small business investment companies	86	188	184	182	109
Tennessee Valley Authority: Seven States Energy Corporation	—	684	16	—	—
Other	64	18	30	−50	−58
Subtotal, outlays from direct loans	13,282	16,249	16,244	15,157	11,949
Interest, transfer of surplus, and administrative expenses	−110	159	72	−140	−143
Total, FFB outlays	13,172	16,408	16,316	15,017	11,806

[1] Beginning in 1982, it is proposed that the activities attributed to the Student Loan Marketing Association be assumed by the Government Student Loan Association within the Department of Education.

ministration is on-budget, these transactions decrease total budget outlays as well as the outlays of the Farmers Home Administration. The purchase of certificates of beneficial ownership from the off-budget rural electrification and telephone revolving fund explains the small size of this fund's outlays in the previous table on the outlays of off-budget entities. These transactions offset this fund's outlays and augment the outlays of the FFB.

The following table compares the outlays of the off-budget Federal entities with budget outlays.[13] The outlays of the entities that are now off-budget (which thus exclude the Export-Import Bank and Exchange Stabilization Fund) were negligible in 1973 but grew rapidly afterwards, as the Federal Financing Bank and other off-budget entities were created or shifted out of the budget. The outlays of the off-budget Federal entities equalled 2.5% of budget outlays in 1979 and are estimated to equal 3.0% in 1980 and 2.9% in 1981.

Comparison of outlays for the budget, off-budget Federal entities, and government-sponsored enterprises (in billions of dollars)

Fiscal year	Outlays			
	Federal Government [1]			Government sponsored enterprises [2]
	Budget	Off-budget Federal entities	Total	
1960	92.2	—	92.2	.4
1961	97.8	—	97.8	−.3
1962	106.8	—	106.8	1.1
1963	111.3	—	111.3	.5
1964	118.6	—	118.6	1.8
1965	118.4	—	118.4	1.2
1966	134.7	—	134.7	1.9
1967	158.3	—	158.3	−2.9
1968	178.8	—	178.8	1.7
1969	184.5	—	184.5	4.3
1970	196.6	—	196.6	9.6
1971	211.4	—	211.4	*
1972	232.0	—	232.0	4.4
1973	247.1	0.1	247.1	11.4
1974	269.6	1.4	271.1	14.5
1975	326.2	8.1	334.2	7.0
1976	366.4	7.3	373.7	4.6
TQ	94.7	1.8	96.5	2.3
1977	402.7	8.7	411.4	10.2
1978	450.8	10.3	461.2	25.6
1979	493.7	12.4	506.1	27.1
1980 estimate	563.6	16.8	580.3	16.4
1981 estimate	615.8	18.1	633.9	17.7
1982 estimate	686.3	15.1	701.4	[3]
1983 estimate	774.3	12.9	787.2	[3]

* $50 million or less.

[1] The 1972–77 and TQ data have been revised to include the Export-Import Bank and the Housing for the elderly or handicapped fund in the budget instead of with the off-budget Federal entities. The administrative expenses and interest collections of the Exchange Stabilization Fund are included in the budget beginning in 1975, and the actual profits and losses realized from foreign exchange transactions are included beginning in 1979. Comparable data are not available for earlier years.

[2] To prevent double counting, outlays of Government-sponsored enterprises exclude loans to other Government-sponsored enterprises and loans to or from Federal agencies and off-budget Federal entities.

[3] Not available.

Notes to Appendix B

3. Financial statements for these entities are published in the *Appendix. Budget of the United States Government. Fiscal Year 1981*. See Part IV, "Off-Budget Federal Entities."

4. For financial statements, see the *Appendix*. Part VI, "Government-Sponsored Enterprises."

5. The Board of Governors of the Federal Reserve System (but not the Federal Reserve banks, which are privately owned) is a Federal organization. It is excluded from the budget and from this discussion.

6. The Exchange Stabilization Fund conducts a cycle of operations similar to revolving funds. Consequently, its classification as a deposit fund was contrary to the normal definition of a deposit fund: an account that records amounts held by the Government as an agent for others or amounts held in suspense temporarily before being refunded or paid into some other fund.

7. Because it is not practicable to forecast transactions in gold, foreign currency, and foreign investments,

the budget will continue the past practice of not estimating profits and losses from foreign exchange transactions for the current and future years.

8. In time, these loans will be repaid from windfall profit tax receipts.

9. Any receipts of the Corporation will also be offsets to its outlays and will reduce its need to borrow from Treasury.

10. House of Representatives, Committee on the Budget, *Off-Budget Activities of the Federal Government,* Report No. 94–1740 (1976); and *First Concurrent Resolution on the Budget—Fiscal Year 1978.* Report No. 95–189 (1977), pp. 11–12 and 135.

11. House of Representatives, Committee on the Budget, *First Concurrent Resolution on the Budget—Fiscal Year 1979,* Report No. 95–1055 (1978), p. 23.

12. The President's Commission on Budget Concepts recommended that the sale of such securities (also known as participation certificates) be treated as borrowing, since as a means of financing outlays there is no difference between an agency selling securities labeled "certificates of beneficial ownership," the same agency selling securities labeled "debt," and the Treasury selling securities labeled "debt." See *Report of the President's Commission on Budget Concepts* (Washington: U.S. Government Printing Office, 1967), pp. 8, 47–48, and 54–55.

13. The historical data for budget outlays include Federal entities that are now off-budget for any period when they were in the budget, and include Government-sponsored enterprises for periods when they had any Government ownership. The outlays of former off-budget entities are included in the budget totals for all years to the extent practicable.

Economic Effects on Employees and Employers

Unemployment Insurance and Seasonal Industries

Alex R. Maurizi

The unemployment insurance (UI) system recognized the special problem presented by employment in seasonal industries at the time of the system's inception, but there have since been few studies of the effects of extending UI coverage to seasonal industries. The purpose of this investigation is to extend the analysis of one such study, conducted by Barry R. Chiswick, on the effects of UI extension to one such seasonal industry—agriculture. Chiswick's analysis is of limited usefulness because of the small amount of data available at the time he conducted his study.

Until January 1, 1975, the agricultural sector was excluded from coverage in the Federal UI program. The Emergency Jobs and Unemployment Assistance Act of 1974 created a special, temporary program to cover agricultural wage and salary workers which took effect January 1, 1975. This special program was extended until January 1, 1978, when permanent UI coverage was extended to agriculture.

Chiswick's analysis was limited by data availability to the first 9 months after the special program went into effect—i.e., until September 1975. The evidence to that date supported two important hypotheses Chiswick put forth: (1) that the agricultural wage and salary unemployment rate would increase during the off-season as a result of UI coverage and (2) that the agricultural wage and salary employment level would increase during the on-season as a result of UI coverage. Chiswick tested these hypotheses by first constructing an estimating equation for the unemployment rate and then one for the employment level; estimation was conducted using historical data for the period before the special program was enacted. These two estimating equations were then used to predict the unemployment rate and employment level in each of the 9 months after the special program was enacted. These predicted values for the unemployment rate and employment level were regarded as what the values would have been in the absence of the special program, and these were then compared to actual values. The comparison of actual and predicted values provided support for both of Chiswick's hypotheses.

Our project collected the most recent available data for each of the variables in Chiswick's two estimating equations and reestimated his equations for the same period. Since the data series in question are subject to frequent revision, exact reproduction of his results was not expected although similar results were obtained for the unemployment rate equation. The differences found in the employment level equation results were thought to be due to a change in the base year for a price index that was used as an independent variable. Therefore these differences represent merely a scaling effect, as well as revision of the data for the remaining independent variables and the dependent variable.

These estimating equations were then used to predict both the unemployment rate and the employment level to the most recent available month: December 1979 for the unemployment rate and October 1979 for the employment level. Though the prediction results were quite similar to Chiswick's for the first 6 to 9 months, the similarities ceased at that point. Both predicted series yielded results that were quite unreasonable. The predicted unemployment rate exhibited a steady downward trend to less than half its actual value in 1979, and the predicted employment level exhibited a similar steady downward trend to almost one-third of its actual level in 1979.

The steady downward trend in each equation was thought to be due to the presence of a time-squared variable in each equation. When the variable was removed, each equation was reestimated, and a new predicted series was developed based on the reestimation. The downward trend in each predicted series was eliminated. Since there is some question about the appropriateness of including even a time variable, this variable was also excluded and each equation was then reestimated and predictions based on this respecification were also made. The resulting predictions tended to support Chiswick's hypothesis that the unemployment rate would increase in the off-season, but they also provided evidence that the unemployment rate increased in the on-season. The predictions for the employment level

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provided conflicting evidence in regard to Chiswick's hypothesis that employment would increase in the on-season.

Chiswick conducted his original estimation using 3-month averages of monthly data referred to as "quarterly" data. Since valuable information may have been contained in the monthly data that could have affected the results, all equations were reestimated using monthly rather than quarterly data and additional predictions were made using each of the equations estimated with monthly data. The results were no different than with quarterly data, however.

A more direct test of Chiswick's two hypotheses was conducted using all available data for the estimation but incorporating dummy variables to account for the on- and off-seasons and for the periods before and after UI coverage. The results of this more direct test revealed that there was a significant increase in the agricultural-unemployment rate after coverage, but no significant difference between the on- and off-season unemployment rates holding other factors constant; and that there was no significant difference between the level of agricultural employment before and after coverage either in the on- or off-season, holding other factors constant. The same equations were reestimated excluding the seasonal dummy with the result that the coefficients and statistics for the remaining variables were essentially unchanged. These results regarding the seasonal dummy are not surprising since seasonally adjusted data are being used, but the results do raise a fundamental question about the appropriateness of Chiswick's use of seasonally adjusted data to pick up seasonal effects.

Finally, separate coverage dummies were introduced to distinguish the temporary from the permanent program effects. The results indicated that the temporary program significantly increased the unemployment rate but had no significant impact on the employment level. The results concerning the permanent program are more difficult to interpret.

We can say the permanent program had a significant impact on both the unemployment rate (equal in magnitude to the temporary program impact) and the employment level only if we accept one particular specification, namely, the one including both time-trend variables. The implausible predictions for the 1975–1979 period, resulting from Chiswick's specification including both these time-trend variables, indicate that this specification may confine meaningful analysis of the impact of the permanent program to recorded data. Such analysis would now imply that both the temporary and permanent programs increased the agricultural unemployment rate, in both the on- and off-seasons, by about 1.3 percentage points. In addition, this specification implies that the permanent program increased the agricultural employment level in both the on- and off-seasons by about 69,000 persons. Further research is needed before it is safe to choose one specification over another and reach any definitive conclusions about the permanent program's impact. Moreover, it will be necessary to determine why the unemployment rate increased in the on-season as well as in the off-season and why the employment level increased in the off-season as well as in the on-season before we can understand the impact identified thus far.

Background and Introduction

The effects of UI on unemployment

The UI system has often been criticized for encouraging unemployment. Critics have pointed out that workers, by defining their acceptable wages and employment conditions, can affect the amount of time they spend between jobs. Liberal benefits encourage workers to remain unemployed longer or report being unemployed when not actively seeking work. In addition, critics point out that the experience rating of employers is not uniformly administered; revenues collected from firms with stable employment sometimes subsidize the benefits paid to former employees of firms with higher layoff rates, thereby encouraging labor turnover and the growth of firms with less stable labor demand.[1]

A number of recent studies have focused on whether increases in UI weekly benefits encourage unemployed workers to lengthen their period of job search and whether a longer period of job search results in a job with higher earnings.[2] Other studies have focused on whether changes in eligibility requirements and the number of weeks of UI benefits have similar effects.[3] Still other studies have discussed the extent to which the UI tax is unrelated to UI benefits received by the industry being taxed and the resulting effects.[4]

The special problems of seasonal industries

The special problem presented to the UI system by employment in seasonal industries was recognized at the time of the inception of the system, but there have been few studies of the effects of extending UI coverage to seasonal industries.

The UI payroll tax was applied at the outset only to covered employers with eight or more employees in each of 20 different weeks. Only three State UI programs (D.C., Hawaii, and Washington) covered employers with one or more employees at any time; all others excluded employers who operated less than a specified number of days or weeks in a year, usually 20 weeks, or whose payroll was below specified amounts for a quarter or year. This excluded employment in a number of firms of a highly seasonal nature such as resort hotels and cotton gins. All States, except D.C., specifically excluded employment in agriculture from coverage because of its highly seasonal nature.

Even if a seasonal industry was covered, workers were frequently ineligible for UI benefits because they did not work long enough or earn enough to meet the State's qualifying requirement. Many people working in canneries and sugar beet refineries did not earn enough to qualify for UI benefits unless they did additional work in other covered industries. Some States went even further. Mississippi law excluded cotton gin workers from coverage; Wisconsin law excluded those performing services in logging operations. If a seasonal industry was covered and a worker was qualified for UI benefits, a number of States limited the amount of benefits that could be drawn. Arizona permitted cotton gin workers to draw benefits only during the cotton-ginning season; Oregon curtailed the benefit rights of lumber workers; and Florida restricted the benefit rights of workers in the citrus-packing and citrus-canning industries.[5]

Several reasons existed for these various provisions affecting seasonal workers. It was felt that seasonal workers did not seek employment during the off-season; unemployed workers must be actively seeking work to qualify for UI benefits. It was felt that the wages received by seasonal workers were sufficiently high to provide for them during the off-season in the absence of UI benefits.

Some people believed that the payment of UI benefits to seasonal workers would not leave enough funds to adequately compensate other workers suffering long-term unemployment or would adversely affect tax rates for employers in seasonal industries. Some felt that UI benefits paid to seasonal workers constituted a wage subsidy to seasonal industries and would attract more workers to the industry and eventually reduce wages there. Finally, it was felt that there should not be insurance coverage in an industry characterized by spells of unemployment occurring regularly from year to year.[6]

Previous studies of the availability of UI on the likelihood of being unemployed

Few studies have examined the relation between the availability of UI benefits and the likelihood of a person's becoming unemployed, yet this relation is the central issue in extension of UI coverage to seasonal industries. Feldstein pointed out that the job search model is not relevant to understanding the behavior of workers who are laid off because most of these workers are subsequently rehired by their original employer.[7] In this case he finds that the UI subsidy (the subsidy results from less than full experience rating and from benefits not being taxed like other income) may be responsible for a very high fraction of such layoffs.[8] O'Connor found that the introduction of the UI programs in the 1930's had a significant effect on the allocation of labor; wages fell in moderately seasonal industries (which were expected to be covered by the UI program) relative to wages in highly seasonal industries (not expected to be covered) and non-seasonal industries.[9] Finally, Chiswick examined this relation between the availability of UI benefits and the likelihood of a worker's becoming unemployed for one seasonal industry, namely, agriculture, and found that the availability of UI benefits increased unemployment rates by 20 percent in the off-season in agriculture while leaving the on-season unemployment rate unaffected. Chiswick also found that agricultural employment increased in the on-season and decreased in the off-season.[10]

The Extension of UI Coverage to a Seasonal Industry: Agriculture

The agricultural sector was excluded from coverage in the original Federal unemployment compensation (UC) program and its subsequent amendments. As of 1975 only two States (Hawaii and Minnesota) covered some agricultural wage and salary workers under their State programs. However, the Emergency Jobs and Unemployment Assistance Act of 1974 created a temporary program to cover these workers beginning January 1, 1975. The June 1975 amendments to this Act extended the special program through March 1977, and it was later extended until January 1, 1978, when permanent UI coverage was extended to agriculture.

The special program enacted in 1974 covered farm workers whose employers had one employee or more in any 20 weeks of the year whereas the permanent program covers farmworkers whose employers have 10 or more employees in any 20 weeks of the year, or who pay $20,000 or more in cash wages for any calendar quarter. In addition, there was no experience rating of employers in the special program so that these UI benefits were paid out of general Federal revenues and not from a tax on employers; experience rating is a feature of the permanent program. The eligibility provisions and weekly benefits for the temporary program were the same as for the State's regular UI program.

The extension of UI coverage to the agricultural industry has provided a unique opportunity to examine the effects of the existence of a UI program on unemployment rates and employment levels in a seasonal industry. Moreover, the incentive to avoid work and receive benefits during the off-season could be particularly strong in agriculture since it is a low-wage industry. Workers in low-wage industries (wages 150 percent below the poverty level) typically receive UI benefits averaging 70 percent of their lost after-tax earnings while workers receiving higher wages (above the poverty level) typically receive UI benefits averaging only 40 percent of their lost after-tax earnings.

Chiswick's Study of the Effects of the UI Coverage

Chiswick's hypotheses

Chiswick regarded the temporary program as a subsidy to hired farm workers during their unemployment. Since the off-season weekly "wage" is increased, and the wage during the on-season remains unchanged initially, more workers are expected to offer their services to the agricultural sector during the on-season. This increase in labor supply is expected to reduce agricultural wage rates and increase agricultural employment during the on-season.

Employment during the off-season would normally be less than during the on-season, but the availability of UI benefits is expected to encourage workers, once unemployed, to remain unemployed longer and perhaps encourage employers to lay off more workers during the off-season, thus further reducing off-season employment. Thus, the seasonality of employment is expected to increase: employment is expected to increase during the on-season and decrease during the off-season. (Since the permanent program does incorporate an experience-rating system for employers, these effects would be expected to have been mitigated since January 1978.)

In addition, Chiswick expects that the seasonality of agricultural unemployment will also increase. During the off-season, those workers who would have been employed in low-wage farm jobs or temporary nonfarm jobs are encouraged to apply for and receive UI benefits. Workers who would otherwise have dropped out of the labor force because they were unable to find jobs in the off-season would also be encouraged to report being unemployed in order to receive UI benefits. The existence of UI benefits is expected to have much less effect on unemployment during the on-season. Receiving UI benefits during the off-season is contingent on having worked during the on-season, so work during the on-season earns more than just the wage earned then; it earns the right to future UI benefits. Hence, this encourages employment rather than unemployment during the on-season.

It is much more difficult for the unemployed worker in the on-season to claim that no other work is available, which is one of the qualifying criteria to receive UI benefits. Some workers, either assured of employment in the next off-season or intending to withdraw from the labor force then, may be encouraged to seek UI benefits during the on-season, thus offsetting those having reduced incentive to seek UI benefits in the on-season.

The net effect of these tendencies is as follows. During the off-season the unemployment level is expected to increase and the employment level is expected to decrease, implying that the unemployment rate will increase in the off-season. Chiswick expects the unemployment level in the on-season to either increase or decrease while the on-season employment level is expected to increase; he thus expects the net effect on the on-season unemployment rate to be unclear. In order for the on-season unemployment rate to increase, the percent increase in those unemployed would have to exceed the percent increase in those employed. However, little evidence is available to suggest the on-season unemployment rate would actually increase. The likely tendency would be for those with reduced incentives to become unemployed or stay unemployed longer in the on-season to outweigh the increased incentives to seek UI benefits because of anticipated off-season employment or an intention to withdraw from the labor force. Hence, one might expect the on-season unemployment rate to experience no increase, and perhaps to experience a decrease.

Chiswick examined seasonal factors for the unemployment rate and employment level for agricultural wage and salary workers and concluded that the off-season is defined as the 6 months from November through April, and the on-season is defined as the 6 months from May through October. There is some question, it should be noted, as to whether the month of September should be regarded as an on-season month but Chiswick did regard it as such.[11]

Chiswick's specification of tests of his hypotheses

The principal hypotheses were tested by constructing a model to explain the unemployment rate and another to explain the employment level in agriculture prior to the availability of UI benefits in 1975. Both these models were estimated using historical data through the third quarter of 1974. (The fourth quarter of 1974 was used to determine whether the models under-predicted or over-predicted in the period just prior to the enactment of the special program.) These estimating equations were then used to predict the unemployment rate and the level of employment for each month from October 1974 through September 1975. These predicted values were then compared to the observed unemployment rate and employment level in each such month to determine whether the actual unemployment rate was higher in the off-season than would have been predicted and whether the actual employment-level was higher during the on-season than would have been predicted.

The agricultural wage and salary unemployment rate was explained using the unemployment rate of adult men (20 years and over), the unemployment rate of teenage males (16 to 19 years old), and time and time-squared. The level of agricultural wage and salary employment was explained using the prices farmers receive for their products, the wholesale price index for all industrial commodities, the unemployment rate of teenage males (16 to 19 years old), and time and time-squared.

All variables except for time and time-squared were entered in logarithmic form.

All of the variables were in seasonally adjusted form. Using seasonally adjusted data to test for seasonal effects may not have been appropriate; using unadjusted data might have been better. Unfortunately, Chiswick provides no explanation for his decision to use seasonally adjusted data. In addition, estimation was not conducted on monthly historical data. Instead, averages of the 3 months in each quarter were used. Though this is not the same as "quarterly" data for the unemployment rate (which would average the number of unemployed for 3 months and divide that by the average number of employed plus unemployed for 3 months rather than average the unemployment rates for the 3 months), we will refer to Chiswick's estimation as being conducted on quarterly data. Chiswick explains that this was done to reduce some of the noise that appears in the monthly data.[12] Finally, each regression was adjusted for autocorrelation in the residuals.

The independent variables chosen for each equation are explained as follows. Since nearly all (83 percent) agricultural wage and salary workers are male, and a large fraction of these (nearly 25 percent) were less than 20 years old in 1974, Chiswick chose the unemployment rates for males 20 and over and for males 16–19 years old as two independent variables to explain the agricultural unemployment rate. Unemployment in the agricultural sector is expected to be related to the tightness of nonfarm labor markets for men with similar skills. The greater the unemployment rate for similarly aged males with these skills in the nonfarm sector, the greater the unemployment rate will be in agriculture. Time and time-squared variables were introduced to "capture secular changes in agricultural unemployment rates relative to adult and teenage male unemployment rates."[13]

The demand for hired farmworkers was regarded as a function of the price of the farmer's output and the cost of alternative factor inputs. The greater the prices farmers receive for their product, the greater the demand for hired farmworkers is expected to be. The cost of alternative factor inputs was measured using the wholesale price index for all industrial commodities. The greater the wholesale price index for industrial goods, the greater the demand for hired farm workers is expected to be. The teenage male unemployment rate is used as a labor supply shift variable, since it is dominated by job opportunities in the nonfarm sector. The fewer these nonfarm opportunities (the greater the male teenage unemployment rate), the greater the labor supply to the farm sector and hence the greater the number of hired farmworkers is expected to be. Time and time-squared variables are added to "capture the effects of other relevant but omitted demand and supply shift variables. . . ."[14]

The results of Chiswick's tests of his hypotheses

The prediction period for both the unemployment rate and the employment level was divided into three parts. The period from October 1974 through January 1975 was the first period and includes the 3 months prior to enactment of the law plus its first month of operation which was viewed as a transition month. The period from February 1975 through April 1975 was the second period and was defined as the "off"-season. The period from May 1975 through September 1975 was the third period and was defined as the "on"-season.

The predictions for both the unemployment rate and the employment level for the months from October 1974 through December 1974 were very close to the observed values so it was concluded that the equation did not overpredict or underpredict. The predicted unemployment rate for the off-season was below the observed rate by a large amount (1 to 2 percentage points) while the difference between them for the "on"-season was comparatively small. The predicted employment level was above the observed level in all but one of the months in the "on"-season and below the observed level in all of the "off"-season months. These findings were consistent with the hypothesis that the special program extending UI coverage to agriculture resulted in increased off-season unemployment rates, increased on-season employment levels, and decreased off-season employment levels. The unemployment rate during the off-season was estimated to have increased by 20 percent; the employment level was estimated to have increased in the on-season by over 2 percent and decreased in the off-season by over 5 percent.

Extending Chiswick's Analysis With More Recent Data

Estimation of Chiswick's equations for the same historical period

The first step in extending the prediction period of Chiswick's analysis is to estimate the equations he specified using data for the same historical period. His equations should not be estimated using the data he used at the time he conducted his analysis since all of the data series in question are subject to frequent revision; these revisions change the previously recorded historical data. Moreover, one data series, the prices farmers receive for their produce, has been revised to a new 1967 base since Chiswick's study. The data used in this study were the historical series for each variable revised as of January 1980. Estimation requires that these basic data be converted to average 3-month, or quarterly, data.

Table 1 presents the estimation results for the unemployment rate. The ordinary least-squares results pre-

TABLE 1. Comparison of our estimation results with Chiswick's for the same historical period (t-statistics in parentheses)

Dependent variable: Log of agricultural unemployment rate

Independent variables	Ordinary Least Squares (1) Ours	Ordinary Least Squares (2) Chiswick's	Cochrane-Orcutt (3) Ours	Cochrane-Orcutt (4) Chiswick's
Constant	−.0607	−.0518	.0786	.0587
	(−.23)	(−.19)	(.26)	(.19)
LUM20	.1620	.1634	.2174	.2128
	(1.47)	(1.47)	(1.74)	(1.65)
LUM16	.6874	.6824	.5999	.6058
	(4.00)	(3.93)	(3.09)	(3.04)
Time	.0050	.0051	.0052	.0057
	(2.41)	(2.45)	(2.00)	(2.18)
Time squared	−.000052	−.000052	−.000051	−.00005
	(−3.34)	(−3.40)	(−2.59)	(−2.83)
Regression statistics				
Rho			.181	.175
			(1.89)	(1.75)
R-squared	.74	.73	.74	.73
Durbin-Watson	1.66	1.67	2.06	2.05
No. of Obs.	107	107	106	106

LUM20 = Log of Unemployment Rate, Males 20 and over.
LUM16 = Log of Unemployment Rate, Males 16–19 years.

sented in columns (1) and (2) compare our data with the results obtained by Chiswick. The regression coefficients we obtained are almost identical to Chiswick's, as are the t-statistics in parentheses below each coefficient, the Durbin-Watson statistics, the standard errors of the regressions, and the R-squared. This suggests that whatever revisions were made in the historical data series for the variables in this regression did not affect the estimation results. Columns (3) and (4) of Table 1 present our estimation results after adjusting for autocorrelation using the Cochrane-Orcutt technique and Chiswick's results. Once again, our results are virtually identical with his.

Table 2 presents the estimation results for the employment level. Column (1) presents our ordinary least-squares results in this case. Column (3) presents our results after adjusting for autocorrelation, and Column (4) presents Chiswick's results. Considerable differences between our results and Chiswick's are revealed in these last two columns.

While all regression coefficients have the same sign, they are not the same in magnitude. No doubt the completely revised series for the LPR (Log of Prices Farmers receive for their products) variable to a new base year of 1967, instead of 1910–14, is such that each year's index is approximately one-third its former size, and, therefore, its coefficient is about one-third the size of that in Chiswick's results. This is simply a scaling effect for that variable. The coefficient for LUM16 is about half that obtained by Chiswick and the coefficient for LWPI is half again as large as that obtained by Chiswick. These differences are probably due to revisions in the data series. Revisions in the data series due to changing benchmarks and changing seasonal factors can be substantial. However, the LPR and LUM16 variables are not statistically significant in our results, whereas they were in Chiswick's results.

Extending the prediction period through 1979

The next step is to predict the monthly unemployment rate and employment level for the period from October 1974 through the most recently available month: December 1979 for the former and October 1979 for the latter. Table 3 presents the predicted unemployment rate along with the actual unemployment rate for each month in this period as well as the difference (the actual minus the predicted value) between them. Table 4 presents similar results for the employment level. The predicted values in Tables 3 and 4 are based on the Cochrane-Orcutt estimation results and use the optimal predictor developed by Goldberger when autocorrelation is present.[15]

The predicted unemployment rate is similar to the observed rate for the months of October through December 1974. In fact, the pattern of differences is

TABLE 2. Comparison of our estimation results with Chiswick's for the same historical period (t-statistics in parentheses)

Dependent variable: log of agricultural employment level

Independent variables	Ordinary least squares (1) Ours	Ordinary least squares (2) Chiswick's	Cochrane-Orcutt (3) Ours	Cochrane-Orcutt (4) Chiswick's
Constant	3.391	Not	3.3556	7.11
	(4.66)	reported	(2.43)	(44.3)
LPR	.2000		.0835	.28
	(1.47)		(.53)	(1.72)
LWPI	.5843		.7529	.51
	(2.34)		(2.12)	(1.71)
LUM16	.1583		.0632	.11
	(3.89)		(.99)	(1.66)
Time	.0036		.0057	.005
	(1.71)		(1.41)	(1.27)
Time-Squared	−.00010		−.00012	−.0001
	(−5.37)		(−2.79)	(−2.60)
Regression statistics				
Rho			.691	.670
			(9.41)	(8.15)
R-squared	.69		.84	.83
Durbin-Watson	.66		1.95	1.92
No. of Obs.	99		98	98

LPR = Log of Prices Farmers receive for their products.
LWPI = Log of Wholesale Price Index, manufactured goods.
LUM16 = Log of Unemployment Rate, Males 16–19 years.

exactly the same as that obtained by Chiswick, though the magnitude of the differences is somewhat larger in our case (0.6, —0.6, and —1.0 versus Chiswick's 0.3, —0.8, —0.3). The differences between the rates for the off-season months of February 1975 through April 1975 are the same in sign though somewhat smaller than Chiswick found (—0.3, 1.2, and 1.6 versus his —0.7, 2.5, and 2.2). The pattern of differences for the on-season of May 1975 through September 1975 is the same as found by Chiswick, though the magnitudes are somewhat different (—0.1, 0.5, —0.6, 2.1, and 2.1 versus his —1.0, 0.9, —1.2, 0.9, and 0.5).

TABLE 3. Comparison of actual and predicted agricultural unemployment rates using estimation results from column (3) of Table 1

		Agricultural unemployment rate		
Year	Month	Actual	Predicted	Difference
74	10	8.3	7.7	0.6
74	11	7.5	8.1	−0.6
74	12	7.5	8.4	−0.9
75	1	10.6	9.1	1.5
75	2	8.9	9.1	−0.2
75	3	10.5	9.2	1.3
75	4	11.2	9.5	1.7
75	5	9.3	9.3	−0.0
75	6	10.3	9.8	0.5
75	7	8.9	9.5	−0.6
75	8	11.3	9.2	2.1
75	9	11.0	8.8	2.2
75	10	10.9	8.8	2.1
75	11	10.3	8.5	1.8
75	12	11.5	8.4	3.1
76	1	11.4	8.5	2.9
76	2	10.4	8.0	2.4
76	3	10.9	8.0	2.9
76	4	11.4	8.2	3.2
76	5	12.8	8.0	4.8
76	6	11.3	7.8	3.5
76	7	11.6	7.7	3.9
76	8	11.0	7.7	3.3
76	9	11.2	7.7	3.5
76	10	11.4	7.7	3.7
76	11	13.4	7.7	5.7
76	12	13.4	7.5	5.9
77	1	13.0	7.1	5.9
77	2	12.7	7.1	5.6
77	3	12.6	7.0	5.6
77	4	12.5	6.6	5.9
77	5	11.7	6.7	5.0
77	6	11.4	6.8	4.6
77	7	9.4	6.4	3.0
77	8	10.0	6.4	3.6
77	9	10.4	6.3	4.1
77	10	10.3	6.0	4.3
77	11	9.3	5.9	3.4
77	12	9.7	5.4	4.3
78	1	9.3	5.6	3.7
78	2	9.5	5.7	3.8
78	3	10.0	5.6	4.4
78	4	8.0	5.5	2.5
78	5	7.8	5.2	2.6
78	6	8.5	4.9	3.6
78	7	9.1	5.2	3.9
78	8	8.6	4.9	3.7
78	9	8.5	5.0	3.5
78	10	9.7	5.0	4.7
78	11	7.8	4.9	2.9
78	12	8.0	5.0	3.0
79	1	7.5	4.9	2.6
79	2	8.6	4.8	3.8
79	3	8.0	4.7	3.3
79	4	8.7	4.7	4.0
79	5	9.3	4.6	4.7
79	6	7.8	4.3	3.5
79	7	9.7	4.5	5.2
79	8	9.9	4.6	5.3
79	9	10.0	4.5	5.5
79	10	9.9	4.4	5.5
79	11	10.1	4.4	5.7
79	12	9.4	4.3	5.1

Off-season means: actual = 10.1 predicted = 6.8
On-season means: actual = 10.0 predicted = 6.6

t-statistics:	Off-season	On-season
	7.57	8.77
D.F.	62	60

TABLE 4. Comparison of actual and predicted agricultural levels using estimation results from column (3) of Table 2 (employment levels in 000's)

		Agricultural employment level		
Year	Month	Actual	Predicted	Difference
74	10	1356	1324	32
74	11	1402	1309	93
74	12	1288	1288	−0
75	1	1281	1275	6
75	2	1216	1247	−31
75	3	1213	1220	−7
75	4	1169	1208	−39
75	5	1297	1190	107
75	6	1276	1178	98
75	7	1355	1161	194
75	8	1336	1140	196
75	9	1328	1117	211
75	10	1288	1102	186
75	11	1278	1072	206
75	12	1249	1054	195
76	1	1312	1036	276
76	2	1323	1010	313
76	3	1338	987	351
76	4	1355	977	378
76	5	1289	955	334
76	6	1293	937	356
76	7	1324	919	405
76	8	1334	895	439
76	9	1302	880	422
76	10	1301	860	441
76	11	1279	841	438
76	12	1375	826	549
77	1	1265	807	458
77	2	1305	793	512
77	3	1295	779	516

TABLE 4. (*continued*)

		Agricultural employment level		
Year	Month	Actual	Predicted	Difference
77	4	1311	765	546
77	5	1314	749	565
77	6	1346	730	616
77	7	1299	708	591
77	8	1325	689	636
77	9	1341	673	668
77	10	1391	655	736
77	11	1392	641	751
77	12	1362	622	740
78	1	1414	612	802
78	2	1360	603	757
78	3	1394	590	804
78	4	1420	579	841
78	5	1423	565	858
78	6	1429	549	880
78	7	1395	540	855
78	8	1440	522	918
78	9	1448	512	936
78	10	1429	503	926
78	11	1402	490	912
78	12	1447	479	968
79	1	1387	471	916
79	2	1425	462	963
79	3	1415	451	964
79	4	1379	443	936
79	5	1424	432	992
79	6	1423	418	005
79	7	1419	411	008
79	8	1384	401	983
79	9	1399	392	007
79	10	1381	383	998

Off-season means: actual = 1335 predicted = 831
On-season means: actual = 1358 predicted = 758

t-statistics:	Off-season	On-season
	9.23	11.46
D.F.	58	60

On the basis of our data for the first off-season, one might conclude that the special UI program had increased the unemployment rate by almost 1 percentage point in the off-season. Our finding for the first on-season reflects an increase in the unemployment rate beyond that predicted by about 1 percentage point, however, in contrast to Chiswick's finding of no difference. This basic pattern of an increase in the unemployment rate over what was predicted is present in our findings for the on-season as well as the off-season. Moreover, the differences grow in magnitude over time. The average unemployment rate for the off-season was actually 10.1 percent but the predicted rate averaged 6.8 percent. The t-statistic on the difference between these means, presented at the bottom of Table 3, is highly significant. But the average actual on-season unemployment rate was 10.0 percent compared to the average predicted on-season unemployment rate of 6.7 percent. The difference between these means is also highly significant.

A closer look at the series of predicted values indicates that the predicted unemployment rate is subject to a noticeable downward trend. The predicted unemployment rate was about 9 percent for the months of 1975, 8 percent for 1976, 6 percent for 1977, 5 percent for 1978, and 4 percent for 1979 in comparison to actual unemployment rates of about 10 percent in 1975, 11 percent in 1976 and 1977, and 9 percent in 1978 and 1979. Given this pattern, it is likely that any random collection of months will reveal a significantly greater observed than predicted unemployment rate. Apparently Chiswick's estimating equation for the unemployment rate is not reliable for long-range prediction. It is not likely that the agricultural unemployment rate would be less than half of its current magnitude if only the UI program had not been extended to agriculture.

An examination of the data presented in Table 4 for the employment level indicates a similar difficulty. The predicted employment level steadily declines from over 1 million in 1975 to about 0.9 million in 1976, 0.8 million in 1977, 0.6 million in 1978, and about 0.5 million in 1979 while the actual employment level fluctuated between 1.2 million and 1.4 million for the entire period. The average actual off-season employment level of 1.335 million is significantly greater than the 0.851 million average predicted value; the average actual on-season value of 1.358 million is significantly greater than the 0.79 million average predicted value. Chiswick's specification of the equation for the employment level is apparently unreliable for long-range predicting also.

The Specification of Chiswick's Estimating Equations

The time-trend variables

One possible explanation for the poor long-run predictive nature of Chiswick's estimating equation lies in the presence of a time-squared variable in both equations. It is the only variable likely to be able to explain lower predicted values over time; it is the only independent variable with a negative sign in either equation. Since the values of the independent variables in each equation do not exhibit a downward trend in the prediction period, the presence of a time-squared variable in both equations is the most likely explanation. Although the magnitude of the regression coefficient of the time-squared variable is very small in each equation, the value of time-squared becomes exceedingly large for values of time over 100 and could have a dominant effect on the logarithms of the unemployment rate and the employment level. The time-squared variable alone would reduce the natural log of the average unemployment rate from 1.981 to 1.386 or reduce the average unemployment rate from 7.25

percent to 4 percent; the time-squared variable alone would reduce the natural log of the average employment level from 7.258 percent to 6.278 percent or reduce the average employment level from 1.419 million to 0.533 million.

This issue concerns the appropriate specification of the manner in which the time-trend variables are to enter the estimating equation. If a plot of the dependent variable over time reveals that a curvilinear trend of a parabolic nature is not present, then it is advisable to enter only the time variable and exclude the time-squared variable. Accordingly, Figures 1 and 2 present the plots of the dependent variable in each equation against time. The plot of the log of the unemployment rate does not clearly indicate the presence of a parabolic trend over its entire range, although such a trend may be indicated from 1953 to 1968. Similarly, the plot of the log of the employment level over time does not clearly indicate a parabolic trend over its range; but such a trend may be indicated from 1954 to 1970. Both plots may also be consistent with the notion that a linear trend is present rather than a parabolic one. Fluctuations about such a linear trend would be quite large so the argument that a linear trend is present is only weakly supported. However this assumption may be as reasonable as the one of a parabolic trend. Almost equally plausible would be the claim that no trend is evident.

Respecification excluding the time-trend variable

Since there is some question about whether it is appropriate to specify that a parabolic time-trend characterizes each dependent variable and since the presence of a time-squared variable may be responsible for the steady downward trend in the predicted values from each equation, we have respecified each equation to exclude the time-squared variable. Since there is also some question as to whether even a linear trend is present in the data, we have made a second respecification in which neither time nor time-squared variables are present. Both of these respecifications have been made for each of the two equations and each has been reestimated accordingly. The results of the estimation of these respecified equations are presented in Table 5 for the unemployment rate and in Table 6 for the employment level; the Cochrane-Orcutt adjustment for autocorrelation is made for each. For purposes of comparison column (1) of each table reproduces the results including both time-trend variables.

Estimation results

The estimation results for the respecified unemployment equation without the time-squared variable are similar to the original except that the LUM20 coefficient is statistically significant at only the 10 percent

FIGURE 1. Log of unemployment rate versus time in quarters

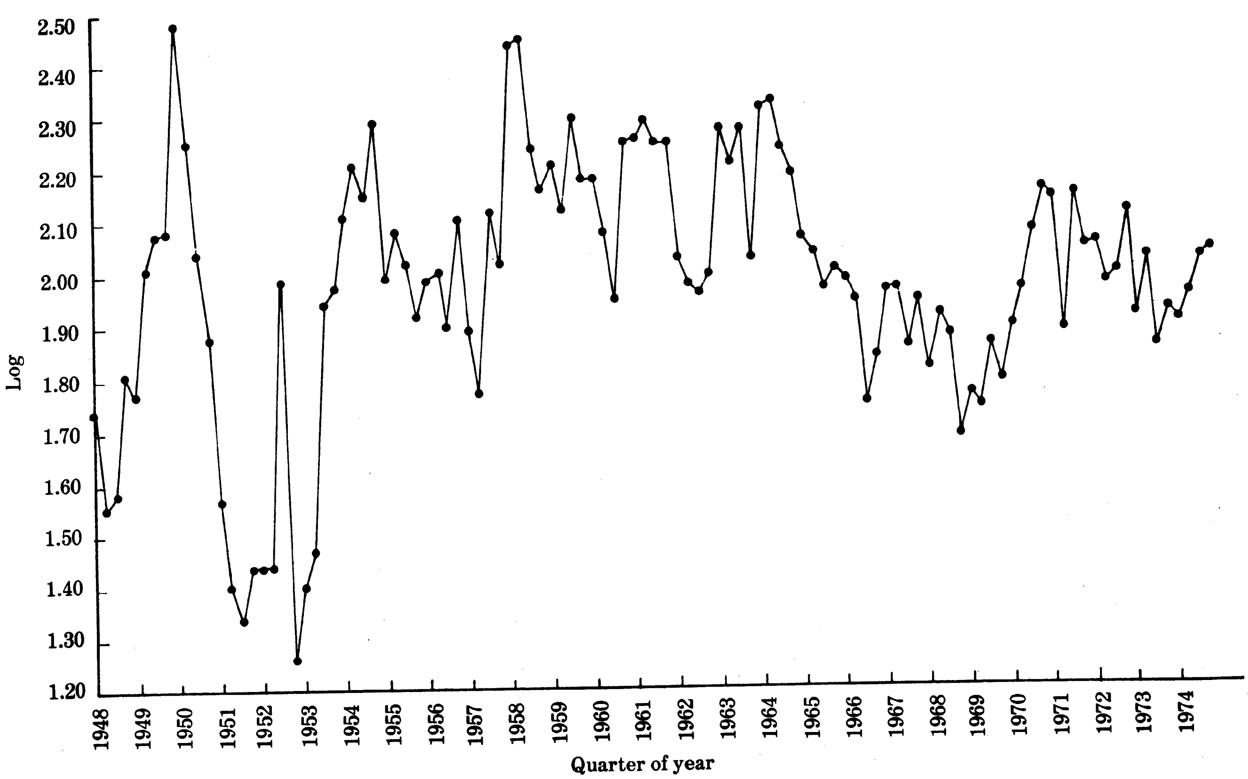

FIGURE 2. Log of employment level versus time in quarters

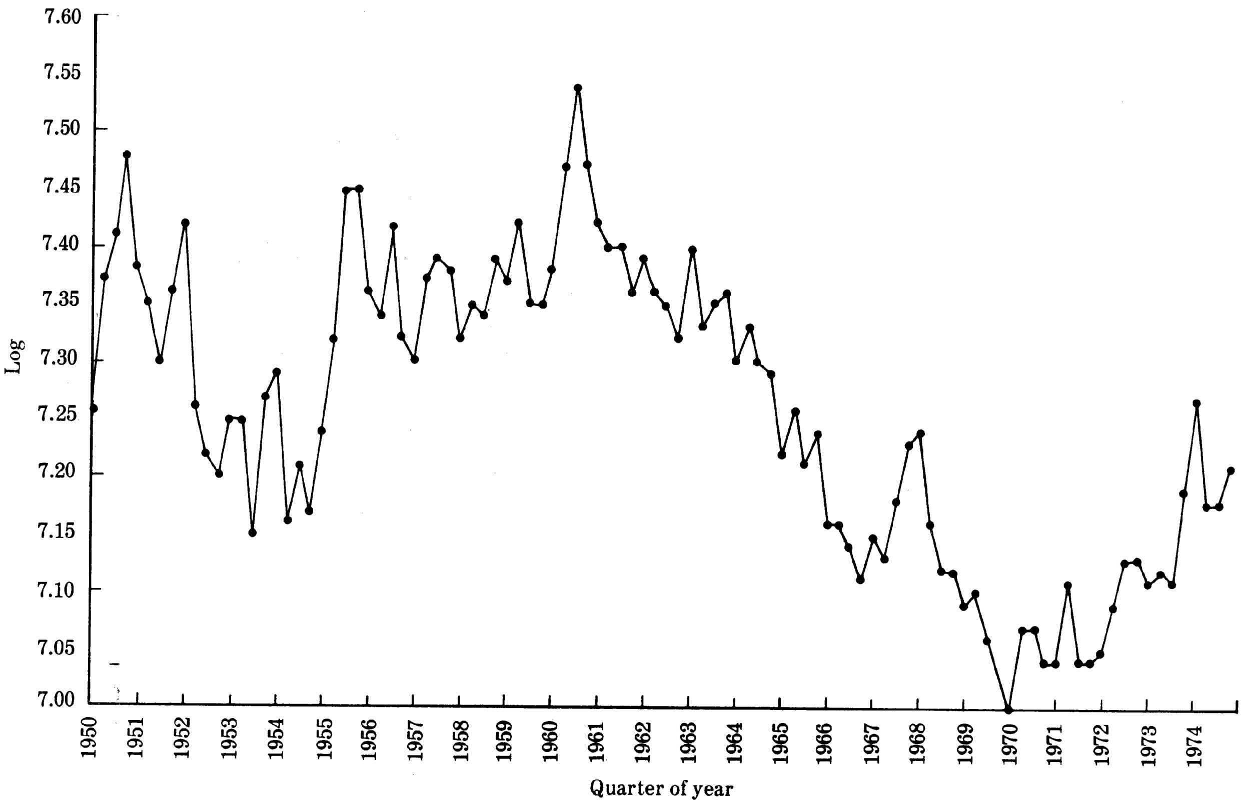

TABLE 5. Estimation using quarterly data: 1948–1974 (III)—time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log of agricultural unemployment rate

Independent variables	Type of estimation: Cochrane-Orcutt		
	(1)	(2)	(3)
Constant	.0786	−.0186	.1802
	(.26)	(−.06)	(.84)
LUM20	.2174	.1667	.2567
	(1.74)	(1.29)	(3.31)
LUM16	.5999	.7156	.5755
	(3.09)	(3.69)	(5.35)
Time	.0052	−.00085	
	(2.00)	(−.81)	
Time-squared	−.000051		
	(−2.59)		
Regression statistics			
Rho	.181	.243	.274
	(2.89)	(2.57)	(2.93)
R-squared	.74	.72	.72
Durbin-Watson	2.06	2.11	2.13
No. of Obs.	105	105	105

LUM20 = Log of Unemployment Rate, Males 20 and over.
LUM16 = Log of Unemployment Rate, Males 16–19 years.

level using a one-tailed t-test. The magnitudes of the coefficients for the LUM20 and LUM16 variables are changed slightly. The remaining time variable is no longer significant, however, indicating that the assumption of a linear trend may not be appropriate. There is only a slight reduction in the corrected R-squared. The first order autocorrelation coefficient, rho, remains significant though slightly larger than before. The additional elimination of the time variable produces results also quite similar to the original with no further reduction in the corrected R-squared; moreover, the independent variables are more highly significant than in the original specification. On the whole, either of these respecifications appears to be just as plausible as the original specification.

The estimation results for the respecified employment equations without the time-squared variable are not similar to the original specification. While the coefficients for both LPR and LUM16 were insignificant in the original specification, the LPR coefficient has changed sign and the LWPI coefficient is now insignificant in the respecification. The time variable is of the opposite sign and significant, indicating that a downward linear trend is present in the employment variable. Since employment in the agricultural sector has been declining historically, this is a more plausible result. Moreover, this same result occurs when using monthly

TABLE 6. Estimation using quarterly data: 1950–1974 (III)—time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependable variable: log of agricultural employment level

Independent variables	Type of estimation: Cochrane-Orcutt (1)	(2)	(3)
Constant	3.3556	6.3281	8.2135
	(2.43)	(5.10)	(7.92)
LPR	.0835	−.0469	.0314
	(.53)	(−.30)	(.20)
LWPI	.7529	.2547	−.2563
	(2.12)	(.70)	(−.88)
LUM16	.0632	.0794	.0272
	(.99)	(1.21)	(.41)
Time	.0057	−.00435	
	(1.41)	(−2.46)	
Time-squared	−.00012		
	(−.2.79)		
Regression statistics			
Rho	.691	.804	.883
	(9.41)	(13.31)	(2.09)
R-squared	.84	.84	.83
Durbin-Watson	1.95	2.02	2.09
No. of Obs.	97	97	97

LPR = Log of Prices Farmers receive for their products.
LWPI = Log of Wholesale Price Index, manufactured goods.
LUM16 = Log of Unemployment Rate, Males 16–19 years.

data, as the text below will indicate. The remaining regression statistics are comparable to the original results. The estimation results for the equation which excludes both the time and time-squared variables are also substantially different from the original. All three independent variables are significant and the LWPI coefficient has changed sign. On the whole, neither respecification is very satisfactory, though the one with only time included may be preferred. Although this respecification may eliminate the dominant downward trend in the predicted values due to the time-squared variable, the model is weaker than the original.

Prediction using respecified unemployment rate equations

The predicted unemployment rates using these respecified estimating equations are presented in Tables 7 and 8 along with the actual values and the difference between them; Table 7 presents the results using the equation without the time-squared variables and Table 8 presents the results using the equation without either time or time-squared variables. The results in Table 7 indicate that the elimination of the time-squared variable alone removed the sizable downward trend in predicted values. The differences between actual and predicted values do remain sizable, however, for both the on- and off-season. The t-statistic on the difference between the actual and predicted means is significant in both the on- and off-season. The mean actual unemployment rate was 10.1 percent in the off-season while the mean predicted rate was 9 percent; the mean actual rate in the on-season was 10 percent while the mean predicted rate was 8.9 percent. The results in Table 8 are basically the same; however the predicted values are somewhat higher than in Table 7. The mean predicted off-season unemployment rate equals 9.5 percent (compared to 9 percent) and the mean predicted on-season unemployment rate equals 9.5 percent (compared to 8.9 percent); the t-statistics indicate that both these differences are statistically significant.

TABLE 7. Comparison of actual and predicted agricultural unemployment rates using estimation results from column (2) of Table 5

Year	Month	Agricultural unemployment rate: Actual	Predicted	Difference
74	10	8.3	8.4	−0.1
74	11	7.5	8.9	−1.4
74	12	7.5	9.3	−1.8
75	1	10.6	10.2	0.4
75	2	8.9	10.2	−1.3
75	3	10.5	10.4	0.1
75	4	11.2	10.8	0.4
75	5	9.3	10.6	−1.3
75	6	10.3	11.3	−1.0
75	7	8.9	11.0	−2.1
75	8	11.3	10.7	0.6
75	9	11.0	10.3	0.7
75	10	10.9	10.3	0.6
75	11	10.3	9.9	0.4
75	12	11.5	10.0	1.5
76	1	11.4	10.2	1.2
76	2	10.4	9.7	0.7
76	3	10.9	9.7	1.2
76	4	11.4	10.1	1.3
76	5	12.8	9.9	2.9
76	6	11.3	9.6	1.7
76	7	11.6	9.6	2.0
76	8	11.0	9.6	1.4
76	9	11.2	9.7	1.5
76	10	11.4	9.8	1.6
76	11	13.4	10.0	3.4
76	12	13.4	9.7	3.7
77	1	13.0	9.2	3.8
77	2	12.7	9.3	3.4
77	3	12.6	9.2	3.4
77	4	12.5	8.8	3.7
77	5	11.7	8.9	2.8
77	6	11.4	9.3	2.1
77	7	9.4	8.7	0.7
77	8	10.0	8.9	1.1
77	9	10.4	8.7	1.7
77	10	10.3	8.4	1.9
77	11	9.3	8.3	1.0
77	12	9.7	7.7	2.0
78	1	9.3	8.0	1.3
78	2	9.5	8.3	1.2
78	3	10.0	8.3	1.7
78	4	8.0	8.1	−0.1

TABLE 7. *(continued)*

Year	Month	Agricultural unemployment rate: Actual	Predicted	Difference
78	5	7.8	7.8	0.0
78	6	8.5	7.2	1.3
78	7	9.1	7.9	1.2
78	8	8.6	7.5	1.1
78	9	8.5	7.7	0.8
78	10	9.7	7.9	1.8
78	11	7.8	7.8	−0.0
78	12	8.0	8.1	−0.1
79	1	7.5	7.9	−0.4
79	2	8.6	7.9	0.7
79	3	8.0	7.8	0.2
79	4	8.7	7.8	0.9
79	5	9.3	7.8	1.5
79	6	7.8	7.3	0.5
79	7	9.7	7.6	2.1
79	8	9.9	8.0	1.9
79	9	10.0	7.9	2.1
79	10	9.9	7.8	2.1
79	11	10.1	7.8	2.3
79	12	9.4	7.7	1.7

Off-season means: actual = 10.1 predicted = 9.0
On-season means: actual = 10.0 predicted = 8.9

	Off-season	On-season
t-statistics:	3.09	3.63
D.F.	62	60

TABLE 8. Comparison of actual and predicted agricultural unemployment rates using estimation results from column (3) of Table 5

Year	Month	Agricultural unemployment rate: Actual	Predicted	Difference
74	10	8.3	8.6	−0.3
74	11	7.5	9.2	−1.7
74	12	7.5	9.7	−2.2
75	1	10.6	10.6	0.0
75	2	8.9	10.7	−1.8
75	3	10.5	10.9	−0.4
75	4	11.2	11.3	−0.1
75	5	9.3	11.2	−1.9
75	6	10.3	11.8	−1.5
75	7	8.9	11.5	−2.6
75	8	11.3	11.2	0.1
75	9	11.0	10.9	0.1
75	10	10.9	10.8	0.1
75	11	10.3	10.6	−0.3
75	12	11.5	10.6	0.9
76	1	11.4	10.7	0.7
76	2	10.4	10.2	0.2
76	3	10.9	10.2	0.7
76	4	11.4	10.6	0.8
76	5	12.8	10.3	2.5
76	6	11.3	10.2	1.1
76	7	11.6	10.2	1.4
76	8	11.0	10.2	0.8
76	9	11.2	10.3	0.9
76	10	11.4	10.4	1.0
76	11	13.4	10.6	2.8
76	12	13.4	10.3	3.1
77	1	13.0	9.8	3.2
77	2	12.7	10.0	2.7

TABLE 8. *(continued)*

Year	Month	Agricultural employment rate: Actual	Predicted	Difference
77	3	12.6	9.8	2.8
77	4	12.5	9.4	3.1
77	5	11.7	9.6	2.1
77	6	11.4	9.9	1.5
77	7	9.4	9.4	0.0
77	8	10.0	9.5	0.5
77	9	10.4	9.3	1.1
77	10	10.3	9.0	1.3
77	11	9.3	8.9	0.4
77	12	9.7	8.3	1.4
78	1	9.3	8.6	0.7
78	2	9.5	8.9	0.6
78	3	10.0	8.8	1.2
78	4	8.0	8.6	−0.6
78	5	7.8	8.4	−0.6
78	6	8.5	7.9	0.6
78	7	9.1	8.4	0.7
78	8	8.6	8.1	0.5
78	9	8.5	8.3	0.2
78	10	9.7	8.5	1.2
78	11	7.8	8.3	−0.5
78	12	8.0	8.6	−0.6
79	1	7.5	8.5	−1.0
79	2	8.6	8.4	0.2
79	3	8.0	8.4	−0.4
79	4	8.7	8.4	0.3
79	5	9.3	8.4	0.9
79	6	7.8	8.0	−0.2
79	7	9.7	8.3	1.4
79	8	9.9	8.6	1.3
79	9	10.0	8.6	1.4
79	10	9.9	8.4	1.5
79	11	10.1	8.5	1.6
79	12	9.4	8.4	1.0

Off-season means: actual = 10.1 predicted = 9.5
On-season means: actual = 10.0 predicted = 9.5

	Off-season	On-season
t-statistics:	1.60	1.81
D.F.	62	60

Prediction using respecified employment equations

The predicted employment levels using these respecified equations are presented in Tables 9 and 10 along with the actual values and the differences between them. Table 9 presents the results using the equation without the time-squared variable and Table 10 presents the results using the equation without either time or time-squared variables. The results in Table 9 indicate that the elimination of the time-squared variable removed the sizable downward trend in the predicted values, although a slight downward trend remains. The major difference is that the predicted level is generally greater (rather than less) than the actual level throughout the prediction period for both the on- and off-season. The mean predicted employment level was 1.512 million in the off-season compared to an actual mean of 1.335 million, and it was 1.5 million in the on-season compared to an actual mean of 1.358 million. The t-statistics indicate the differences between the actual and predicted mean values are highly significant in both the on- and off-season.

Thus, Chiswick's hypothesis that the employment level would increase in the on-season is not supported, but his hypothesis that it would decrease in the off-season is supported, which is just the opposite of the predictions based on the original specification. The results in Table 10 indicate that eliminating both time variables also removed the sizable downward trend present in the predicted series, though once again a slight downward trend is still evident. However, in this case, the predicted values are below the actual values, just as they were in the original specification. The mean predicted value for the off-season was 1.238 million compared to an actual mean of 1.335 million and for the on-season it was 1.226 million compared to an actual mean of 1.358 million. The t-statistics indicate these differences are also statistically significant.

TABLE 9. Comparison of actual and predicted agricultural employment levels using estimation results from column (2) of Table 6 (employment level in 000's)

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
74	10	1356	1317	39
74	11	1402	1316	86
74	12	1288	1313	−25
75	1	1281	1319	−38
75	2	1216	1313	−97
75	3	1213	1308	−95
75	4	1169	1305	−136
75	5	1297	1295	2
75	6	1276	1299	−23
75	7	1355	1289	66
75	8	1336	1283	53
75	9	1328	1270	58
75	10	1288	1268	20
75	11	1278	1259	19
75	12	1249	1256	−7
76	1	1312	1256	56
76	2	1323	1246	77
76	3	1338	1242	96
76	4	1355	1243	112
76	5	1289	1235	54
76	6	1293	1226	67
76	7	1324	1222	102
76	8	1334	1220	114
76	9	1302	1217	85
76	10	1301	1216	85
76	11	1279	1214	65
76	12	1375	1205	170
77	1	1265	1195	70
77	2	1305	1192	113
77	3	1295	1188	107
77	4	1311	1179	132
77	5	1314	1179	135
77	6	1346	1184	162
77	7	1299	1173	126
77	8	1325	1173	152
77	9	1341	1167	174
77	10	1391	1159	232
77	11	1392	1154	238
77	12	1362	1140	222
78	1	1414	1141	273
78	2	1360	1142	218
78	3	1394	1137	257
78	4	1420	1131	289
78	5	1423	1122	301
78	6	1429	1111	318
78	7	1395	1118	277
78	8	1440	1111	329
78	9	1448	1111	337
78	10	1429	1112	317
78	11	1402	1107	295
78	12	1447	1107	340
79	1	1387	1102	285
79	2	1425	1098	327
79	3	1415	1094	321
79	4	1379	1094	285
79	5	1424	1092	332
79	6	1423	1081	342
79	7	1419	1084	335
79	8	1384	1088	296
79	9	1399	1086	313
79	10	1381	1084	297

Off-season means: actual = 1335 predicted = 1200
On-season means: actual = 1358 predicted = 1180

	Off-season	On-season
t-statistics:	7.03	10.53
D.F.	58	60

TABLE 10. Comparison of actual and predicted agricultural employment levels using estimation results from column (3) of Table 6 (employment level in 000's)

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
74	10	1356	1299	57
74	11	1402	1296	106
74	12	1288	1291	−3
75	1	1281	1288	−7
75	2	1216	1285	−69
75	3	1213	1282	−69
75	4	1169	1282	−113
75	5	1297	1279	18
75	6	1276	1280	−4
75	7	1355	1276	79
75	8	1336	1273	63
75	9	1328	1269	59
75	10	1288	1265	23
75	11	1278	1262	16
75	12	1249	1262	−13
76	1	1312	1261	51
76	2	1323	1258	65
76	3	1338	1256	82
76	4	1355	1257	98
76	5	1289	1254	35
76	6	1293	1251	42
76	7	1324	1249	75

TABLE 10. (*continued*)

Year	Month	Agricultural employment level: Actual	Predicted	Difference
76	8	1334	1248	86
76	9	1302	1246	56
76	10	1301	1245	56
76	11	1279	1243	36
76	12	1375	1241	134
77	1	1265	1238	27
77	2	1305	1237	68
77	3	1295	1235	60
77	4	1311	1231	80
77	5	1314	1229	85
77	6	1346	1228	118
77	7	1299	1224	75
77	8	1325	1223	102
77	9	1341	1221	120
77	10	1391	1217	174
77	11	1392	1217	175
77	12	1362	1213	149
78	1	1414	1213	201
78	2	1360	1213	147
78	3	1394	1212	182
78	4	1420	1210	210
78	5	1423	1206	217
78	6	1429	1202	227
78	7	1395	1204	191
78	8	1440	1200	240
79	9	1448	1199	249
78	10	1429	1198	231
78	11	1402	1196	206
78	12	1447	1196	251
79	1	1387	1192	195
79	2	1425	1190	235
79	3	1415	1187	228
79	4	1379	1183	196
79	5	1424	1181	243
79	6	1423	1175	248
79	7	1419	1174	245
79	8	1384	1171	213
79	9	1399	1167	232
79	10	1381	1161	220

Off-season means: actual = 1335 predicted = 1238
On-season means: actual = 1358 predicted = 1226

	Off-season	On-season
t-statistics:	6.71	11.05
D.F.	58	60

Summary: Respecification excluding time-trend variables

In summary, the respecified equations for both the unemployment rate and the employment level do provide predicted series free of the sizable downward trend so evident from the original specifications. However, the two respecified employment equations provide conflicting evidence concerning Chiswick's employment hypotheses, and in either case, the data for only one of the two seasons provide supporting evidence for one of the hypotheses, while the data for the other season provide evidence that tends to reject the other employment hypothesis. The two respecified unemployment rate equations still provide evidence that the unemployment rate did increase in the off-season (as did the original specification), but they also indicate the unemployment rate increased in the on-season.

The specification of the original estimating equations to include two time-trend variables is clearly critical to yielding a plausible predicted series for either the unemployment rate or the employment level. A strong case is not made for including the time-squared variable, and its exclusion does substantially improve the predicted series in both cases from this point of view. While the respecified unemployment rate equation excluding the time-squared variable is satisfactory, it appears that excluding the time variable from this equation would also be justifiable. In the case of the employment level, however, the respecified equation without the time-squared variable is not entirely satisfactory since the coefficient for the LPR variable has opposite the expected sign, though it is insignificant. The statistical significance of the remaining time-variable suggests that removing this variable would not be justifiable; the estimation results without it do not represent an improvement.

Estimation Using Monthly Rather Than Quarterly Data

Chiswick conducted his estimation using the average of each quarter's 3 months rather than the monthly data because of what he refers to as noise in the monthly CPS statistics. The predicted series are both based on monthly data, however. It is possible that some valuable information is contained in the monthly data which has been discarded with the "noise," so it is of interest to determine whether estimation using monthly data provides any better results than using quarterly data. Furthermore, it would be interesting to learn whether estimation using monthly data and the original specification will provide the same, sizable downward trend in the predicted series, and if so, whether the most desirable respecifications concerning time-trend are the same as those suggested using quarterly data. Accordingly, we have estimated the original specification for each equation using monthly data and present those results in Table 11 for the unemployment rate and in Table 12 for the employment level.

The monthly estimation results for the unemployment rate present no substantial changes in the regression coefficients except for the time-trend variables, but this is to be expected since they represent monthly rather than quarterly changes. The value of the time variable is three times that when using quarterly data, and the time-trend coefficient is about three times as great; we do not observe a pure scale effect because the variability of the dependent variable is different using monthly data. The R-squared is reduced to 0.62 and 0.61 from 0.74 and 0.72, respectively, but that is

TABLE 11. Estimation using monthly data: 1948–1974 (Sept.)—time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log of agricultural unemployment rate

Type of estimation: Cochrane-Orcutt

Independent variables	(1)	(2)	(3)
Constant	.0549	−.0018	.0681
	(.30)	(−.01)	(.46)
LUM20	.2380	.2124	.2469
	(3.09)	(2.68)	(4.46)
LUM16	.5901	.6732	.6203
	(5.17)	(5.91)	(8.54)
Time	.0019	−.00013	
	(3.08)	(−.60)	
Time-squared	−.000006		
	(−3.56)		
Regression statistics			
Rho	.199	.242	.247
	(3.63)	(4.51)	(4.56)
R-squared	.62	.61	.61
Durbin-Watson	2.05	2.08	2.08
No. of Obs.	319	319	319

LUM20 = Log of Unemployment Rate, Males 20 and over.
LUM16 = Log of Unemployment Rate, Males 16–19 years.

TABLE 12. Estimation using monthly data: 1948–1974 (Sept.) time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log of agricultural employment level

Type of estimation: Cochrane-Orcutt

Independent variables	(1)	(2)	(3)
Constant	3.4304	5.7406	9.2535
	(3.01)	(4.96)	(13.01)
LPR	−.0416	−.2300	.0082
	(−.30)	(−1.72)	(.06)
LWPI	.9076	.6122	−.4394
	(2.90)	(1.72)	(−2.14)
LUM16	.0137	.0189	−.0060
	(.38)	(.53)	(−.16)
Time	.0010	−.0017	
	(1.03)	(−3.55)	
Time-squared	−.000011		
	(−3.38)		
Regression statistics			
Rho	.740	.800	.859
	(18.89)	(22.90)	(28.78)
R-squared	.82	.81	.81
Durbin-Watson	2.27	2.34	2.40
No. of Obs.	295	295	295

LPR = Log of Prices Farmers receive for their products.
LWPI = Log of Wholesale Price Index, manufactured goods.
LUM16 = Log of Unemployment Rate, Males aged 16–19 years.

to be expected using monthly data rather than the average of every three months of data.

The monthly estimation results for the employment level are substantially different, however, than the quarterly estimation results. Not only are the time-trend coefficients different, but so are the coefficients for each of the other independent variables. Moreover, this is the case for each of the three specifications presented. The only coefficients that are significant in column (1) of Table 12 are LWPI and Time-Squared, just as with quarterly data reported in Table 6. In column (2) of Table 12, however, the significant coefficients LPR and LWPI were not significant in Table 6, and in column (3) of Table 12 the LWPI coefficient is significant whereas it was not using quarterly data. There was little change in the remaining statistics, including R-squared.

On the basis of these comparisons of estimation results, we might expect that the prediction results would be similar to those using quarterly estimation for the unemployment rate but not for the employment level. The prediction results for the unemployment rate are presented in Tables 13, 14, and 15 for each of the three specifications and for the employment level in Tables 16, 17, and 18 for each of the three specifications.

TABLE 13. Comparison of actual and predicted agricultural unemployment rates using estimation results from column (1) of Table 11

Year	Month	Agricultural employment level: Actual	Predicted	Difference
74	10	8.3	13.1	−4.8
74	11	7.5	14.2	−6.7
74	12	7.5	15.0	−7.5
75	1	10.6	16.4	−5.8
75	2	8.9	16.6	−7.7
75	3	10.5	16.9	−6.4
75	4	11.2	17.6	−6.4
75	5	9.3	17.4	−8.1
75	6	10.3	18.4	−8.1
75	7	8.9	17.9	−9.0
75	8	11.3	17.6	−6.3
75	9	11.0	17.1	−6.1
75	10	10.9	17.0	−6.1
75	11	10.3	16.6	−6.3
75	12	11.5	16.7	−5.2
76	1	11.4	16.9	−5.5
76	2	10.4	16.1	−5.7
76	3	10.9	16.2	−5.3
76	4	11.4	16.8	−5.4
76	5	12.8	16.4	−3.6
76	6	11.3	16.3	−5.0
76	7	11.6	16.2	−4.6
76	8	11.0	16.2	−5.2
76	9	11.2	16.4	−5.2
76	10	11.4	16.6	−5.2
76	11	13.4	16.9	−3.5
76	12	13.4	16.5	−3.1
77	1	13.0	15.8	−2.8

TABLE 13. (*continued*)

Year	Month	Agricultural employment level Actual	Predicted	Difference
77	2	12.7	16.0	−3.3
77	3	12.6	15.8	−3.2
77	4	12.5	15.2	−2.7
77	5	11.7	15.5	−3.8
77	6	11.4	16.0	−4.6
77	7	9.4	15.2	−5.8
77	8	10.0	15.4	−5.4
77	9	10.4	15.1	−4.7
77	10	10.3	14.7	−4.4
77	11	9.3	14.6	−5.3
77	12	9.7	13.6	−3.9
78	1	9.3	14.1	−4.8
78	2	9.5	14.6	−5.1
78	3	10.0	14.6	−4.6
78	4	8.0	14.3	−6.3
78	5	7.8	13.8	−6.0
78	6	8.5	13.0	−4.5
78	7	9.1	14.0	−4.9
78	8	8.6	13.5	−4.9
78	9	8.5	13.8	−5.3
78	10	9.7	14.1	−4.4
78	11	7.8	13.9	−6.1
78	12	8.0	14.4	−6.4
79	1	7.5	14.2	−6.7
79	2	8.6	14.1	−5.5
79	3	8.0	14.0	−6.0
79	4	8.7	14.2	−5.5
79	5	9.3	14.1	−4.8
79	6	7.8	13.4	−5.6
79	7	9.7	14.0	−4.3
79	8	9.9	14.6	−4.7
79	9	10.0	14.5	−4.5
79	10	9.9	14.3	−4.4
79	11	10.1	14.4	−4.3
79	12	9.4	14.3	−4.9

Off-season means: actual = 10.1 predicted = 15.4
On-season means: actual = 10.0 predicted = 15.3
t-statistics: Off-season −13.61 On-season −14.88
D.F. 62 60

TABLE 14. Comparison of actual and predicted agricultural unemployment rates using estimation results from column (2) of Table 11

Year	Month	Agricultural employment level Actual	Predicted	Difference
74	10	8.3	8.4	−0.1
74	11	7.5	9.1	−1.6
74	12	7.5	9.5	−2.0
75	1	10.6	10.4	0.2
75	2	8.9	10.5	−1.6
75	3	10.5	10.7	−0.2
75	4	11.2	11.2	0.0
75	5	9.3	11.0	−1.7
75	6	10.3	11.7	−1.4
75	7	8.9	11.3	−2.4
75	8	11.3	11.1	0.2
75	9	11.0	10.7	0.3
75	10	10.9	10.6	0.3

TABLE 14. (*continued*)

Year	Month	Agricultural employment level Actual	Predicted	Difference
75	11	10.3	10.3	−0.0
75	12	11.5	10.4	1.1
76	1	11.4	10.6	0.8
76	2	10.4	10.0	0.4
76	3	10.9	10.0	0.9
76	4	11.4	10.5	0.9
76	5	12.8	10.2	2.6
76	6	11.3	10.0	1.3
76	7	11.6	10.0	1.6
76	8	11.0	10.0	1.0
76	9	11.2	10.1	1.1
76	10	11.4	10.2	1.2
76	11	13.4	10.4	3.0
76	12	13.4	10.1	3.3
77	1	13.0	9.6	3.4
77	2	12.7	9.7	3.0
77	3	12.6	9.6	3.0
77	4	12.5	9.2	3.3
77	5	11.7	9.3	2.4
77	6	11.4	9.7	1.7
77	7	9.4	9.1	0.3
77	8	10.0	9.3	0.7
77	9	10.4	9.1	1.3
77	10	10.3	8.8	1.5
77	11	9.3	8.7	0.6
77	12	9.7	8.0	1.7
78	1	9.3	8.4	0.9
78	2	9.5	8.7	0.8
78	3	10.0	8.7	1.3
78	4	8.0	8.5	−0.5
78	5	7.8	8.1	−0.3
78	6	8.5	7.6	0.9
78	7	9.1	8.2	0.9
78	8	8.6	7.9	0.7
78	9	8.5	8.1	0.4
78	10	9.7	8.3	1.4
78	11	7.8	8.2	−0.4
78	12	8.0	8.5	−0.5
79	1	7.5	8.3	−0.8
79	2	8.6	8.2	0.4
79	3	8.0	8.2	−0.2
79	4	8.7	8.3	0.4
79	5	9.3	8.2	1.1
79	6	7.8	7.7	0.1
79	7	9.7	8.1	1.6
79	8	9.9	8.4	1.5
79	9	10.0	8.4	1.6
79	10	9.9	8.2	1.7
79	11	10.1	8.3	1.8
79	12	9.4	8.2	1.2

Off-season means: actual = 10.1 predicted = 9.3
On-season means: actual = 10.0 predicted = 9.3
t-statistics: Off-season 2.10 On-season 2.41
D.F. 62 60

Predicted unemployment rate

The predicted unemployment rate based on monthly estimation and including both time-trend variables is presented in Table 13. Instead of a steady downward trend in the predicted series (as was the case using quarterly data) the predicted series is uniformly higher than the actual series by 4 to 6 percentage points. The mean predicted rate is 15.4 percent for the off-season and 15.3 percent for the on-season compared to actual means of 10.1 percent and 10.0 percent, respectively.

The likely explanation is in the increased importance attributed to the time-trend variables using monthly data, particularly the time variable itself, due to the much higher values attained by the start of the prediction period.

The prediction results reported in Table 14 tend to confirm this explanation. Table 14 presents the predicted unemployment rate based on estimation excluding the time-variable. A glance at Table 11 reveals that the time-variable coefficient is negative, rather than positive in this case, but more importantly its coefficient is one-twentieth the size in absolute magnitude when compared with its coefficient when the time-squared variable is included. The predicted series in Table 14 is not substantially and uniformly higher or lower than the actual series as is the case in Table 13. The mean predicted unemployment rate is 9.3 percent for both the off- and on-season compared to actual rates of 10.1 percent and 10 percent. The t-statistics at the base of the table reveal these to be significant differences in both cases, however. Essentially the same results are obtained when both time-trend variables are removed from the estimating equation, as Table 15 indicates. In that case, the mean predicted rate is 9.5 percent for both the off- and on-seasons; once again, both these differences are statistically significant, though the difference for the off-season is less highly significant than for the on-season.

Thus, using monthly rather than quarterly estimation does not substantially alter the earlier findings that including both time-trend variables yields prediction results that are not believable, and excluding either one or both of the time-trend variables yields believable predictions, but these indicate in both cases that the on-season as well as the off-season unemployment rates were substantially increased by the extension of UI coverage to the agricultural sector. While the latter was expected by Chiswick, the former was not.

TABLE 15. Comparison of actual and predicted agricultural unemployment rates using estimation results from column (3) of Table 11

		Agricultural employment level		
Year	Month	Actual	Predicted	Difference
74	10	8.3	8.5	−0.2
74	11	7.5	9.2	−1.7
74	12	7.5	9.7	−2.2
75	1	10.6	10.6	0.0
75	2	8.9	10.7	−1.8
75	3	10.5	11.0	−0.5
75	4	11.2	11.4	−0.2
75	5	9.3	11.2	−1.9
75	6	10.3	11.9	−1.6
75	7	8.9	11.5	−2.6
75	8	11.3	11.3	0.0
75	9	11.0	10.9	0.1
75	10	10.9	10.9	0.0
75	11	10.3	10.6	−0.3
75	12	11.5	10.6	0.9
76	1	11.4	10.8	0.6
76	2	10.4	10.2	0.2
76	3	10.9	10.2	0.7
76	4	11.4	10.6	0.8
76	5	12.8	10.4	2.4
76	6	11.3	10.3	1.0
76	7	11.6	10.2	1.4
76	8	11.0	10.2	0.8
76	9	11.2	10.3	0.9
76	10	11.4	10.4	1.0
76	11	13.4	10.6	2.8
76	12	13.4	10.3	3.1
77	1	13.0	9.8	3.2
77	2	12.7	10.0	2.7
77	3	12.6	9.8	2.8
77	4	12.5	9.4	3.1
77	5	11.7	9.5	2.2
77	6	11.4	9.9	1.5
77	7	9.4	9.3	0.1
77	8	10.0	9.5	0.5
77	9	10.4	9.3	1.1
77	10	10.3	9.0	1.3
77	11	9.3	8.9	0.4
77	12	9.7	8.3	1.4
78	1	9.3	8.6	0.7
78	2	9.5	8.9	0.6

TABLE 15. (*continued*)

		Agricultural employment level		
Year	Month	Actual	Predicted	Difference
78	3	10.0	8.8	1.2
78	4	8.0	8.6	−0.6
78	5	7.8	8.3	−0.5
78	6	8.5	7.8	0.7
78	7	9.1	8.4	0.7
78	8	8.6	8.1	0.5
78	9	8.5	8.3	0.2
78	10	9.7	8.4	1.3
78	11	7.8	8.3	−0.5
78	12	8.0	8.6	−0.6
79	1	7.5	8.5	−1.0
79	2	8.6	8.4	0.2
79	3	8.0	8.4	−0.4
79	4	8.7	8.4	0.3
79	5	9.3	8.4	0.9
79	6	7.8	7.9	−0.1
79	7	9.7	8.3	1.4
79	8	9.9	8.6	1.3
79	9	10.0	8.6	1.4
79	10	9.9	8.4	1.5
79	11	10.1	8.5	1.6
79	12	9.4	8.4	1.0

Off-season means: actual = 10.1 predicted = 9.5
On-season means: actual = 10.0 predicted = 9.5

t-statistics:	Off-season	On-season
	1.58	1.77
D.F.	62	60

Predicted employment level

Table 16 presents the predicted employment level using monthly estimation with both time-trend variables included. The mean predicted level is 3571 for the off-season and 3741 for the on-season, nearly three times the actual means of 1335 and 1358, respectively.

Thus, this specification appears unsuitable with monthly data just as with quarterly data; the trend in the predicted series using quarterly data was a steady downward one whereas this predicted series begins much higher than actual values and rises throughout the prediction period.

TABLE 16. Comparison of actual and predicted agricultural employment levels using estimation results from column (1) of Table 12

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
74	10	1356	2025	−669
74	11	1402	2305	−903
74	12	1288	2539	−1251
75	1	1281	2742	−1461
75	2	1216	2883	−1667
75	3	1213	2992	−1779
75	4	1169	3088	−1919
75	5	1297	3160	−1863
75	6	1276	3222	−1946
75	7	1355	3274	−1919
75	8	1336	3317	−1981
75	9	1328	3345	−2017
75	10	1288	3388	−2100
75	11	1278	3400	−2122
75	12	1249	3415	−2166
76	1	1312	3437	−2125
76	2	1323	3445	−2122
76	3	1338	3460	−2122
76	4	1355	3481	−2126
76	5	1289	3493	−2204
76	6	1293	3512	−2219
76	7	1324	3530	−2206
76	8	1334	3538	−2204
76	9	1302	3558	−2256
76	10	1301	3575	−2274
76	11	1279	3587	−2308
76	12	1375	3603	−2228
77	1	1265	3618	−2353
77	2	1305	3637	−2332
77	3	1295	3662	−2367
77	4	1311	3691	−2380
77	5	1314	3719	−2405
77	6	1346	3737	−2391
77	7	1299	3744	−2445
77	8	1325	3759	−2434
77	9	1341	3772	−2431
77	10	1391	3791	−2400
77	11	1392	3801	−2409
77	12	1362	3809	−2447
78	1	1414	3838	−2424
78	2	1360	3865	−2505
78	3	1394	3881	−2487
78	4	1420	3911	−2491
78	5	1423	3934	−2511
78	6	1429	3952	−2523

TABLE 16. *(continued)*

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
78	7	1395	3978	−2583
78	8	1440	3996	−2556
78	9	1448	4023	−2575
78	10	1429	4065	−2636
78	11	1402	4084	−2682
78	12	1447	4108	−2661
79	1	1387	4153	−2766
79	2	1425	4190	−2765
79	3	1415	4227	−2812
79	4	1379	4286	−2907
79	5	1424	4321	−2897
79	6	1423	4343	−2920
79	7	1419	4395	−2976
79	8	1384	4443	−3059
79	9	1399	4500	−3101
79	10	1381	4565	−3184

Off-season means: actual = 1335 predicted = 3571
On-season means: actual = 1358 predicted = 3741
t-statistics: Off-season −24.28 On-season −25.95
D.F. 58 60

TABLE 17. Comparison of actual and predicted agricultural employment levels using estimation results from column (2) of Table 12

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
74	10	1356	1353	3
74	11	1402	1357	45
74	12	1288	1365	−77
75	1	1281	1379	−98
75	2	1216	1385	−169
75	3	1213	1388	−175
75	4	1169	1379	−210
75	5	1297	1368	−71
75	6	1276	1368	−92
75	7	1355	1359	−4
75	8	1336	1361	−25
75	9	1328	1354	−26
75	10	1288	1359	−71
75	11	1278	1364	−86
75	12	1249	1361	−112
76	1	1312	1364	−52
76	2	1323	1365	−42
76	3	1338	1371	−33
76	4	1355	1365	−10
76	5	1289	1365	−76
76	6	1293	1361	−68
76	7	1324	1362	−38
76	8	1334	1372	−38
76	9	1302	1371	−69
76	10	1301	1381	−80
76	11	1279	1386	−107
76	12	1375	1375	−0
77	1	1265	1373	−108
77	2	1305	1368	−63
77	3	1295	1367	−72
77	4	1311	1363	−52
77	5	1314	1373	−59

TABLE 17. (*continued*)

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
77	6	1346	1392	−46
77	7	1299	1394	−95
77	8	1325	1408	−83
77	9	1341	1408	−67
77	10	1391	1409	−18
77	11	1392	1404	−12
77	12	1362	1398	−36
78	1	1414	1397	17
78	2	1360	1392	−32
78	3	1394	1386	8
78	4	1420	1378	42
78	5	1423	1377	46
78	6	1429	1373	56
78	7	1395	1377	18
78	8	1440	1391	49
78	9	1448	1389	59
78	10	1429	1391	38
78	11	1402	1394	8
78	12	1447	1392	55
79	1	1387	1389	−2
79	2	1425	1383	42
79	3	1415	1386	29
79	4	1379	1393	−14
79	5	1424	1398	26
79	6	1423	1402	21
79	7	1419	1407	12
79	8	1384	1425	−41
79	9	1399	1432	−33
79	10	1381	1445	−64

Off-season means: actual = 1335 predicted = 1379
On-season means: actual = 1358 predicted = 1385

	Off-season	On-season
t-statistics:	−3.30	−2.55
D.F.	58	60

TABLE 18. Comparison of actual and predicted agricultural employment levels using estimation results from column (3) of Table 12

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
74	10	1356	1284	72
74	11	1402	1258	144
74	12	1288	1237	51
75	1	1281	1216	65
75	2	1216	1203	13
75	3	1213	1193	20
75	4	1169	1180	−11
75	5	1297	1170	127
75	6	1276	1161	115
75	7	1355	1152	203
75	8	1336	1144	192
75	9	1328	1139	189
75	10	1288	1131	157
75	11	1278	1128	150
75	12	1249	1124	125
76	1	1312	1120	192
76	2	1323	1117	206
76	3	1338	1114	224
76	4	1355	1110	245

TABLE 18. (*continued*)

Year	Month	Agricultural employment level: Actual	Agricultural employment level: Predicted	Difference
76	5	1289	1107	182
76	6	1293	1103	190
76	7	1324	1100	224
76	8	1334	1099	235
76	9	1302	1095	207
76	10	1301	1093	208
76	11	1279	1091	188
76	12	1375	1088	287
77	1	1265	1085	180
77	2	1305	1082	223
77	3	1295	1078	217
77	4	1311	1073	238
77	5	1314	1070	244
77	6	1346	1068	278
77	7	1299	1067	232
77	8	1325	1066	259
77	9	1341	1064	277
77	10	1391	1061	330
77	11	1392	1060	332
77	12	1362	1059	303
78	1	1414	1054	360
78	2	1360	1051	309
78	3	1394	1048	346
78	4	1420	1044	376
78	5	1423	1041	382
78	6	1429	1038	391
78	7	1395	1035	360
78	8	1440	1034	406
78	9	1448	1030	418
78	10	1429	1025	404
78	11	1402	1023	379
78	12	1447	1020	427
79	1	1387	1014	373
79	2	1425	1009	416
79	3	1415	1005	410
79	4	1379	998	381
79	5	1424	994	430
79	6	1423	992	431
79	7	1419	986	433
79	8	1384	982	402
79	9	1399	976	423
79	10	1381	969	412

Off-season means: actual = 1335 predicted = 1096
On-season means: actual = 1358 predicted = 1073

	Off-season	On-season
t-statistics:	12.95	18.04
D.F.	58	60

Eliminating the time-squared variable or both time-trend variables yields more reasonable predictions, although a noticeable downward trend in the predicted series is present in the latter case. With only the time-squared variable removed, the mean predicted level is 1379 for the off-season and 1385 for the on-season, compared to actual means of 1335 and 1358. The t-statistics indicate that the predicted means are significantly different from the actual means in both the on- and off-seasons.

Chiswick's prediction that actual on-season employment levels would be greater than predicted is not confirmed in this case. The results in Table 18, where the predicted series is based on estimation excluding both time-trend variables, indicate that a downward trend in the predicted series is present. The mean predicted level is 1096 for the off-season and 1073 for the on-season, both significantly lower than the actual means of 1335 and 1358, respectively. Chiswick's expectation that the on-season employment level would be greater than predicted is confirmed but his expectation that the off-season employment level would be less than predicted is not.

In summary, no strong reason exists for using quarterly rather than monthly data for estimating the unemployment rate except for a slight increase in R-squared. The prediction results indicate that Chiswick's specification is a poor one in either case and that the prediction results are very sensitive to the inclusion of time-trend variables.

Excluding time-squared or both time-trend variables yields more reasonable predictions which are similar whether monthly or quarterly estimation is the basis for prediction. In contrast, the estimation results for the employment level are substantially different when using monthly rather than quarterly data. No strong reason exists for choosing to estimate using monthly data except that more of the coefficients are statistically significant than is the case in using quarterly data.

However, the monthly estimation still yields a negative sign for LPR in two of the three specifications presented in Table 12. The prediction results are no better than those using quarterly data. Chiswick's specification provides unbelievable predictions which are opposite to those expected for the off-season; excluding time and time-squared variables provides more reasonable predictions consistent with Chiswick's expectations for the off-season but opposite to those for the on-season.

A More Direct Test of Chiswick's Hypotheses

Instead of estimating an equation for the period prior to the extension of UI coverage to the agricultural sector and then using this equation to predict for the period since its extension up to the present, we suggest that the entire period of data be used for estimation purposes. This estimation is to be conducted with several dummy variables included, however. The season dummy is defined as unity for a month in the off-season and zero for a month in the on-season. The coverage dummy is defined as unity for the months beginning with January 1, 1975, and zero for the months before then. An interaction dummy is defined to be unity for the off-season months after coverage and zero otherwise.

Consider the unemployment-rate equation. The unemployment rate in the on-season will be greater after coverage than before if the coverage coefficient is significantly positive and will be less after coverage than before if the coverage coefficient is significantly negative. The unemployment rate in the off-season will be greater after coverage than before if either (1) the coverage and interaction coefficients are both significantly positive; or (2) the coverage coefficient is significantly positive while the interaction coefficient is significantly negative but smaller in absolute value than the coverage coefficient; or (3) the coverage coefficient is significantly negative while the interaction term is significantly positive and greater in absolute value than the coverage coefficient.

Consider the employment-level equation. The employment level in the on-season will be greater after coverage than before if the coverage coefficient is significantly positive. The employment level in the off-season will be lower after coverage than before if (1) both the coverage and interaction coefficients are significantly negative; or (2) the coverage coefficient is significantly positive while the interaction coefficient is significantly negative but larger in absolute value than the coverage coefficient; or (3) the coverage coefficient is significantly negative and the interaction coefficient is significantly positive but smaller in absolute value than the coverage coefficient. Chiswick's hypotheses that on-season employment will be higher after coverage than before and that off-season employment will be lower than before coverage imply that the coverage coefficient is expected to be positive and that the interaction coefficient is expected to be negative and larger in absolute value than the coverage coefficient.

We have conducted three such regression analyses for both the unemployment rate and the employment level, including in each case the season dummy, the coverage dummy, and an interaction dummy. The first analysis in each case contains both time and time-squared variables, the second only time, and the third neither time nor time-squared. Those results revealed that the interaction dummy was in no case significant. Moreover, eliminating the interaction dummy in no way changed the results for the other variables or any of the regression statistics. Therefore, we report only those results with the interaction dummy removed.

Unemployment rate estimation results

Table 19 reports the regression results for the entire period through December 1979 incorporating both the season and coverage-dummy variables. Column (1) presents the results with both time-trend variables included, column (2) those results with time-squared removed, and column (3) those results with both time-trend variables removed.

In all three cases the season dummy is not statistically significant. The regression coefficients for the remaining variables are basically the same as those reported for estimation through September 1974. The

TABLE 19. Estimation using monthly data: 1948–1979—dummy variables for "on-off season" and "UICOVERAGE" added time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log of agricultural unemployment rate

Type of estimation: Cochrane-Orcutt

Independent variables	(1)	(2)	(3)
Constant	.0958	.0341	.1022
	(.55)	(.19)	(.72)
LUM20	.2302	.2104	.2444
	(3.19)	(2.85)	(4.62)
LUM16	.5828	.6593	.6070
	(5.44)	(6.24)	(8.67)
ONOFF	.0028	.0026	.0028
	(.14)	(.13)	(.14)
UICOVERAGE	.2270	.0945	.0718
	(3.66)	(1.90)	(2.02)
Time	.0016	−.00014	
	(2.78)	(−.66)	
Time-squared	−.000005		
	(−3.26)		
Regression statistics			
Rho	.246	.277	.281
	(4.96)	(5.63)	(5.73)
R-squared	.68	.67	.67
Durbin-Watson	2.08	2.10	2.11
No. of Obs.	383	383	383

LUM20 = Log of Unemployment Rate, Males 20 and over.
LUM16 = Log of Unemployment Rate, Males 16–19 years.
ONOFF = 1 for off-season months, 0 for on-season months.
UICOVERAGE = 1 for months after Dec. 1974.
= 0 for months thru Dec. 1974.

R-squared has been increased from 0.62 and 0.61 to 0.68 and 0.67, respectively. The magnitude of the coverage dummy varies among the three regressions from a low of 0.07 when both time-trend variables are excluded to a high of 0.23 when both are included. Given a mean value for the log of the unemployment rate of 2.03 (a mean unemployment rate of 7.6), this implies that the agricultural unemployment rate was increased by between 0.6 and 2.0 percentage points after January 1, 1975, holding other factors constant.

These estimation results are consistent with the prediction results reported earlier based on either quarterly or monthly estimation and excluding at least the time-squared variable; namely, that the actual unemployment rate was found to be significantly greater than the predicted rate for both the on- and off-seasons. These estimation results are consistent with Chiswick's hypothesis that off-season unemployment rates were increased as a result of the extension of UI coverage to the agricultural sector but they suggest that this extension of coverage had a much broader impact than just upon the off-season and raise some question as to whether there might be some other explanation for the observed impact. Chiswick did not expect such an unambiguous impact on the unemployment rate in all months since the extension of coverage.

The employment level

Table 20 presents the estimation results for the employment level incorporating the season and coverage dummies; columns (1), (2), and (3) report the results with both time-trend variables included, time-squared excluded, and both time-trend variables excluded, respectively. The results indicate that neither the season dummy nor the coverage dummy is statistically significant in any case. Neither of Chiswick's hypotheses (that employment would increase in the on-season and decrease in the off-season) finds any support in these results in contrast to Chiswick's earlier results, which supported both of these hypotheses.

TABLE 20. Estimation using monthly data: 1948–1979—dummy variables for "on-off season" and "UICOVERAGE" added time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log af agricultural employment level

Type of estimation: Cochrane-Orcutt

Independent variables	(1)	(2)	(3)
Constant	3.2653	5.7853	8.0781
	(3.58)	(9.04)	(17.28)
LPR	−.0806	−.1837	.0192
	(−.74)	(−1.66)	(.16)
LWPI	.9950	.5553	−.1869
	(4.41)	(2.58)	(−1.20)
LUM16	.0042	.0158	−.0176
	(.13)	(.48)	(−.52)
ONOFF	−.0022	−.0025	−.0027
	(−.29)	(−.32)	(−.35)
UICOVERAGE	−.0160	−.0182	.0334
	(−.32)	(−.34)	(.61)
Time	.0006	−.0017	
	(.72)	(−4.71)	
Time-squared	−.00001		
	(−3.29)		
Regression statistics			
Rho	.753	.800	.879
	(21.58)	(25.19)	(34.72)
R-squared	.82	.81	.80
Durbin-Watson	2.30	2.36	2.44
No. of Obs.	356	356	356

LPR = Log of Prices Farmers receive for their products.
LWPI = Log of Wholesale Price Index, manufactured goods.
LUM16 = Log of Unemployment Rate, Males 16–19 years.
ONOFF = 1 for off-season months, 0 for on-season months.
UICOVERAGE = 0 for months thru Dec. 1974, 1 for months after Dec. 1974.

TABLE 21. Estimation using monthly data: 1948–1979—separate dummy variables for temporary and permanent "UICOVERAGE" added time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log of agricultural unemployment rate

Type of estimation: Cochrane-Orcutt

Independent variables	(1)	(2)	(3)
Constant	.1152	.0683	.0914
	(.66)	(.39)	(.65)
LUM20	.2567	.2293	.2402
	(3.54)[1]	(3.15)[1]	(4.47)[1]
LUM16	.5650	.6316	.6143
	(5.28)[1]	(6.05)[1]	(8.81)[1]
TCOV	.1599	.0843	.0776
	(2.76)[1]	(1.58)[2]	(1.77)[1]
PCOV	.1573	.0445	.0375
	(2.29)[1]	(.78)	(.78)
Time	.0014	−.00005	
	(−2.37)[1]	(−.22)	
Time-squared	−.000004		
	(−2.64)[1]		
Regression statistics			
Rho	.247	.280	.281
	(4.99)	(5.70)	(5.74)
R-squared	.68	.67	.67
Durbin-Watson	2.08	2.10	2.11
No. of Obs.	383	383	383

LUM20 = Log of Unemployment Rate, Males 20 and over.
LUM16 = Log of Unemployment Rate, Males 16–19 years.
TCOV = 1 for months from Jan. 1975–Dec. 1977; 0 otherwise.
PCOV = 1 for months from Jan. 1978–Dec. 1979; 0 otherwise.
[1] Significant at the 5 percent level, one-tailed t-test.
[2] Significant at the 10 percent level, one-tailed t-test.

Elimination of the seasonal dummy

The insignificant results for the seasonal dummy in each of these equations are not surprising since seasonally adjusted data are being used. Accordingly, the seasonal dummy was removed from the unemployment-rate and employment-level equations in our more direct test; the regression coefficients for the remaining variables as well as the regression statistics were essentially the same as those reported in Tables 19 and 20. This raises a fundamental question about Chiswick's attempt to pick up seasonal effects using seasonally adjusted data; using data that were not seasonally adjusted might have been more appropriate.

Separate dummies for temporary versus permanent program coverage

Separate coverage dummy variables were also introduced to distinguish the period of the temporary program during 1975, 1976, and 1977 from the period of the permanent program in 1978 and 1979. Since the permanent program was more restrictive in coverage and did have experience rating for employers (which the temporary program did not have), one might expect some difference in effects. In particular, the effects from the temporary program would be expected to be more pronounced than those from the permanent program. The results from the inclusion of these two separate coverage dummies instead of one coverage dummy (and excluding the seasonal dummy for reasons indicated above) are displayed for the unemployment rate in Table 21 and for the employment level in Table 22.

In the unemployment-rate equation the temporary coverage dummy is significantly positive in all three specifications while the permanent coverage dummy is significant for only the specification including both time-trend variables; in the latter, the temporary and permanent coverage coefficients are equal in magnitude.

TABLE 22. Estimation using monthly data: 1948–1979—separate dummy variables for temporary and permanent "UICOVERAGE" added time and time-squared variables removed one at a time (t-statistics in parentheses)

Dependent variable: log of agricultural employment level

Type of estimation: Cochrane-Orcutt

Independent variables	(1)	(2)	(3)
Constant	3.3636	6.0504	8.0716
	(4.18)[1]	(11.57)[1]	(20.06)[1]
LPR	−.0451	−.1731	.0115
	(−.43)	(−1.61)[2]	(.10)
LWPI	.9285	.4817	−.1784
	(4.82)[1]	(2.56)[1]	(−1.25)
LUM16	.0122	.0190	−.0161
	(.37)	(.58)	(−.48)
TCOV	−.0342	−.0253	−.0135
	(−1.01)	(−.70)	(−.35)
PCOV	.0579	.0418	.0669
	(1.29)[2]	(.86)	(1.26)
Time	.0008	−.0016	
	(1.16)	(−4.76)[1]	
Time-squared	−.00001		
	(−3.77)[1]		
Regression statistics			
Rho	.736	.797	.876
	(20.53)	(24.88)	(34.29)
R-squared	.81	.81	.80
Durbin-Watson	2.27	2.35	2.44
No. of Obs.	356	356	356

LPR = Log of Prices Farmers receive for their products.
LWPI = Log of Wholesale Price Index, manufactured goods.
LUM16 = Log of Unemployment Rate, Males aged 16–19 years.
TCOV = 1 for months Jan. 1975–Dec. 1977; 0 otherwise.
PCOV = 1 for months Jan. 1978–Oct. 1979; 0 otherwise.
[1] Significant at the 5 percent level, one-tailed t-test.
[2] Significant at the 10 percent level, one-tailed t-test.

In the employment-level equation the temporary coverage dummy is insignificant in all three specifications while the permanent coverage dummy is significant in only one of the three specifications, that being the one including both time-trend variables.

On the whole, these results indicate the temporary program significantly increased the unemployment rate but had no significant impact on the employment level. The results concerning the permanent program indicate that it had no significant impact on either the unemployment rate or the employment level in two of the three specifications and that its impact on the employment level in that one remaining specification was not highly significant.

In general, we can say the permanent program had a highly significant impact only on the unemployment rate and that this is the case only if both time-trend variables are included. Thus, if we are willing to accept the specification for the unemployment-rate equation including both time-trend variables, both the temporary and permanent programs significantly increased the unemployment rate (in both seasons) by slightly over one percentage point. If we are not willing to accept this specification, then it must be concluded that the temporary program significantly increased the unemployment rate (in both seasons) while the permanent program did not. We saw earlier that prediction based on this particular specification was unreliable for periods longer than a year, however, which makes it difficult to use this specification for predicting the impact of the permanent program over a long future period. Accepting this specification may therefore confine meaningful analysis of the impact of the program on the unemployment rate or the employment level to not longer than 1 year.

Notes

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2. Ronald G. Ehrenberg and Ronald L. Oaxaca, "Unemployment Insurance, Duration of Unemployment and Subsequent Wage Gain," *The American Economic Review,* December 1976, pp. 754–766; and Kathleen P. Classen, "The Effect of Unemployment Insurance on the Duration of Unemployment and Subsequent Earnings," *Industrial and Labor Relations Review,* July 1977, pp. 438–444.

3. Arlene Holen, "Effects of Unemployment Entitlement on Duration and Job Search Outcome," *Industrial and Labor Relations Review,* July 1976, pp. 445–450.

4. Charles E. McLure, Jr., "The Incidence of the Financing of Unemployment Insurance," *Industrial and Labor Relations Review,* July 1977, pp. 469–479; and Frank Brechling, "Unemployment Insurance Taxes and Labor Turnover: Summary of Theoretical Findings," *Industrial and Labor Relations Review,* April 1979, pp. 363–366.

5. Marianne Sakmann Linnenberg, "Seasonal Employers and Seasonal Workers Under State Unemployment Compensation Laws," *Social Security Bulletin,* November 1944, pp. 13–26.

6. Linnenberg, "Seasonal Employers," p. 14.

7. Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* October 1976, pp. 937–957.

8. Feldstein, "Temporary Layoffs," p. 956.

9. James O'Connor, "Seasonal Unemployment and Unemployment Insurance," *American Economic Review,* June 1962, pp. 468–469.

10. Barry R. Chiswick, "The Effect of Unemployment Compensation on a Seasonal Industry: Agriculture," *Journal of Political Economy,* June 1976, pp. 591–602.

11. Chiswick, "Effect of Unemployment Compensation," pp. 595–599.

12. Ibid., p. 596.

13. Ibid., p. 596.

14. Ibid., p. 598.

15. Arthur W. Goldberger, "Best Linear Unbiased Prediction in the Generalized Linear Regression Model," *American Statistical Association Journal,* June 1962, pp. 369–375; and Henri Theil, *Principles of Econometrics* (New York, John Wiley and Sons, 1971), pp. 280–281.

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Employment Stabilization

Terrence C. Halpin

The experience-rated unemployment insurance (UI) tax has often been cited as a potential employment stabilizer.[1] Since a firm's tax rate is tied to its past history with unemployment, it has an incentive to reduce its employment fluctuations in order to reduce its tax burden. Recent empirical evidence indicates that firms do indeed make long-term adjustments to reduce seasonality of employment in response to effective experience rating.[2] This report investigates whether rating might play a similar role in reducing temporary layoff unemployment, a shorter-term but more prevalent category of unemployment.

Because of nonzero tax rate floors, ineffective maximum tax rates, and taxable wage bases that are less than total wages, the degree of experience rating varies from State to State. Incomplete rating creates a layoff subsidy, since it allows some firms to escape the total benefit cost generated by their layoffs. Whether experience rating substantially affects the layoff decision is tested by observing the probability of layoff for workers in States with strong rating versus those in States with weak rating.

The empirical results indicate the experience rating has a powerful effect on layoff unemployment. An increase of one percentage point in the effectiveness of the maximum tax rate is estimated to result in a decrease of .14 percentage point in layoff unemployment (a 10 percent drop in the layoff unemployment rate for the 1976 sample that was used in the test).

Martin Feldstein has pointed out the importance of temporary layoff unemployment: among unemployed job losers, temporary layoffs account for about 50 percent of all unemployment spells; in manufacturing industries, 75 percent of all those laid off return to their original employers; according to the National Longitudinal Survey, while only 6 percent of those surveyed changed jobs involuntarily between 1966 and 1969, there were at least 30 layoffs per 100 workers.[3]

UI benefits were conceived as short-term support for workers who are involuntarily unemployed through no fault of their own.[4] The fact that a significant number of laid-off workers return to their original employers indicates that a significant portion of unemployment is not of the involuntary type and that workers view temporary layoffs as part of the job attributes. The availability of UI benefits might promote these layoffs, since the partial support provided makes it more likely that a separated worker will wait for recall rather than immediately search for a new job. This decreases the expected cost of a layoff to the firm, because it diminishes the probability that an experienced worker will leave its labor pool. A higher level of temporary layoff unemployment does not imply economic inefficiency as long as firms bear the cost of the benefits their workers receive. In effect, workers and employers bargain over a total wage and leisure package that might consist of some layoff time at reduced rates of remuneration.

However, incomplete experience rating does allow some firms to escape at least part of the cost of benefits paid to laid-off workers. Because of tax rate ceilings, nonzero tax rate floors, and other factors, not all firms balance their tax payments with benefits drawn by their ex-employees. The interfirm transfer payments created by not completely adjusting the tax schedule to changes in experience make it relatively cheap for some firms to lay off workers, since they pay only a fraction of the benefit costs.[5]

Because of different tax schedules and taxable wage minimums, the degree of experience rating differs from State to State. This difference allows for a test of rating's effect: States with strong (more complete) experience rating should exhibit a lower incidence of layoff unemployment than States with weak rating. If rating does affect temporary layoffs, this type of unemployment can be reduced with little alteration in the basic structure of the State UI systems—benefit levels need not be changed; eligibility rules need not be changed; only the way the UI tax is levied need be changed.

Experience Rating Strength

Regular UI benefits are financed by State UI taxes. All but three States charge these taxes exclusively to employers. (Alabama, Alaska, and New Jersey require

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employee contributions.) The State taxes are differentiated by experience rating, that is, by assigning a tax rate to each firm on the basis of its past employment experience. A firm that has generated a large number of layoffs, and hence is responsible for a large amount of benefits paid, is charged at a higher tax rate than a firm with few benefit charges. In that sense, each firm pays for the unemployment it creates.

A completely experience-rated tax charges each firm that tax necessary to balance its payments into the UI fund with the expected benefit withdrawals from the fund by its separated workers. A firm with no layoffs would be assigned a zero tax rate, a firm with many layoffs a rate high enough to ensure a balance of UI payments and withdrawals. Because of tax rate ceilings, nonzero minimum tax rates, and taxable wage bases that are less than total wages, account balancing does not always occur. Firms that generate more benefits than taxes are negative-balance firms. The distinction between strong and weak experience rating is made on the basis of the balancing of accounts. In States with weak experience rating the incentive to stabilize employment is reduced, since the individual firm bears a smaller portion of the total benefit cost its layoffs produce.[6]

A Model of Temporary Layoff Unemployment

In a significant number of cases, temporary layoff unemployment is voluntary and little job search is undertaken. Because of these factors, the standard models of unemployment, which stress involuntary unemployment and job-search activity, are inadequate for explaining the phenomenon of temporary layoffs. The model of temporary layoff unemployment that forms the basis for this research is from Feldstein.[7] The basic features of the model are that firms face uncertain demand and that workers become permanently attached to their firms, so that all unemployment is temporary layoff unemployment.

Suppose firms face less than perfectly elastic demand and set prices to maximize profits. Pure monopoly profits are eliminated by the free entry of firms into the same product market. The assumption that capital and labor markets are competitive forces firms to choose a combination of wages and layoffs that maximizes workers' utility, subject to other constraints. Workers are assumed to use savings and credit to maintain a constant level of consumption despite fluctuations in cash receipts.

The firm produces a perishable good X according to the production function $X = F(N,K)$, where K is capital stock and N is number of workers. When demand is normal, the firm chooses its profit-maximizing price according to $P_0 = P_0(X)$. When demand is low, the entire demand curve shifts and the firm sets price by $P_1 = P_1(X)$. If the probability of low demand is λ, the firm's expected revenue is $(1-\lambda)P_0X_0 + \lambda P_1X_1$, where P_0X_0 is the price-quantity combination for normal demand and P_1X_1 is the corresponding combination for low demand.

Let N_0 be the firm's total number of workers. Then $X_0 = F(K,N_0)$; that is, all the workers are employed during normal demand. Similarly, $X_1 = F(K,N_1)$, where N_1 is the number employed during low demand. If workers receive UI benefits at rate b, then expected benefits for all employees per period are $B = \lambda b(N_0 - N_1)$. If the UI tax were perfectly experience-rated, the firm's UI payments would also be B. However, the tax is imperfectly related to benefits drawn. This is represented by letting the firm's payment be a fraction e of benefits B plus some constant amount T, where T is chosen so that $eB + T$ summed over all firms equals B summed over all firms. The zero monopoly profits condition requires expected total revenue to equal expected total costs so that

$$\begin{aligned}(1-\lambda)&[wN_0 + T + cK] \\ &+ \lambda[wN_1 + eb(N_0 - N_1) + T + cK] \\ &= (1-\lambda)P_0(X_0)X_0 + \lambda P_1(X_1)X_1 \qquad (1)\end{aligned}$$

where w is the wage rate and c is the user cost per unit of capital.

Total after-tax income of workers is $Y = (1-t)W + B$, where $W = (1-\lambda)xN_0 + \lambda wN_1$, since wages are taxed but UI benefits are not. Assuming that each worker has equal probability of layoff, each worker's expected net income is

$$y = (1-t)\frac{W}{N_0} + \frac{B}{N_0} \qquad (2)$$

Suppose each employee's utility in each period depends only on the level of consumption and the time spent working in that period. Then, with proper assumptions about separability, each worker's expected utility is

$$E[U] = u(y) + (1-\lambda)V(h) + \frac{\lambda \cdot N_1 \cdot V(h)}{N_0} + \frac{\lambda(N_0 - N_1)\cdot V(0)}{N_0} \qquad (3)$$

where $V(Z)$ is the disutility of working Z hours.

The firm's optimal behavior is to choose a layoff rate that maximizes its workers' expected utility. Choosing N_1 fixes $X_1 = F(K,N_1)$, which determines the firm's optimal price $P_1 = P_1(X_1)$ during low-demand periods. Maximizing (3) subject to (1) and (2) leads to the condition

$$P_1\left|1 + \frac{X_1}{P_1}\frac{dP_1}{dX_1}\right|\frac{\partial X_1}{\partial N_1} = \frac{V(0) - V(h)}{(1-t)u(y)} + \frac{[1-(1-t)e]b}{(1-t)} \qquad (4)$$

The left-hand side is the revenue product of the marginal worker. The first term on the right is the value of the utility difference between no work and h hours of work. The second term is the excess of UI benefits over the net cost of the experience-rated tax. Both measures are in terms of pretax earnings. The greater the degree of experience rating—that is the closer e is to 1—the smaller is the right-hand term. Therefore, strengthened experience rating lowers the revenue product of the marginal worker during periods of low demand. In other words, strengthened rating increases N_1, which is the same thing as decreasing temporary layoffs.

Data and Methodology

The test of whether experience rating significantly affects layoff unemployment was performed on a sample drawn from the 1976 Survey of Income and Education (SIE). The SIE contains extensive data on labor force participation, employment, unemployment, wages, prior earnings, and demographic and occupational characteristics for over 400,000 individuals. The final sample consists of 40,868 observations. Only private sector workers between the ages of 25 and 55 who were full-time participants in the experienced labor force were admitted to the sample. Self-employed, part-time, and farm (SIC 17) workers were not included. Persons who did not work in 1975 were dropped from the sample. Lastly, only persons in 30 States that use the reserve ratio formula to compute UI tax rates were selected. (Some important UI data are available from these States and not available from the others. See Table 1 for a listing of the included States.) Thus, the final sample of weighted observations, representing a little over 22 million persons, consists chiefly of prime-age workers in the private, nonfarm sector from 30 of the 50 States and the District of Columbia.

The estimated regression equations relate the likelihood of temporary layoff unemployment to a person's demographic characteristics, the type of employment, the potential UI benefit, and the strength of experience rating in the worker's State. The dependent variable is binary, 1 if the person is on layoff, 0 if not.[8] The equations are estimated by the method of ordinary least squares.

The variables of primary interest are the indicators of experience rating strength. MINTAX is the lowest tax rate actually charged in a State averaged over the 7 years from 1970 to 1976. The greater the divergence of the minimum rate from zero, the less the incentive for low-unemployment firms to reduce layoffs, since those reductions do not result in lower tax rates. The minimum rate also hints at the effectiveness of the ceiling tax rate, since additional benefits charged to

TABLE 1. Experience rating indicators for States in sample

	MINTAX	MAXTAX	NONCHRG	TAXBASE	MAXGAP
Arizona	0.18	2.90	32.06	54.48	1.34
Arkansas	0.33	4.15	23.25	60.64	2.88
California	1.16	3.95	9.12	49.52	4.16
Colorado	0.00	3.49	5.74	50.27	0.98
D.C.	0.08	2.70	1.25	46.28	2.27
Georgia	0.20	3.76	18.75	53.52	1.34
Hawaii	1.30	3.00	37.57	67.32	4.03
Idaho	0.75	4.29	22.50	59.47	2.91
Indiana	0.12	3.13	1.89	47.45	2.24
Kansas	0.03	3.26	20.44	51.86	2.85
Kentucky	0.14	3.43	10.16	51.17	5.24
Louisiana	0.48	2.81	11.00	50.92	4.72
Maine	1.50	3.95	20.86	55.65	3.31
Massachusetts	1.95	4.35	20.31	49.55	6.51
Michigan	0.48	6.39	00.00	43.91	3.98
Missouri	0.06	3.55	14.18	46.80	4.31
Nebraska	0.10	3.82	27.19	50.72	4.82
Nevada	1.19	2.99	20.22	51.38	4.00
New Hampshire	1.50	3.95	6.17	53.92	3.13
New Jersey	0.95	5.05	13.33	45.34	4.43
New Mexico	0.33	3.30	25.32	54.69	3.84
New York	1.11	4.19	0.73	43.28	6.52
North Carolina	0.16	4.70	15.38	59.74	1.58
North Dakota	0.95	4.55	0.64	55.27	5.77
Ohio	0.21	4.09	5.78	43.60	4.96
Rhode Island	2.13	3.85	17.22	54.48	5.24
South Carolina	0.51	4.10	39.59	57.36	1.90
Tennessee	0.40	3.95	56.59	—	3.58
West Virginia	0.00	3.30	18.39	52.12	2.89
Wisconsin	0.06	4.69	0.53	50.56	5.52

SOURCES: *Significant Provisions of State UI Laws* for years 1970–76; individual State ES-204 forms for years 1970–76.

firms already paying at the maximum rate must be made up for by all other firms in the State. Assuming that those charges are evenly spread over all firms in each State, higher minimum rates imply a less effective maximum rate. Either way, higher minimum tax rates imply weaker experience rating.

A high maximum tax rate makes it harder for firms to escape tax charges and therefore, assuming everything else is the same, indicates strong experience rating. MAXTAX is the State's highest rate charged averaged over the 7 years from 1970 to 1976. The ability of MAXTAX to indicate rating strength is compromised by the fact that "everything else" is not the same from State to State. Because of differing industrial mixes, what may be an effective maximum in one State may not be in another. For example, in a State dominated by very stable employment industries, a maximum rate of 3 percent may be high enough so that no firm has a negative balance; but, in a State with many unstable employment industry firms, even a 4 percent ceiling might not be effective. Thus, the level of the maximum rate does not necessarily measure the strength of experience rating. It is the effectiveness of the maximum that is the important consideration.

MAXGAP was created to gauge the effectiveness of the maximum rate. First the ratio of benefits charged against negative-balance firms to the taxable wages of negative-balance firms was calculated. This figure is the tax rate that would have to occur for the "average" negative-balance firm to balance its tax payments with its benefit withdrawals.[9] The gap between that rate and the actual maximum rate charged indicates the effectiveness of the State ceiling tax rate. A large gap implies an ineffective maximum and therefore weak experience rating. Weak rating increases the likelihood of layoffs, since for firms at or near the ceiling rate more layoffs cost the firms little or nothing.

Most State UI taxes are levied on only the first $6,000 of each covered worker's wages (although 15 States have higher bases). Since the taxable base limits the portion of the firm's total wage bill that is actually subject to the experience-rated tax, high bases should indicate more complete rating. This study uses not the statutory base but the ratio of taxable wages to total wages in order to control for interstate differences in wage levels. If the base alone were used, then a low-wage State with a $6,000 base and a high-wage State with a $6,000 base would rank the same despite the fact that a greater portion of the wage bill in the low-wage State is actually subject to rating. Higher TAXBASE's indicate stronger experience rating, since they imply that a greater portion of the wage bill is subject to rating.

The last indicator of experience rating strength is noncharged benefits, NONCHRG. These are benefits that are paid to workers but not charged against any particular firm's account. Noncharging can be significant, as indicated in Table 1. Arizona, Hawaii, and South Carolina each noncharged over 35 percent of benefits in the 1970–76 period. Higher levels of noncharges imply that more firms are escaping the full cost of benefits drawn by ex-employees, thus weakening the degree of experience rating. Since weak experience rating decreases the cost of layoffs to some firms, States with high levels of noncharges should exhibit a higher incidence of layoffs. However, noncharges are dominated by benefits paid to disqualified workers. In most States workers who are disqualified still can receive benefits after waiting out a penalty period. Disqualifications might decrease the unemployment rate, since the disqualified worker's total potential benefit for the entire spell of unemployment is reduced, thus reducing the affordable search time for the worker. Therefore, although noncharges indicate incomplete rating, the sign on NONCHRG in the estimating equation is ambiguous.

The non-experience-rating control variables correspond to those used in Feldstein's study of UI and temporary layoff unemployment. The demographic characteristics consist of sex, race, marital status, and age. Age is entered in dummy variable form splitting workers into four groups: ages 25–29, 30–39, 40–49, and 49 and over. Job characteristics are controlled for by 10 industry and 9 occupation dummies. (See Appendix for a listing of these dummies.) Feldstein found that union workers experienced higher levels of layoff unemployment than nonunion workers. This is logical: union workers are more likely to return to an employer upon recall, since they, on the average, have more invested in their jobs than nonunion workers (e.g., pension rights, seniority, and other fringes). Also, the availability of supplemental benefits grants some union members funds over and above their State UI benefits. Unfortunately, the SIE does not contain information about a person's union membership. To at least partially compensate for the union effect, dummy variables were created to indicate the degree of unionization within a worker's industry.[10] This dummy indicates a probability of union membership (based on national, not State-by-State, union figures) and not whether the individual is actually a union member. Imperfectly controlling for union membership seemed better than ignoring the question altogether.

Two monetary variables are included in the estimating equations, the benefit replacement rate and the worker's average weekly wage. The benefit replacement rate measures the portion of a worker's prior wage that is replaced by the UI benefit. Potential benefit figures were created for each worker according to the formula in effect in the individual's State in 1976. The actual benefit attributed to a worker was based on 1975 employment and earnings data. Since UI benefits at that time were not taxed, the gross replacement rate (the ratio of benefits to prior wage) can easily understate the actual amount of earnings replaced. The replacement rate used here is the proportion of untaxed wages replaced by the UI benefit. Each individual's marginal Federal and State tax rates were computed (assuming the standard deduction was taken) along with the marginal social security tax rate. This replacement rate, though it has its shortcomings, better measures the true proportion of wages replaced than the gross measure.[11] In order to separate workers ineligible for benefits from those who qualify, and in order to accommodate a nonlinear response to the replacement rate, dummy variables for different levels of the replacement rate rather than the replacement itself are used in the estimating equation. Feldstein notes the virtues and drawbacks of this specification.

The worker's wage is included. The wage and the layoff probability are related in several ways. High wages imply a greater cost of unemployment because of forgone earnings. They also imply higher benefits, though this is limited by State UI benefit maximums. Therefore, the sign of this effect may be negative or positive. If high wages are the result of seniority or earnings in excess of the prevailing market wage, then they indicate persons who are more likely to return upon recall and who are more likely to be laid off.

Finally, the annual survey unemployment rate for each State, averaged from 1970 to 1976, is included to control in some way for differing industrial mixes. States dominated by unstable employment industries will have higher-than-average layoff rates and higher-than-average negative-balance firms. Therefore, lower levels of temporary layoff unemployment in a State might appear to be caused by strong rating but might simply be due to the fact that the State does not have industries that generate many layoffs. Including the unemployment rate might cause the measured effect of rating to be biased downward, however, since strong rating should attract low-layoff firms and weak rating should attract high-layoff firms, since the latter are seeking locales where they can escape part of their layoff costs.[12]

Regression Results

Several forms of the estimating equation appear in compact form in Table 2. The coefficients in Table 2 have been multiplied by 100 so that the dependent variable can be interpreted as an unemployment rate rather than simply as a probability of temporary layoff.

All the regressions indicate that experience rating has a powerful influence on layoff unemployment. The negative and significant coefficient for TAXBASE shows that strong rating, as indicated by high taxable wage bases, reduces the temporary layoff unemployment rate. The greater the portion of the wage bill subject to the tax, the greater the tax burden for a given tax rate, and hence the more expensive a layoff for the firm. High minimum tax rates imply weak experience rating: there is little incentive for low-layoff firms to improve their records if tax reductions are not possible; high tax floors can be the result of inadequate maximum rates. The positive, though insignificant, MINTAX coefficient provides some further evidence that strong rating can reduce layoffs. The positive and significant MAXGAP shows that more complete experience rating, as exhibited by lower gaps, reduces the layoff unemployment rate. MAXGAP measures the effectiveness of a State's maximum tax rate. When a firm is at the maximum rate, additional layoffs do not change the firm's UI tax burden at all, clearly decreasing the cost of a layoff. Large MAXGAP values indicate that a large portion of benefits are not being charged to the firms that generated the layoffs, thereby weakening the employment stabilization power of the UI system.

The maximum tax rate itself, MAXTAX, has a positive effect on layoffs: high ceiling rates go hand in hand with high layoff unemployment rates. At first blush it would seem that high maximum rates should make it harder for firms to escape experience rating and that hence high ceilings should decrease unemployment. As noted earlier, however, it is the effectiveness of the maximum rate, not its level, that indicates strength of rating. MAXGAP shows that effective ceiling rates do decrease the probability of unemployment. MAXTAX itself partially controls for industrial mix and benefit levels in a State: States having firms with higher unemployment require higher maximum rates; States with higher benefit levels require higher maximum rates.

The last indicator of experience rating strength is noncharges: NONCHRG. When States fail to charge

TABLE 2. Experience rating and temporary layoff unemployment

Dependent variable: Temporary layoff unemployment rate (mean value 1.49)

	(1)	(2)	(3)	(4)
TAXBASE	−0.045 (5.329)	−0.069 (15.729)	−0.053 (6.306)	
MINTAX	0.071 (0.236)	0.319 (7.433)	0.240 (1.140)	
MAXTAX	0.269 (10.856)	0.237 (8.576)	0.303 (11.701)	
MAXGAP	0.171 (8.203)		0.147 (5.142)	
NONCHRG	0.008 (0.656)	0.004 (0.173)	0.008 (0.610)	
BEN=0	3.266 (61.810)	3.265 (61.765)	3.271 (61.985)	5.35 (23.021)
BEN=0–30	0.640 (1.971)	0.547 (1.447)	0.649 (2.028)	1.39 (2.881)
BEN=30–50	0.326 (1.468)	0.276 (1.053)	0.342 (1.604)	1.12 (3.441)
BEN=50–70	−0.013 (0.004)	−0.035 (0.026)	0.009 (0.002)	0.429 (1.147)
BEN=70–85	0.202 (0.864)	0.217 (0.996)	0.211 (0.941)	0.389 (1.833)
Married	−0.641 (18.970)	−0.638 (18.846)	−0.639 (18.906)	−0.723 (24.317)
Male	−0.526 (10.257)	−0.514 (9.807)	−0.532 (10.470)	−0.437 (7.024)
White	−0.897 (21.584)	−0.895 (21.450)	−0.902 (21.803)	−0.826 (18.300)
Age 25–29	0.362 (3.409)	0.349 (3.182)	0.362 (3.412)	0.307 (2.448)
Age 30–39	0.435 (5.854)	0.424 (5.558)	0.469 (5.883)	0.406 (5.096)
Age 40–49	0.469 (6.518)	0.463 (6.365)	0.469 (6.509)	0.441 (5.754)
Wage (in $100 units)	−0.175 (11.415)	−0.169 (10.657)	−0.174 (11.283)	−0.073 (4.767)
State UER			−0.904 (0.977)	
Union	CONTROL	CONTROL	CONTROL	CONTROL
Industry and occupation	CONTROL	CONTROL	CONTROL	CONTROL

F values in parentheses.
SOURCES: 1976 Survey of Income and Education, State UER, Statistical Abstract. For UI variables, see Table 1.

benefits to individual firms, the experience rating scheme is weakened. As noted earlier, noncharges control for more than experience rating, but the positive sign does represent further evidence that strong experience rating can encourage firms to reduce their layoffs.

Taken as a group, the estimated coefficients for the several experience rating strength indicators show strong evidence that the subsidy provided to firms because of incomplete rating results in increased layoffs. Although the primary interpretation of the indicators is as a group, measuring the overall effectiveness of rating, comments can be made about the statistical significance of individual components. Since the layoff subsidy is enjoyed primarily by those firms at the maximum rate, it would be expected that the layoff unemployment rate would be more responsive to effective maximum rates than to minimum rates. The insignificance of the minimum rate might also be partially due to its correlation with MAXGAP (simple correlation .55), since the minimum rate partly measures the effectiveness of the maximum. Although the size of noncharges helps to indicate overall rating strength, noncharges also control for other factors. Rating's effect calls for a positive coefficient, the other factors for a negative, thereby decreasing the chance for arriving at a statistically significant coefficient either way.

The regression results for the non-experience-rating control variables produced some surprising results. As expected, layoffs were more prevalent among females, nonwhites, and single persons. Contrary to expectations, however, the benefit replacement rate was completely insignificant, and even its signs show no definite pattern of response. This insignificance is most likely due to the fact that the SIE was taken during a period of high unemployment, April to July 1976.[13] When a firm lays off an experienced worker, it stands a chance of losing that worker permanently. Generous UI benefits increase the chance that the worker will await recall and hence can increase the number of layoffs. In periods of high unemployment the firm's concern that a laid-off worker might leave its labor pool is diminished, since the worker has few alternative employment opportunities. Therefore, the size of the laid-off worker's benefit is of less concern to the firm, since the worker is more likely to remain in its labor pool no matter what the benefits.[14]

The age variables also show that this may be an atypical period. Except for the oldest age bracket, the regressions indicate that older workers incur higher layoff probabilities than younger workers. Again, if firms need not worry about losing experienced workers, they can lay off the most costly workers (usually the older workers) first. Also, reverse seniority in layoffs might induce more layoffs among some older workers.

That April through July 1976 may be an atypical period does not diminish the strong evidence that more complete experience rating induces firms to reduce layoffs. High unemployment periods might imply that workers are essentially passive in connection with the layoff decision and that the expected cost of a layoff for the firm is reduced because of the diminished probability of losing the worker. The firm still must pay the UI costs of the layoff, and the rating indicators show that this cost is an important factor in determining the layoff decision. In times of normal unemployment, firms will certainly be more sensitive to the benefit replacement rate, but even in high unemployment periods the subsidy provided for layoffs because of incomplete rating should be of great influence.

Potential Problems and Caveats

Whether or not April through July 1976 is atypical cannot call into question the basic evidence that experience rating reduces the layoff subsidy and hence reduces layoff unemployment. However, predictions about the size of the effect of incomplete experience rating in this period might not correspond to its effect in periods of lower unemployment. The problem of prediction is compounded by the fact that the rating indicators are interrelated, so that it is difficult to isolate the effect of changing one parameter of the system. Nevertheless, it is possible to get a general idea of the size of the effect of more complete rating. Since the layoff subsidy is primarily affected by ineffective maximum rates, the appropriate single indicator is MAXGAP. If each State would increase the effectiveness of its maximum rate by one percentage point (i.e., narrow MAXGAP by one unit), the temporary layoff rate would be reduced by between .14 and .17 percentage points—approximately a 10 percent reduction in unemployment.

A simultaneity problem may exist in estimating rating's effect, since high rates of unemployment may cause what appears to be weak rating. For example, States with high unemployment levels, ceteris paribus, will have a higher amount of negative balances. However, the left-hand-side variable is an individual's probability of layoff, whereas the right-hand-side rating variables are statewide measures. Therefore, the influence of the left-hand-side variable on the right-hand-side variable is negligible. An additional potential estimation problem is the fact that there are so very few observations on unemployed persons. Only about 600 of the 40,000 observations were unemployed persons. Changes in characteristics for a relative handful might have large effects on the estimated coefficients. Therefore, tests of the sort in this study require very large data sets like the SIE.

The chief estimation problem is that the desired measurement is the layoff subsidy that the individual firm may enjoy from incomplete rating, but instead what is actually measured is the overall strength of rating in the firm's State. Essentially, this is an error in the variables problem arising from measurement error. Past studies have shown that differences in UI tax rates are primarily interindustry and not intra-industry.[15] Therefore, by carefully controlling for industry and occupation, the measurement error is alleviated. When the same type of firm in the same type of industry faces stronger experience rating in one State than another, it can be concluded fairly confidently that the industry enjoys a larger layoff subsidy in the State with weak rating. Therefore, statewide measures of rating strength can be used to impute each firm's experience-rating situation.

Conclusions

Experience rating has a powerful effect on temporary layoff unemployment. Layoff rates for a certain type of workers in States with weak rating are significantly higher than for the same type of workers in States with strong rating. This is apparently the result of firms responding to the layoff subsidy created by weak experience rating. Incomplete rating fails to charge the firm the full cost of the benefits drawn by a separated worker and therefore decreases the cost of a layoff. The regression results indicate that an increase of one percentage point in the effectiveness of the maximum tax rate would result in a decrease of .14 percentage point in the temporary layoff unemployment rate (approximately 10 percent cut in the rate).

The basic parameters of State UI systems, the tax rates and taxable wage bases, were used as indicators of experience rating strength. They consistently showed that low temporary layoff unemployment rates are related to strong experience rating.

The close relationship between experience rating and temporary layoff unemployment has the important implication that the "permanent" unemployment rate can be cut simply by making UI tax rates more responsive to individual firm experience. This change can promote economic efficiency in the short run, by forcing firms to pay the full cost of layoffs, given transitory changes in demand, and also in the long run, by diminishing the inefficient flow of resources to unstable demand industries.

One warning: these estimates are based on a period of relatively high unemployment. During lower periods of unemployment the observed effect of rating might be smaller, since the firm would also need to consider the increased expected cost of losing a laid-off worker from its labor pool. Still, the basic conclusion remains that rating does influence the layoff decision.

Because of the size of temporary layoff unemployment in the U.S. economy, the link between it and UI is extremely important. Two things might help define more completely the role that the experience-rated UI tax plays in that link: first, estimating the connection for a period of normal unemployment; second, seeing whether, as benefits have become more generous, UI taxes have kept pace with the increases or experience rating has become less effective over time.

Notes

1. Joseph M. Becker, *Experience Rating in Unemployment Insurance* (Baltimore, The Johns Hopkins University Press, 1972) and William Haber and Merrill Murray, *Unemployment Insurance in the American Economy* (Homewood, Ill., Richard D. Irwin, Inc., 1966) give details of the stabilization effects of UI.

2. Terrence C. Halpin, "The Effect of Unemployment Insurance on Seasonal Fluctuations in Employment." *Industrial and Labor Relations Review,* April 1979, shows a relationship between seasonality of employment and the UI tax. For other recent empirical tests of UI's effect on stabilization see Frank Brechling, "Layoffs and Unemployment Insurance," Public Research Institute Center for Naval Analyses, February 1979; Barry R. Chiswick, "The Effect of Unemployment Compensation on a Seasonal Industry: Agriculture," *Journal of Political Economy,* 1976; and George M. von Furstenberg, "Stabilization Characteristics of Unemployment Insurance," *Industrial and Labor Relations Review,* April 1976.

3. See Martin Feldstein, "The Effect of Unemployment Insurance on Temporary Layoff Unemployment," *American Economic Review,* December 1978.

4. See, for example, Haber and Murray, *Unemployment Insurance,* p. 26.

5. Daniel S. Hamermesh, *Jobless Pay and the Economy* (Baltimore, The Johns Hopkins University Press, 1977), discusses the wedges and subsidies that result from incomplete experience-rated taxes. Feldstein, "Effect of Unemployment Insurance," exhibits the existence of a net UI subsidy simply because benefits are not taxed. This subsidy exists even if every firm completely pays all its benefit costs.

6. Becker, *Experience Rating,* and Haber and Murray, *Unemployment Insurance,* give extensive descriptions of experience rating.

7. See Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* October 1976, and "Effect of Unemployment Insurance" for the model in detail. Martin N. Baily, "On the Theory of Layoffs and Unemployment," *Econometrica,* July 1977, and Brechling, "Layoffs and Unemployment Insurance," and others also develop models for layoff unemployment. Brechling's empirical estimates on aggregate data indicate a definite relationship between strength of experience rating and layoffs.

8. In this research piece people are on temporary layoff if they are classed by the SIE as being on tem-

porary layoff (known duration less than 30 days) or indefinite layoff (unknown duration).

9. "Average" is in quotes because it does not necessarily apply to any one firm. If a State charged each negative-balance firm at a rate equal to MAXGAP + MAXTAX, all charges to negative-balance firms would be covered. This is not to say that rating would be complete, since not all those negative-balance firms require a tax rate that high in order to balance. MAXGAP is a statewide aggregate measure of rating strength, as in fact are all the indicators used here. This presents a bit of a problem, since the measurement desired is the degree of experience rating strength that an individual worker's employer faces.

10. See Appendix for a list of the union dummies.

11. Hamermesh, *Jobless Pay and the Economy,* discusses the pros and cons of various replacement rate measures. The chief drawback of the measure used here is that it ignores the value of lost fringe benefits and fails to correct for annual wage increases (this year's benefit is compared to last year's wages). Both these considerations imply an upward bias in this replacement rate.

12. Including the statewide survey unemployment rate might create a simultaneity problem, since the left-hand-side variable here can be interpreted as an unemployment rate. It is not an unemployment rate but a probability of individual unemployment. Given that the right-hand-side unemployment rate is a statewide average from 7 years and the left-hand-side variable is an individual's layoff status, the chance of reverse causation is negligible.

13. The overall unemployment rate for 1976 was 7.7 percent. The seasonally adjusted April-through-July averages were 7.5, 7.3, 7.6, and 7.8 percent. For prime-age workers 25–54 years of age the seasonally adjusted rates were 4.6, 4.6, 5.0, and 5.2 percent. Almost all of the SIE observations were gathered in May and June, a few in April and July. (Source: *Monthly Labor Review.*)

14. A computer program calculated potential benefits for every worker in the sample. Persons who failed to meet State qualifying standards based on 1975 wages and weeks worked were assigned a potential benefit of zero. Because of extended benefits this may have classified some workers who actually were still receiving benefits in 1976 as not qualifying. Although this discrepancy is probably not large, it could have a minor effect on the replacement rate coefficients.

15. See Hamermesh, *Jobless Pay and the Economy.*

Appendix: Definition of Industry, Occupation, and Union Dummies

Industry

1 Agriculture, forestry, and fisheries
2 Mining
3 Construction
4 Manufacturing—durable goods
5 Manufacturing—nondurable goods
6 Transportation, communications, and public utilities
7 Wholesale trade
8 Retail trade
9 Finance, insurance, and real estate
10 Services and all others

Occupation

1 Professional, technical, and kindred workers
2 Managers and administrators, except farm
3 Sales workers
4 Clerical and kindred workers
5 Craft and kindred workers
6 Operatives, except transport
7 Transport equipment operatives
8 Nonfarm laborers
9 Service workers and all others

Union [1]

1 0–9 percent unionization in worker's industry
2 10–19 percent unionization in worker's industry
3 20–29 percent unionization in worker's industry
4 30–39 percent unionization in worker's industry
5 40–49 percent unionization in worker's industry
6 50–59 percent unionization in worker's industry
7 60 and over percent unionization in worker's industry

Note to appendix

1. Source for unionization: Freeman and Medoff.

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The Effects of Experience Rating on the Unemployment Rate

Henry Saffer

A number of recent studies suggest that the unemployment insurance (UI) system exaggerates the effect of variations in output on the demand for labor. This report provides additional empirical evidence of a causal link between the structure of the UI financing system and variations in the rate of unemployment, and its findings are generally consistent with earlier work.

Review of Previous Research

Research on incentive effects of the UI system can be grouped into two broad categories. Most research has been done on the effect of benefits on labor supply.[1] This work is based on the idea of UI benefits as a subsidy to leisure or job search between periods of employment. Unemployment benefits affect the opportunity cost of not working and thus the duration and extent of unemployment and labor force participation. Since the unemployment benefit recipients modeled in this approach are on layoff and have a varying expected duration of unemployment, but a high average probability of recall, the assumption that they are seeking other employment is questionable. The income effect of UI benefits will reduce the supply of labor until benefits are exhausted, at which time unemployment among former recipients declines rapidly.

The second group of studies includes the effects of the taxation system on the demand for labor. Though each State has evolved its own specifics, the tax system in essence consists of a tax schedule, an experience-rating formula, and a wage base. The tax schedule is a set of tax rates that are mapped into discrete values of the experience-rating variable. This variable, computed for all employers, is a function of the employer's tax payments and benefits paid to its former employees. If charged benefits exceed tax payments in one year, for example, the firm's experience rating increases, and its tax rate is increased for the following year. There are, however, minimum and maximum tax rates, so that employers whose experience rating falls beyond some given range have fixed tax rates. The wage base is the dollar value of annual wages paid to a worker by one employer that are subject to this tax. The degree of experience rating refers to the percentage of taxable wages that is subject to a variable tax rate.

In a profit maximization model presented by Brechling, employers' tax liabilities vary with the UI system's financial limits and the layoff rates.[2] Variations in tax schedules and taxable wage bases affect these tax liabilities and thus the marginal cost of layoffs. A somewhat different formulation of this concept, presented by Feldstein, is based on the theory of implicit contracts and focuses on temporary layoffs.[3] Employers are assumed to offer a combination of weeks of work, hours per week, wages, and UI benefits. The extent to which employers must pay for UI benefits and thus incur a marginal layoff cost varies with the tax system structure. The assumptions of this model include an implicit account of UI benefits in the total compensation package.

Both models predict that an increase in the degree of experience rating reduces layoffs; but the implicit-contract model implies that increases in benefits will raise layoffs, whereas the profit maximization model implies that increases in benefits will lower layoffs. The strength of the implicit-contract model's assumption about benefits is proportional to the degree of competition in input and output markets. In addition, since the duration and the extent of unemployment are to a degree substitutable, the optimal mix will reflect benefit levels, benefit duration, and workers' marginal utility of leisure. The application of the model is thus limited to temporary layoffs resulting from transitory demand fluctuations.

Several empirical tests have been made of the Feldstein implicit-contracts model. The model predicts that layoffs will be affected in the following manner: an increase in benefits or in the benefit-to-wage ratio will increase layoffs. An increase in the amount of benefits charged to the firm decreases layoffs. The charging of benefits is limited by the degree of experience rating in the tax system; thus, employers who are beyond the

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experience-rated range do not incur a marginal tax cost for layoffs. The larger the range of tax rates, or the higher the maximum rate and the lower the minimum rate, the lower the probability of moving into the non-experience-rated portion of the tax schedule. An increase in the taxable wage base or the mean tax rate, other things being equal, increases the tax liability and thus increases the amount of benefits that can be charged before any marginal layoff cost is incurred.

Empirical results provided by Feldstein show a positive effect of benefit wage replacement ratios on layoff rates.[4] By using Current Population Survey (CPS) data on 25,000 individuals, average weekly benefits and potential wages were estimated. These were adjusted for income taxes, and net wage replacement ratios were calculated. A regression of a binary layoff variable on the replacement ratio and several worker characteristics shows a positive effect of benefits on layoffs. No variables are included for any parameters of the tax system, and the estimated coefficient of the replacement rate is somewhat large.

A study by Brechling uses yearly State industry aggregates as a unit of observation.[5] The data are restricted to manufacturing; layoffs are regressed on benefits, wages, and several parameters of the tax schedule. Several of the tax variables used have an ambiguous relationship to experience rating. Collinearity is introduced by using wages and benefits as separate variables, and the taxable wage base has been omitted. The estimated coefficients appear to reasonably confirm the expectations of the theoretical model.

A study by Halpin uses yearly State aggregates for three industries.[6] A spectral measure of layoffs is used with minimum and maximum tax rates. Additional variables to control for the percentage of taxable wages at the maximum rate and the ratio of taxable to total wages are used. No variable is provided for benefits. The ratio of taxable to total wages varies inversely with average wages, as indicated. However, it also varies positively with the layoff rate, obscuring the meaning of this variable. Variations of this ratio alter the potential tax liability, and the ratio acts as a scale parameter rather than a measure of experience rating. The coefficients generally show mixed results.

The Model

If the scope of the analysis is expanded beyond temporary layoffs to covered unemployment in general, the assumption of benefits as part of total compensation is weakened. Assume that not all workers are offered the implicit contract until some probationary period is completed, at which time they advance to permanent status. Some workers may not be required to undergo the probationary period, as a result of the characteristics noted at the time of hiring. Other workers will simply fail the probationary tests and not advance to permanent employment. Employer-specific human capital is acquired during the probationary period, and union rules institutionalize the process. The effect of unemployment benefits on temporary layoffs will be different from the effect on permanent layoffs. The implicit-contract arrangement is offered to the permanent employees and not to temporary employees. Thus, permanent employees are put on temporary layoff only, and UI benefits become part of their compensation. Temporary employees receive permanent layoffs, and their UI benefits are a cost to the employer. Since covered unemployment includes both types of workers, the effect of benefits is ambiguous.

A modified version of the implicit-contract model provides for a production function:

$$X = G(N)$$

where $X =$ output and $N =$ labor. Capital and hours of work per week are assumed constant, and perfect competition in input and output markets and no risk aversion are assumed. During a period of reduced demand for output lasting for a fraction of the year λ, the price of output falls from r_0 to r_1, output falls from x_0 to x_1, and employment falls from N_0 to N_1. Annual revenue equals

$$(1-\lambda)r_0x_0 + \lambda r_1x_1 = (1-\lambda)r_0G(N_0) + \lambda r_1G(N_1)$$

Annual wages (W) are paid to N_0 workers during the $(1-\lambda)$ period and to N_1 workers during the λ period at an annual rate of w.

$$W = (1-\lambda)wN_0 + \lambda wN_1$$

Benefits (B) are paid to laid-off workers for the duration of the layoff at an annual rate of b. Thus,

$$B = \lambda b(N_0 - N_1)$$

The cost of unemployment insurance to the employer is

$$eB + F$$

where e is the percentage of benefits charged to the employer and is called the degree of experience rating. F is a fixed tax independent of benefits.

UI benefits to workers under an implicit-contract arrangement are considered part of total compensation, and the employer perceives these payments as a subsidy or addition to total revenue. Since permanent employment status involves other costs to the employer, optimality suggests that not all workers receive the implicit-contract arrangement. Define γ as the percent of the firm's labor force that is considered permanent.

Since total cost equals total revenue,

$$W + eB + F = (1-\lambda)r_0G(N_0) + \lambda r_1G(N_1) + \gamma B$$

or

$$(1-\lambda)wN_0 + \lambda wN_1 + (e-\gamma)\lambda b(N_0 - N_1) + F = (1-\lambda)r_0G(N_0) + \lambda r_1G(N_1)$$

The employer maximizes profit with respect to employment during λ by setting marginal cost equal to marginal revenue. Thus:

$$\lambda w - (e-\gamma)\lambda b = \lambda r_1 G_{N_1} \text{ where } G_{N_1} \text{ is the marginal product of } N_1$$

Rearranging terms:

$$G_{N_1} = \frac{w-(e-\gamma)b}{r_1}$$

To determine the effects on N_1 of changes in r_1, b, e, and γ, respectively, define the following:

$$\frac{(\partial G_{N_1})}{\partial N_1} = G_N$$

(which must be negative)

$$\frac{\partial N_1}{\partial r_1} = \frac{\partial G_{N_1}/\partial r_1}{G_{N_N}} = \frac{-[w-(e-\gamma)b]}{r_1^2 G_{N_N}} > 0$$

$$\frac{\partial N_1}{\partial b} = \frac{\partial G_{N_1}/\partial b}{G_{N_N}} = \frac{-(e-\gamma)b}{r_1 G_{N_N}} \gtreqless 0$$

$$\frac{\partial N_1}{\partial e} = \frac{\partial G_{N_1}/\partial e}{G_{N_N}} = \frac{-b}{r_1 G_{N_N}} > 0$$

$$\frac{\partial N_1}{\partial \gamma} = \frac{\partial G_{N_1}/\partial \gamma}{G_{N_N}} = \frac{b}{r_1 G_{N_N}} < 0$$

Thus, the larger the fall in demand (r_1), the larger the fall in employment (N_1). The effect of a change in benefits is ambiguous, depending on the relative magnitudes of e and γ. If e is greater than γ, then an increase in benefits increases employment (N_1). An increase in the degree of experience rating increases employment, and an increase in job tenure (γ) reduces employment during the λ period.

Empirical Specification

The application of the model to data on covered unemployment provides a test of its conclusions. The data set comes from the U.S. Department of Labor's *Handbook of Unemployment Insurance Data* and the ES202 report. The unit of observation in the *Handbook* data set is a year-State aggregate and includes only workers covered by UI. The data set contains information on employment, unemployment, benefits, and taxes. The ES202 report consists of quarter-State, four-digit Standard Industrial Classification (SIC) aggregates and includes contributions and taxable wages. Dividing contributions by taxable wages yields the weighted average tax rate by four-digit industry groups. Year-State aggregates were created by grouping over quarters and industries. At the same time the mean and variance of the tax rate and the minimum and maximum tax rates for each aggregation group were computed. Both data sets were restricted to the 9-year period 1967 through 1975 and merged. Nine years of data for 52 States, with two observations lost for missing values, yields 466 cases with a year-state aggregate as the unit of observation. This data set provides a test of the model with no restriction on temporary layoffs or on type of industry.

The empirical specification of the equation requires some extensions. The dependent variable is covered unemployment as a percentage of covered employment, known as the *insured unemployment rate* (IUR).

Benefits are expressed as the ratio of the average weekly benefit amount (WBA) to the average weekly wage (AWW). The ratio is termed the REP. Benefits as a percentage of wages yield the wage replacement rate. This alternative controls for variation in benefits due to variations in wages and avoids the problem of multicollinearity between the two variables. Benefits vary in another sense: in most States a total benefit entitlement is divided by the average WBA and a potential duration computed. To define better the liberality of benefits, potential duration is included as a variable.

The degree of experience rating can be defined in two ways. The first method uses the minimum and maximum tax rates as variables. An increase in the maximum, or a decrease in the minimum, holding the mean rate constant, increases the experience-rated range of the tax schedule. The second method uses the variance of the tax rate as a variable. When the mean rate is held constant as the variance increases, the range of rates increases, and more employers fall into the experience-rated portion of the tax schedule.

The potential UI subsidy is proportional to the State's overall tax revenue. Revenue will vary with the mean tax rate and the wage base. Define R as tax revenue, t as the mean tax rate, and W_B as the wage base. Then

$$R = B + S$$

where S is the net change in the UI trust fund balance. Since $R = tW_BN_0$ [7]

$$tW_BN_0 = \lambda b(N_0 - N_1) + S$$

or

$$N_1 = \left(1 - \frac{tW_B}{\lambda b}\right)N_0 + \frac{S}{\lambda b}$$

or

$$\frac{\partial N_1}{\partial t} = \frac{-W_BN_0}{\lambda b} \text{ and } \frac{\partial N_1}{\partial W_B} = \frac{-tN_0}{\lambda b}$$

Thus, the wage base and the mean tax rate are included to control for this effect.

An additional empirical problem results from the fact that tax schedules and wage bases vary as a function of the lagged unemployment rate. Almost all States have a formula that increases tax rates as fund balances fall. Low fund balances also act as an inducement to States to raise the wage base. The assumption of long-run equilibrium values removes the problem on the theoretical level. On the empirical level, the assumption could be approximated by using a single year's data. Alternatively, using a set of annual dummies controls for the effect of these annual variations.[8]

The three a priori expectations for the empirical variables are as follows: (1) an increase in wage replacement or potential duration has an ambiguous effect on unemployment, (2) an increase in the minimum tax rate or a decrease in the maximum rate will increase unemployment, and a decrease in the variance of the tax rate will increase unemployment, and (3) an increase in the mean tax rate or wage base will increase unemployment.

Regression Results

When linear functional forms and ordinary least squares (OLS) are used, the regressions, shown in Table 1, generally support the conclusions of the theoretical model. The benefit variables, wage replacement (REP), and potential duration (POTDUR) are negative and marginally significant. The sign of the benefit variables depends on the relative magnitudes of e and γ. The negative sign may be interpreted as an indication that the degree of experience rating is greater than the degree of job tenure. There is no direct information on γ available; but, since e is estimated at 0.5 or more, γ must be less than 0.50. The low significance level may indicate that e and γ are not far apart in magnitude. If, over time, the degree of experience rating falls and the degree of job tenure increases, the sign of the benefit variables will become positive. A problem in interpreting the coefficient of the replacement variable is that it measures gross wage replacement only. After-tax wage replacement will be higher than pretax replacement; and the difference increases with wages. A monotonic transformation of the replacement variable could change the coefficient and the significance level but would probably not change the sign. Another problem is the assumption of perfect competition in the input and output markets. An implicit contract depends on perfect competition. It may be that these assumptions do not hold up well when tested by the diversity of industries and occupations that fall within the UI system.

TABLE 1. Regressions for effects of experience rating: insured unemployment rate of 3.29 (t-statistics in parentheses)

Independent variable	Mean	Experience rating change effected by adjusting degree of tax-rate variance		Experience rating change effected by adjusting minimum and maximum tax rates	
REP	35.35	−.0274	(2.03)	−.0176	(1.32)
WB	3837	.0002	(2.18)	.00015	(1.81)
RMEAN	1.59	1.8274	(20.17)	1.342	(11.54)
POTDUR	23.88	−.0634	(2.89)	−.0470	(2.14)
RMIN	.316			.9328	(6.9)
RMAX	4.72			−.0490	(2.13)
RTVAR	.464	−1.3111	(6.09)		
DUM67		−2.567	(9.73)	−2.472	(9.49)
DUM68		−2.635	(10.01)	−2.559	(9.87)
DUM69		−2.693	(10.2)	−2.553	(9.81)
DUM70		−1.409	(5.42)	−1.231	(4.77)
DUM71		−.889	(3.45)	−.7205	(2.81)
DUM72		−2.460	(10.15)	−2.3119	(9.61)
DUM73		−3.263	(13.6)	−3.064	(12.78)
DUM74		−2.546	(10.6)	−2.350	(9.91)
Constant		4.806		4.168	
R^2		.66		.67	

The experience-rating variables—the variance in the tax rate or the minimum and maximum tax rates—have the expected signs and are significant. The minimum and maximum rates are the lowest and highest four-digit industry average rates within a year-State aggregate. An increase in the maximum or a decrease in the minimum increases the degree of experience rating and reduces unemployment. Similarly, an increase in the variance increases the degree of experience rating and reduces unemployment. Variations in the minimum rate have a greater effect than variations in the maximum rate. This may result from the fact that the percentage of taxable wages at minimum rates tends to be greater than the percentage at maximum rates. Reductions in the minimum are restricted by the fact that minimums are already close to or at zero. Raising the minimum would, however, strongly increase the unemployment.

Coefficients for the mean tax rate and the wage base are significant and positive. As the overall tax liability increases, the effect on the degree of experience rating is unpredictable; however, empirically this relationship tends to be negative. An increase in the total tax liability, holding the wage replacement rate constant, implies an increase in total benefits that the employer can be charged without altering its position on the tax schedule. These higher costs increase the incentive for the employer to use layoffs as the adjustment for transitory demand fluctuations.

When converted to elasticities, the effect on unemployment of the mean tax rate exceeds that of the wage base. A given percentage increase in either the mean tax rate or the wage base will result in the same percentage increase in revenue. The effect on unemployment is greater if the revenue is generated by using higher taxes rather than higher wage bases.

Conclusions

The variations in the annual dummy variable coefficients correspond to the cyclical variations in the economy. The annual dummies, along with the constant, provide a set of annual intercept values. These intercept values are the value of the dependent variable, the IUR, that would result if all the unemployment insurance variables were set to zero. That is, these intercepts could be interpreted as the IUR that would have prevailed in the absence of a UI system. Also, since insured unemployment is a share of total unemployment, the effect of UI on the total unemployment rate can be calculated.

Table 2 provides the actual IUR in column 1, the IUR predicted by equation 1 in column 2, and the difference between actual and predicted in column 3. To estimate the effect on the total unemployment rate (TUR), define

$$\frac{u_t}{e_t + u_t} = \frac{e_c}{e_t + u_t}\,\frac{u_c}{e_c} + \frac{e_n}{e_t + u_t}\,\frac{u_n}{e_n}$$

where

$$u_t = u_c + u_n \text{ and } e_t = e_c + e_n$$

and

u_c = covered unemployment
u_n = noncovered unemployment
u_t = total unemployment
e_c = covered employment
e_n = noncovered employment
e_t = total employment

That is, the total unemployment rate is a weighted average of the IUR and the rate of noncovered unemployment. Note that the weights do not add to 1, since the denominators are coverage and noncoverage rather than labor force. An increase in IUR increases the TUR by the amount of the weight times the increase in the IUR. In Table 2, column 4 gives the TUR, column 5 gives the weight, and column 6 gives the product of the weight times induced unemployment. Column 7 shows the predicted TUR in the absence of a UI system, and column 8 shows the increase in the IUR as a percentage of the TUR. This percentage shows a steady increase after 1970. The drop in 1975 results from the system's inability to finance itself fully. In 1975 the tax parameters were set below the level needed to pay benefits; and as a result, induced unemployment as a percentage of total unemployment fell.

The percentage of induced unemployment generally increases with tax liabilities. This depends on the degree of experience rating in the tax schedule. As tax rates rise, there is a tendency for a degree of experience rating to fall. The combination of higher tax rates and lower experience rating increases induced unemployment. Funding the system at higher unemployment rates requires higher tax rates, which then increase unemployment. The UI system increases the cyclical variations in unemployment and increases the average rate of unemployment observed at any point.

Notes

1. See the *Industrial and Labor Relations Review* 30, no. 4 (July 1977) for several papers on labor supply incentives.
2. Frank Brechling, "Unemployment Insurance Taxes and Labor Turnover: Summary of Theoretical Findings," *Industrial and Labor Relations Review* 30, no. 4 (July 1977).
3. Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* August 1976.
4. Martin Feldstein, "The Effect of Unemployment Insurance on Temporary Layoff Unemployment," *AER,* December 1978.

TABLE 2. Effect of UI variables on insured unemployment rate

Year	Actual IUR (1)	Predicted IUR (2)	Induced insured unemployment (3)	Actual TUR (4)	Weight (5)	Induced total unemployment (6)	Predicted TUR (7)	Induced TUR as a percentage of actual TUR (8)
1967	2.47	2.24	.23	3.8	.631	.14	3.66	3.7
1968	2.20	2.17	.03	3.6	.639	.02	3.58	.1
1969	2.10	2.10	.0	3.5	.649	.0	3.50	.0
1970	3.46	3.40	.06	4.9	.631	.04	4.86	.8
1971	4.08	3.92	.16	5.9	.631	.10	5.79	1.7
1972	3.02	2.35	.67	5.6	.707	.48	5.12	8.0
1973	2.51	1.54	.97	4.9	.731	.71	4.19	14.4
1974	3.37	2.26	1.17	5.6	.745	.83	4.77	14.8
1975	6.07	4.81	1.26	8.5	.707	.89	7.61	11.0

5. Frank Brechling, "Layoffs and Unemployment Insurance," *Proceedings of the NBER Conference on Low Income Labor Markets,* June 1978.

6. Terrence C. Halpin, "The Effects of Unemployment Insurance on Seasonal Fluctuations in Employment," *Industrial and Labor Relations Review* 32, no. 3 (April 1979).

7. This relationship holds as long as workers are employed long enough for their wages to be greater than or equal to the wage base. For those who do not fulfill this condition, revenue will be equal to the tax rate times actual wages.

8. TSLS might be used with the tax rate predicted by the first stage. Tax rates, however, are dependent on lagged values of unemployment and show only weak serial correlation.

Voluntary Unemployment

Stephen T. Marston

The unemployment insurance (UI) system was created to deal exclusively with involuntary unemployment, but the system has since been expanded to include some cases of voluntary unemployment. This creates two issues, one moral and the other economic. The moral issue—whether government should help people who are voluntarily unemployed—is not the primary concern of this report. The economic issue is whether workers are more likely to quit their jobs if they can collect benefits after quitting. This report evaluates that possibility and discusses its ramifications for the economy as a whole.

When workers consider quitting their current jobs, they compare the benefits of quitting with the costs of possible unemployment. UI could reduce these costs to such an extent that the benefits of quitting exceed the costs. Thus, one would expect workers to quit more frequently if they had some chance of receiving unemployment benefits, than if there were no chance.

Although all States disqualify job leavers from collecting benefits, three groups of job leavers can collect:[1]

1. Quitters in States where disqualification is only temporary. In 15 States, quitters can collect benefits after a fixed period of unemployment—from 3 to 12 weeks, depending on the State. In 17 other States, the disqualification period varies but is still temporary.

2. Quitters whose actions are officially condoned. All States allow workers to collect UI if they quit their job for "good" or "just" cause. The States have various criteria, ranging from strict to liberal, for determining how "just" the cause is.

3. Quitters who pose as job losers. Claims processors may not catch all offenders, despite the active help of employers eager to avoid paying benefits to people who left their employ voluntarily.

The first part of this report discusses the extent to which job leavers collect benefits. The second part tests the hypothesis that these benefits influence job leaving. The last section discusses government influence on a worker's decision to quit.

Benefit Collection Among Job Leavers

How many unemployed job leavers collect UI? The answer to this question will help measure how much the possibility of UI collection can influence a worker's decision about whether to quit. If no quitters receive benefits, UI does not influence quits; if many quitters collect, UI could have a great influence.

Some routes by which job leavers collect benefits are entirely legal, and administrative data show how often these routes are used. In States where a temporary disqualification period is imposed before a job leaver can collect benefits, workers "requalify" for benefits if they return, still unemployed, to the UI office after their disqualification period.

Table 1 presents 1967–1972 data on denials and requalifications imposed after a 6-week disqualification period, for job leavers in Michigan. The table shows that 33 to 52 percent of the workers denied benefits received them eventually after serving a disqualification period. Assuming a constant probability of remaining unemployed each week, these percentages imply that, ceteris paribus, about 30 percent of unemployed job

TABLE 1. Requalification for UI benefits in Michigan, 1967–1972

Year	Job leavers for whom disqualification period was required: Total	Those allowed benefits[2]	Ratio
1972[1]	17,360	8,985	.518
1971	26,161	12,003	.459
1970	19,859	8,545	.430
1969	10,057	3,664	.364
1968	10,197	3,097	.304
1967	9,891	3,248	.328

[1] First 7 months.
[2] After 6-week period completed.

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quitters collect UI benefits in Michigan. But less than half of all States have temporary disqualification periods —most have permanent disqualification—so the overall percent of unemployed job leavers collecting benefits after a disqualification period must be much smaller. Since Michigan's disqualification provisions during the sample period were comparatively liberal, a "ball-park" estimate is that 10 percent of all unemployed job leavers may collect benefits after serving a requalification period.

Requalification provides the only available direct measure of how many job leavers collect benefits. Leavers who collect because they are deemed to have quit for "good cause" or because they convince local administrators they lost their jobs do not show up in administrative data. However, data from the Current Population Survey (CPS) provide an indirect measure. The CPS, a survey of U.S. households that inquires about the labor force status of residents, counts the number of workers unemployed by reason—whether they lost or left their previous jobs or entered or reentered the labor force. These tabulations, applied to the number of workers claiming UI benefits, can help identify the source of the UI claims.

Table 2 presents annual averages of these tabulations for 1972–1976. Insured unemployment refers to the number of persons reporting a week of unemployment under a UI program. The other three measures are all of unemployed workers as reported in the CPS, separated into job losers, job leavers, and reentrants. All in the series have been adjusted so that they correspond to each other as closely as possible.[2]

During 1972–1976, the insured unemployment number was 3 to 9 percent greater than the number of job losers.[3] But, even if job losers were all insured, their numbers would not account fully for the insured unemployment figures. Some workers classified otherwise in the CPS must be among the insured unemployed.

To help identify the components of insured unemployment, the author ran regressions of insured unemployment on the number of unemployed workers separated by reason for unemployment. The data are monthly observations of the variables presented in Table 2 for the years 1967 through 1972. The equation estimated is

$$IU = b_1 U_L + b_2 U_Q + b_3 U_R + b_4 N,$$

where IU is insured unemployment, adjusted;[4] U_L is unemployed job losers, adjusted; U_Q is unemployed job leavers, adjusted; U_R is unemployed reentrants, adjusted; N is people not in the labor force; and $b_1, \ldots, b_4$ are the insured proportions of each of the right-hand variables.

It was necessary to allow for the well-known fact that high unemployment levels tend to discourage workers from quitting their jobs. This relationship requires another equation, in whch the number of unemployed job quitters is a function of insured unemployment along with other exogenous variables, such as job accessions and wages. Thus, the parameters of the first equation must be estimated using the two-state least squares method, with job accessions and wages as excluded, exogenous variables.

The estimated parameters appear in Table 3 according to various specifications of the insured unemployment equation. Regression results show that at least 95 percent of job losers collect UI and suggest that all job losers collect UI. The regressions also indicate that the remaining insured unemployed are classified in the CPS as unemployed job leavers or as "not in the labor force due to inability to find work." The coefficient of the unemployed job leavers is significant at the 5 percent level in the first regression, but is less significant in the other regressions.

The proportion of unemployed job leavers collecting benefits fluctuates, depending on the specification, from 8.5 to 50 percent. Thus, these regressions provide evidence that job leavers collect benefits, but they do not provide specific estimates of the proportion that collects.

TABLE 2. Insured unemployment and unemployment by reason, 1972–1976 [1]

Year	Insured unemployment [2]	Job losers	Job leavers	Labor-force reentrants
1972	1,796	1,750	577	1,330
1973	1,567	1,492	629	1,245
1974	2,184	1,997	711	1,364
1975	3,791	3,516	689	1,686
1976	2,852	2,700	753	1,701

[1] Insured unemployment is from UI administrative data; unemployment by reason is from household data of the census Current Population Survey (CPS). Excluded are the partially unemployed, claimants of extended benefits, claimants in Puerto Rico, and anyone unemployed more than 26 weeks.

[2] Number, in thousands, reporting a week of joblessness under a UI program as reported by State employment security agencies.

TABLE 3. Coefficients resulting from regressions of insured unemployment on its components

Independent variable	Run 1	Run 2	Run 3	Run 4
Unemployed job losers (U_L)	1.068 (40.13)	1.036 (49.13)	1.033 (52.34)	1.063 (42.5)
Unemployed job leavers (U_Q)	.503 (2.02)	.085 (1.10)	.095 (.29)	.176 (.418)
Unemployed reentrants (U_R)	−.242 (1.89)	[1]	[1]	−.183 (−1.46)
Unable to find work (N)	[1]	[1]	.291 (3.01)	.052 (.78)
Constant	[1]	[1]	−824.	[1]

[1] Excluded from equation.
NOTE: t-statistics appear in parentheses.

The Effect of UI Rules on Quit Rates

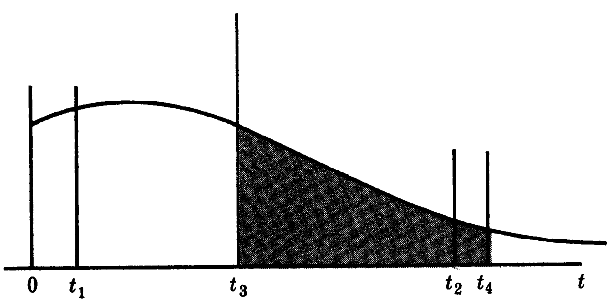
Workers may be more likely to quit their jobs if they believe they will be able to collect benefits after leaving. The probability of their leaving should vary directly with the probability of their collecting benefits and the amount of these benefits. This hypothesis can be tested by determining whether States in which the UI system treats job leavers liberally have higher quit rates than States in which the UI system is strict. The author ran two experiments to test this hypothesis, one using microeconomic data and one using macroeconomic data.

Microanalysis

The microeconomic data come from the CPS's for March 1973, 1974, and 1975. The three surveys were pooled to give adequate information. The dependent variable was given a value of 1 if the respondents were unemployed and quit their previous jobs within 3 weeks of the survey. The variable was coded 0 if the respondents were employed or had been laid off. All other cases were discarded. Thus, the expected value of the dependent variable was the probability that employed workers would quit their jobs and become unemployed.[5]

The independent variables included demographic and job information and a variable called "expected benefit," used to measure the eligibility of job leavers for UI benefits in the respondent's State of residence. Expected benefit can be described with reference to Figure 1, a diagram of the unemployment experience of work-

FIGURE 1. The probability density function of completed spells of unemployment



ers who quit their jobs at time 0 and search for new employment until time t, when they either find a job or drop out of the labor force. The solid curved line is the density of the duration of unemployment spells to completion, $f(t)$. As the diagram indicates, there are more short spells of unemployment than long spells. If claimants are not disqualified, they receive regular benefits from week t_1 until week t_2. If they are disqualified, they receive benefits after a t_3 week requalification period and can receive benefits until week t_4. Claimants unemployed t weeks will receive $t - t_3$ weeks of benefits if they are disqualified. The expected value of the number of weeks of UI benefits a disqualified job quitter will collect is

$$EB(t_3,t_4) = \int_{t_3}^{t_4} (t-t_3)f(t)\, dt.$$

The integral is over the cross-hatched area in Figure 1.

The author evaluated the function EB for every geographic area that can be identified in the CPS and assigned the value to every person surveyed living in the area. The function $f(t)$, which depends on the tightness of the local labor market, is described in Appendix A. EB can be interpreted as the number of weeks of benefits workers can expect to receive if they are unemployed after quitting their jobs. EB is 0 if the State has permanent disqualification; EB increases as the requalification period becomes shorter and duration of benefits becomes longer.

A regression of the quit variable on several others appears in Table 4.[6] Most of the coefficients have the expected sign and most are statistically significant. For example, married workers and heads of household are less likely to quit, while youths and nonwhites are more likely to quit. Workers are less likely to quit in areas where the unemployment rate is high. Professional and clerical workers quit less frequently than workers in other occupations.

The expected benefit variable has the positive sign hypothesized in this report, but the effect is not significant at the 5 percent level. This implies that providing benefits to quitters does encourage workers to quit.

Macroanalysis

The macroeconomic data come from 96 Standard Metropolitan Statistical Areas (SMSA) and States, chosen to avoid overlapping boundaries. The data include manufacturing quit rates, unemployment rates, wage rates, and various measures of the liberality of the States' UI systems. Annual observations were pooled from the years 1972 through 1974.

The manufacturing quit rates come from a sample of employers and thus provide a check on the household questionnaire analyzed in the previous section. Table 5 presents the results of a regression of quit rates on the other variables. The regression displays certain well-known characteristics of quits: quit rates were lower where wages and unemployment rates were high. The regression strongly supports R. B. Freeman's contention that unionization tends to reduce quits.[7] Not surpris-

TABLE 4. Results of regressions of quit variable on job and demographic characteristics

Independent variable	Regression 1		Regression 2	
	Coefficient	t-statistic	Coefficient	t-statistic
Demographic				
Ages 18 to 29	.00340	9.09	.00333	8.70
Age 65 and over	[1]	—	−.000714	.757
Married	−.00179	−4.83	−.00181	−4.85
Head of household	−.00164	−4.31	−.00175	−3.76
Male	[1]	—	.000249	.561
Size of family	−.000116	−1.23	−.000137	−1.40
Nonwhite	[1]	—	.000205	.377
Labor market				
Metropolitan area	[1]	—	.000117	.354
Unemployment rate	−.000136	−1.96	−.000137	−1.97
Wage	-1.56×10^{-6}	−1.16	-1.90×10^{-6}	−1.38
Occupation				
Clerical	−.00293	−3.37	−.00287	−3.29
Professional	−.00153	−1.83	−.00151	−1.79
Service	−.00142	−0.784	−.00149	−.821
Unemployment insurance				
Expected benefit	.000254	.782	.000260	.799
Constant	.00528	—	.00513	—

[1] Excluded.

TABLE 5. Results of regressions of the manufacturing quit rate, on various factors

Item	Run 1	Run 2	Run 3	Run 4
Number of cases	190	190	238	169
Method [1]	OLS	OLS	OLS	2SLS([2])
Independent variables				
Constant	.0714	.0514	.0797	.732
	−.000199	−.000144	−.000271	−.000190
Average wage in manufacturing	(−5.66)	(−4.65)	(−10.55)	(−4.78)
Unemployment rate [3]	−.0603	−.0711	−.0943	−.339
	(−1.25)	(−1.44)	(−2.31)	(−2.83)
Unionization	−.0214	−.0226	[4]	[4]
	(−3.50)	(−3.62)		
Benefit maximum / average wage	−.0272	[4]	−.0234	−.0124
	(−3.09)		(−2.79)	(−1.04)
Proportion of manufacturing labor force age 18–25	.148	.149	[4]	[4]
	(3.91)	(3.88)		
Proportion of manufacturing labor force age 26–60	.000351	.000595	[4]	[4]
	(.08)	(.13)		
Expected benefit	.00097	.000265	.0027	.0057
	(.928)	(.254)	(3.12)	(3.43)
$\bar{R}^2$	.4459	.4200	.466	—

[1] OLS is ordinary least squares and 2SLS is two-state least squares.
[2] Unemployment endogenous.
[3] The unemployment rate is specified to depend on the quit rate and other labor turnover variables.
[4] Excluded.

ingly, areas with large numbers of youths had more quits.

The UI variables are ambiguous, however. The expected benefit variable had the positive sign predicted, but it was not always significant at the 5 percent level. The variable was significant in regressions 3 and 4, but insignificant in regressions 1 and 2, where the age variables were added. Thus, the regressions provide only weak support for the hypothesis that job quitting is encouraged by job leaver eligibility for UI benefits.

Another variable was included to determine whether the monetary liberality of UI benefits induces job quitting. This variable was calculated by dividing the maximum weekly UI benefit level in the State by the average wage in manufacturing. It is a good measure of the UI payment level in States, because most States pay 50 percent of the gross wage in benefits, but only up to a maximum amount. The primary factor discriminating among States is the maximum benefit amount, which varies widely.

Workers in States where benefits are high in proportion to the average wage seemed to have a lower tendency to quit. This is contrary to the relationship predicted by the hypothesis of this report. This result may be a statistical artifact of the unequal distribution of quit rates among different industries; however, industry disaggregations performed retained the same sign for the variable.

The coefficient of the variable "benefit maximum average wage" is difficult to interpret because, unlike the "expected benefit" variable, higher benefit amounts make layoffs as well as quits more attractive. If, as M. S. Feldstein asserts, firms respond to higher benefits by increasing layoffs, some workers may be less likely to quit, anticipating that they will become unemployed anyway through layoff (see Appendix A).[8] Then States with high benefit amounts will tend to have low quit rates, in agreement with the coefficient estimated above. The fact that the coefficient is negative does not necessarily mean that a higher benefit amount will not induce workers to quit more, but it does mean this effect is weaker than the opposite indirect effect that arises from higher benefit amounts making layoffs more attractive.[9] Thus, the coefficient offers no support for a strong quit effect from UI and suggests that the effect, if it exists, is weak.

Other regressions run by the author are even less favorable to the hypothesis that UI induces quitting. Some even showed negative coefficients for the expected benefit variable, though none of these were significant.

Results of Empirical Testing

Neither of the statistical analyses in this study offers much support for the hypothesis that making job leavers eligible for UI benefits raises the quit rate. Both data sets led to positive coefficients linking the expected benefits of job leavers to quit rates, but in neither case was the coefficient consistently significant at the 5-percent level. Furthermore, the payment level of UI benefits was negatively related to the quit rate, rather than positively (as would be expected if UI payments were causing workers to quit their jobs).

A prudent conclusion is that the data do allow the possibility that there is no relationship between the eligibility of job leavers for UI and the quit rate. The data used are adequate: the first data set contained household data from three complete CPS's providing 90,000 individual cases; the second set pooled 3 years of data from metropolitan areas and States, giving as many as 238 cases, each of which was an average of still more cases. Thus, if the relationship did not emerge clearly, it is unlikely to have been due to weak data.

Thus, the hypothesized relationship is either false or unimportant. The availability of UI benefits does not strongly or consistently influence workers to quit their jobs. This is surprising, as there is evidence, some of which is direct and unequivocal, that job leavers are collecting benefits. Almost any economic theory would predict that a change in the availability or amount of such benefits would influence a worker's decision to quit. In fact, the author's initial interest in the topic stemmed from the compelling a priori case that UI can hike quit rates.

It is beyond the goals of this paper to establish precisely why workers do not respond as expected. Two possibilities will be suggested.

First, benefits are not available in sufficient quantity and certainty to enter into job leavers' calculations. Job leavers can secure benefits immediately after quitting only by posing as job losers or by convincing a UI officer that they had "just cause" for leaving. The chance of either of these strategies succeeding may be sufficiently remote that they are of no consequence in a worker's decision to leave. Even in States where job leavers can be certain of collecting benefits, the workers must wait several weeks before collecting. Table 6 presents values for the expected benefit of job leavers in a few States and compares those values with the expected duration of unemployment in those States. On average, only 5 to 20 percent of the duration of unemployment spells in these States are financed by UI. Perhaps this percentage is too small to motivate workers to quit.

TABLE 6. The expected benefit of job leavers in selected States where UI was available after a temporary disqualification period, 1972 (in weeks)

State	t_3 (1)	t_4 (2)	Expected benefit period	Expected duration of unemployment 3	Percent of unemployment paid 4
Alaska	6.0	41.0	3.05	8.40	18.1
Georgia	7.0	18.5	.42	3.75	5.6
Michigan	7.0	19.5	.99	6.95	7.1
Montana	4.5	38.0	2.31	5.81	19.9
Oklahoma	7.0	26.0	.83	4.58	9.1
Washington	11.0	43.0	1.63	8.06	10.1

1 The first week requalified job leavers receive benefits, after completion of the disqualification period.
2 The last week requalified job leavers may receive benefits.
3 The expected duration of unemployment is found from the equation $EB(t_3,t_4) = \int_{t_3}^{t_4} (t - t_3)f(t)\,dt$ allowing $t_3 = 0$ and $t_4 \rightarrow \infty$.
4 The percent of unemployment paid is equal to (EB/expected duration) X .5 $\times$ 100. The coefficient .5 represents the approximate replacement rate. (See D. S. Hamermesh, *Jobless Pay and the Economy* (The Johns Hopkins University Press, 1977), Baltimore.

The second possibility is that workers who quit their jobs without having another may be leaving for reasons other than consideration of the financial consequences. A worker who merely wishes to search for a job can usually do so while employed. Perhaps factors such as personality clashes on the job cause a large portion of job quits into unemployment. In such situations, one would not expect a high degree of rational choice or of attention to the fine points of UI benefits.

Conclusion

This report finds no strong support for the contention that workers are being encouraged to quit their jobs in States that provide UI to job leavers. It also casts doubt on the possibility that workers, suspecting they may be able to avoid disqualification for benefits, are quitting to collect benefits immediately. Thus, while potentially creating a work disincentive, the UI system did not seem to be doing so measurably under the regulations of 1972 through 1975. Current regulations (1979) are even less likely to cause quitting, as a few States that allowed benefits to leavers during the period studied have dropped those rules.

In most respects, this circumstance is fortunate. A strong disincentive effect could lead to higher unemployment, higher training costs, and lower productivity, all through increased labor turnover. In an otherwise perfect labor market, the government should neither encourage nor discourage quitting. UI for job quitters could increase quits beyond the socially optimal level, and the resulting unemployment and costs would be an undesirable burden on the economy.

Of course, the economy and especially the labor market are not perfect. For example, if workers are averse to risk, they will fear the possibility of long-term unemployment so much that they will not quit, even when the benefits of improved job placement exceed the expected costs of unemployment. Some might argue that a quit incentive from UI would be desirable and lead to improved job satisfaction and productivity. Thus, it would be premature to condemn UI regulations, even if they were shown to increase quits.

Also, it would not be consistent to deny benefits to workers who have "good cause" for leaving, for these quits are actually similar to layoffs when employers have sought workers' resignations.

So, despite their potential for mischief, the current UI benefits for job leavers do not seem to be causing a measurable hike in quits. Since UI benefits probably represent some form of "disaster insurance" for risk-averse workers, the advantages of UI payments to job leavers after a suitable disqualification period may exceed the apparently small cost.

Notes

1. U.S. Unemployment Insurance Service, *Unemployment Insurance Statistics,* June 1976, pp. 4–5.

2. Insured unemployment has been reduced by excluding workers who are only partially unemployed (these would be counted as employed in the CPS), claimants of extended benefits, and claimants in Puerto Rico. However it comprises all programs, including Unemployment Compensation for Federal Employees and Unemployment Compensation for Ex-servicemen. The CPS unemployed exclude anyone unemployed longer than 26 weeks. The restriction on duration together with the exclusion of extended benefits, eliminates the long-term unemployed from both sides of the accounting and thus reduces problems arising from exhaustion of benefits. Some claimants have potential durations of regular benefits of less than 26 weeks and a few have durations of more than 26 weeks. This fact biases the results slightly, probably reducing the observed fractions of unemployed job losers and job leavers who are insured.

3. This approach depends upon the accuracy of responses to the household survey. If job leavers who fraudulently pretend to be job losers to collect UI benefits also claim to be job losers in responding to the CPS, this method will fail to identify any of the UI beneficiaries as job leavers. The author believes that the CPS respondents, having no monetary incentive to lie, will admit to being job leavers even if they have told the UI authorities otherwise. Some job leavers may still lie to CPS interviewers, if only to be consistent in their statements to government agencies. Thus, there will be a downward bias in the estimate of job leavers collecting UI benefits, but the estimate should not be reduced to zero.

4. See note 2 for this and other variable adjustments.

5. Account should be taken of the possibility that workers will be laid off as well as that they might quit or remain employed. Appendix B shows that the approach used here introduces only an inconsequential error in ignoring this possibility.

6. A logit analysis would be, strictly speaking, more appropriate than a regression. However, with 89,840 observations, such an iterative procedure was financially prohibitive.

7. R. B. Freeman, "Individual Mobility and Union Voice in the Labor Market," *American Economic Review,* May 1976.

8. M. S. Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* October 1976.

9. Since this coefficient is significantly negative, it represents an indirect confirmation of M. S. Feldstein's hypothesis that UI payments to job losers, when inadequately experience-rated, lead to an increase in layoffs.

Appendix A: The Expected Benefit of Job Leavers

S. W. Salant derived the density of the duration of spells of unemployment to completion ($f(t)$),

$$f(t) = ra^r(a+t)^{-r+1},$$

where r and a are parameters and t is the duration of unemployment to completion.[1] The mean of the distribution, called the expected duration of unemployment, is $a/(r-1)$. To make the distribution $f(t)$ applicable to a wide range of geographic areas and time periods, the author assumed that the parameter a adjusts to elongate the distribution and hike its mean during periods of high unemployment:

$$a = a_0 \, (u/u_0)^\alpha$$

where a_0 is a parameter estimated in the base year, u_0 is the unemployment rate in the base year, u is the 1972 unemployment rate in the area under consideration, and α is the elasticity of the expected duration of unemployment with respect to the unemployment rate, estimated to be 0.7.[2] Both a_0 and r are the parameters of the equation for $f(t)$ when $u=u_0$, so Salant's method can be used to estimate a_0 and r during the base year, 1969.

This estimate uses data from the Bureau of Labor Statistics on the duration of unemployment of voluntary job leavers.

The first and last weeks of benefits—t_3 and t_4 for disqualified claimants—are taken from *Comparison of State UI Laws.* Some States were covered by extended UI benefits or temporary extended unemployment compensation during 1972. In States covered more than half of the year by either of these programs, the author added 13 weeks to the potential duration of benefits, t_4.[3]

Notes to Appendix A

1. S. W. Salant, "Search Theory and Duration Data: A Theory of Sorts," *Quarterly Journal of Economics,* February 1977.
2. Stephen T. Marston, "A Turnover Model of Insured Unemployment" (mimeographed), 1975.
3. See, U.S. House of Representatives, *Report on Experience Under the Emergency Unemployment Compensation Act of 1971, as Amended,* (Washington, D.C., U.S. Government Printing Office, 1973).

Appendix B: Eliminating the Layoff Bias

An estimate of the effect of different variables on the quit rate would require elimination of any bias resulting from the fact that some workers may have been laid off. This can be done by dealing with the probability that workers quit their jobs on the condition that they were not laid off. This conditional probability can be written in terms of the unconditional probabilities observed in the data as follows:

$$q = Q/1-L,$$

where $q = P[\text{quit}|\text{not laid off}]$, $Q = P[\text{quit}]$, and $L = P[\text{laid off}]$. Taking the derivative with respect to an arbitrary independent variable X,

$$\partial q/\partial X = (1/1-L)\ (\partial Q/\partial X + Q/(1-L)^2)\ (\partial L/\partial X)$$

The left-hand side of this equation is the effect of the variable X on the conditional quit probability, the correct measure for studying hypotheses about quit behavior. The equation shows how $\partial q/\partial X$ depends on $\partial Q/\partial X$, the effect of X on the unconditional probability of quits. This derivative was estimated by a coefficient from regressions of Q on X (see Tables 4 and 5, in the main text). As expected, $\partial q/\partial X$ and $\partial Q/\partial X$ are not exactly equal and their ratio depends on the effect of the variable X on layoffs $\partial L/\partial X$).

However, a separate analysis of layoffs is not necessary if Q and L are small compared to the number 1, as they are in this study. In that case, the coefficient of $\partial Q/\partial X$ will always be about 1, while the coefficient of $\partial L/\partial X$ will be close to 0. In the microanalysis, the average values were $Q = 0.003$ and $L = 0.006$, giving weights for $\partial Q/\partial X$ and $\partial L/\partial X$ of 1.006 and 0.003, respectively. Thus, the effect of X on the unconditional quit rate can be used to approximate the effect on the conditional quit rate to a high degree of accuracy.

There is potentially more difficulty in the macro study, because the average values of Q and L were larger, 0.025 and 0.015, respectively. Even here the weights of $\partial Q/\partial X$ and $\partial L/\partial X$ were 1.015 and 0.026, implying that $\partial Q/\partial X$ is 39 times as important in determining the value of $\partial q/\partial X$, as is $\partial L/\partial X$.

One would expect that if there is little chance a worker will be laid off or will quit during a period, little error will be created by assuming that laid-off workers would have remained employed. Then, if laid-off workers are included in the sample and assumed to be the same as employed workers, the answer will be approximately correct.

A slightly more precise answer could be obtained by running a layoff equation and using the equation stated here to find $\partial q/\partial X$. In multinomial logit analysis, this is an elegant procedure. But the answers will be very close to those presented here, so that the costs of doing this procedure will exceed the meager benefits.

Another possible effect of layoffs on quits cannot be eliminated by focusing on q instead of on Q. This effect will arise when workers are deterred from quitting if they expect to be laid off in the future. The workers would not be laid off during the sample period, so conditioning the quit probability on the worker's not being laid off will not rid the quit probability of this effect.

The above effect would mean that any variable that increases layoffs could decrease quits. For example, the benefit amount variable, discussed in the main text of this report, could increase layoffs and, hence, reduce quits. However, the "expected benefit" variable is a payment to job leavers only; so, changes in it will not effect layoffs. Thus, there will be no indirect effect on quits and the coefficient will represent only the direct effect of the payment on a worker's decision to quit.[1]

Note to Appendix B

1. Robert Hutchens is working on the topic of the joint determination of layoffs and quits, and the author has benefited from discussions with him.

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Effects of Unemployment Insurance and Working Wives on Husbands' Unemployment

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It is widely agreed that the unemployment rate corresponding to any level of labor market tightness is higher today than in the past. One reason for this upward trend is that youth and women, who typically experience higher job turnover and unemployment rates, have grown as a proportion of the labor force. Other possible reasons include changes in income-transfer programs and minimum-wage legislation.[1] Consequently, recent analyses of unemployment and inflation have used measures other than the overall unemployment rate to represent comparable labor market tightness. Some researchers have focused on the unemployment rate for men aged 25 to 54. Others have adjusted the overall rate to control for demographic changes in labor force composition. Both approaches assume that prime-age men remain unaffected by the social and institutional factors that have increased the overall unemployment rate.[2]

This assumption may be false. A growing body of empirical evidence indicates that the provision of unemployment benefits encourages longer periods of job search by the unemployed and subsidizes unstable employment patterns.[3] The 1972 and 1978 extensions of the unemployment insurance (UI) program to additional industrial sectors and smaller firms are estimated to have increased the program's coverage from 78 percent to 97 percent of all wage and salary employment.[4] If the program's effects on unemployment apply to prime-age men as well as to other groups, the extensions may well have increased the rate of prime-age male unemployment that corresponds to "full employment."

The increased labor force participation of married women also may have contributed to higher prime-age male unemployment. Figures provided by the Bureau of Labor Statistics show that the percentage of working-age males with wives in the labor force rose from 19 percent in March 1959 to 30 percent in March 1978. As some formal models of job search have recognized, asset depletion during unemployment may result in more rapid return to work.[5] The earnings of working wives, by mitigating asset depletion, may enable unemployed husbands to conduct lengthier job searches (or undergo more frequent unemployment spells).

In addition, UI and married women's increased labor force participation may have interacted in their influence on prime-age male unemployment. UI claimants' benefit amounts are calculated as a fraction, typically about 50 percent, of prior earnings *before* taxes. Since unemployment benefits were not taxable before 1979, the extent to which benefits replaced the earnings *net* of taxes was determined by the marginal tax rate on earnings. If his family income was such that his earnings were taxed at a 30 percent marginal rate, his net benefit/wage ratio was actually not 50 percent, but over 70 percent.[6] Insofar as married women's earnings raise family income and hence marginal tax rates on husbands' earnings, they may have combined with UI to reduce the relative cost of unemployment and hence prolong job search for some married men.[7]

This study uses a unique set of micro data to analyze persistence of unemployment among prime-age husbands. The results are tentative, but they suggest that receipt of unemployment benefits and wives' employment may interact to increase prime-age male unemployment.

The Data Base

The analysis is based on data from the Current Population Survey (CPS), the national household survey that produces the official monthly labor force statistics. Although it is used primarily as a source of cross-sectional and time-series data. CPS also has a longitudinal aspect.

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Households selected for the survey are interviewed for 4 months, dropped from the survey for 8 months, and then interviewed for an additional 4 months before leaving the sample permanently. It is therefore possible to follow a panel of CPS respondents over time.[8]

This study utilizes a sample of CPS repondents who were unemployed in May 1976 and participated in a supplemental interview on jobseeking activities and who were interviewed again in the June CPS. The present analysis is restricted to the sample's 197 married men (spouse present) 25 to 54 years of age.[9] The special May supplement included questions on receipt of unemployment benefits and labor market activity of other family members. Matching this information with responses in the regular May and June surveys enabled a two-period analysis of whether the sampled men's probability of remaining unemployed was influenced by unemployment benefits and their wives' employment status. The data base is unfortunately small but is the only one available that combines information on receipt of unemployment benefits and family work status with longitudinal information on labor force status for a nationally representative group of unemployed men.

The Model

We specify a logit model of the form

$$\log_e \frac{p_j}{1 - p_j} = \beta_o + \beta_1 x_{1j} + \ldots + \beta_k x_{kj} \qquad (1)$$

where p_j is the expected probability that individual j, who is unemployed in May, remains unemployed in June; $x_{1j}, \ldots x_{kj}$ are the value of the explanatory variables for individual j; and $\beta_0, \ldots, \beta_k$ are the associated unknown parameters of the model to be estimated. The expected probability that individual j remains unemployed is therefore

$$P_j = \frac{e^{\beta_o + \beta_1 x_{1j} + \ldots \beta_k x_{kj}}}{1 + e^{\beta_0 + \beta_1 x_{1j} + \cdots + \beta_k x_{kj}}} \qquad (2)$$

The estimation of the model uses a dichotomous dependent variable, which equals 1 if the individual remains unemployed in June and 0 otherwise. (Because impact on measured unemployment is the primary issue, the means of escaping unemployment—either through employment or withdrawal from the labor force—are not distinguished. In any case, only six men in the sample dropped out of the labor force.) The independent variables are drawn from the regular and supplemental May surveys. The definitions and sample means of these variables are shown in Table 1.

The key explanatory variables are UI, a dummy variable equal to 1 if the individual is currently receiving unemployment benefits or if he has applied and believes himself eligible for benefits; WIFEWORK, which equals

TABLE 1. Definitions and mean values of variables

Variable		Sample mean
UNEMP	= 1 if unemployed in June; 0 otherwise	0.65
UI	= 1 if receiving unemplovment benefits in May, or if applied and believed self eligible; 0 otherwise	0.59
WIFEWORK	= 1 if wife working when respondent became unemployed; 0 otherwise	0.36
UI × WIFEWORK		0.21
AGE1	= 1 if age 25–34; 0 otherwise	0.41
AGE2	= 1 if age 35–54; 0 otherwise	0.29
SCHOOL	= 1 if completed high school; 0 otherwise	0.57
NONWHITE	= 1 if nonwhite; 0 otherwise	0.14
NONWAGE	= 1 if family received income in April from interest, dividends, rental payments, social security, railroad retirement, other pensions, veterans' payments, or disability benefits; 0 otherwise	0.21
WKSUNEMP	= number of weeks unemployed as of May survey	21.02
TLAYOFF	= 1 if respondent had definite recall date within 30 days of layoff; 0 otherwise	0.04
LEAVER	= 1 for job leavers; 0 otherwise	0.08
ENTRANT	= 1 for new entrants and reentrants to labor force; 0 otherwise	0.13

1 if his wife was already working when he became unemployed; and UI × WIFEWORK, which allows for an interaction effect of receipt of unemployment benefits and wife's work status. All three variables are expected to increase the probability of remaining unemployed.

The control variables include several demographic characteristics—age, education, and race—that might be associated with both receipt of unemployment benefits and the wage offer distribution available to a jobseeker, and receipt of nonwage income, which might affect the recipient's reservation wage and intensity of job search.[10] The number of weeks the respondent had already been unemployed as of the May survey (WKSUNEMP) is expected to correlate with a higher probability of remaining unemployed in June, because those who have already been unemployed for an extended period may possess unobserved characteristics that tend to prolong their unemployment duration. In addition, lengthy unemployment may directly impair prospects for reemployment.[11]

Finally, the model includes dummy variables to signify the individual's reason for unemployment. Those on temporary layoff, who have definite recall dates within 30 days, should be less likely to remain unemployed than other job losers.[12] Aggregate CPS data on unemployment duration suggest that the job leavers and labor force entrants in the sample also may be expected to escape unemployment more quickly than the job losers not on temporary layoff.

Empirical Results

Maximum likelihood estimates of the parameters of the logit model (and the corresponding asymptotic t-statistics) are displayed in Table 2. The parameter estimate for each variable can be interpreted as the percentage change in the odds of remaining unemployed associated with a unit change in that variable. To simplify interpretation, the table also translates the parameter estimates into a column of derivatives. The derivative listed for each variable represents the absolute change in the probability of remaining unemployed associated with a marginal change of that variable in the vicinity of its mean, holding other variables constant at their means. The χ^2 statistics is significant at the 0.01 level, implying rejection of the null hypothesis that all parameters except the constant are 0.

The parameter estimates for most of the control variables are not significantly different from 0. Undoubtedly, this is partly due to the small sample size, as well as to collinearity among the explanatory variables. The two estimated parameters for control variables (TLAYOFF and WKSUNEMP) that do show statistical significance have the expected signs. Holding other variables at their means, the probability that an individual on temporary layoff remains unemployed the next month is 0.56 less than the probability for a job loser not on temporary layoff.[13] Each additional week of unemployment that an individual has already experienced is estimated to add about 0.003 to the probability of remaining unemployed the next month.

The results for the key variables representing unemployment compensation and wife's employment status are intriguing. The estimated parameters for UI and WIFEWORK are statistically insignificant.[14] (When the interaction term UI $\times$ WIFEWORK was omitted, however, UI showed a significant positive effect, in accordance with other studies on unemployment benefits and duration.) The estimated parameter for UI $\times$ WIFEWORK is significant with the expected positive sign. Setting the control variables equal to their means, the probability of remaining unemployed is estimated to be 0.22 greater for an individual with a working wife and unemployment benefits than for an individual with neither. The large positive interaction effect is consistent with the hypothesis that wives' earnings combine with unemployment benefits to reduce the relative cost of husbands' unemployment and hence encourage longer job search.

TABLE 2. Results of logit analysis

Independent variable	Parameter estimate	Asymptotic $\lvert t \rvert$	Derivative
UI	0.106	0.25	0.024
WIFEWORK	−0.795	1.57	−0.176
UI $\times$ WIFEWORK	1.868	2.60	0.415
AGE1	0.379	0.96	0.084
AGE2	0.448	1.02	0.099
SCHOOL	−0.298	0.85	−0.066
NONWHITE	0.073	0.15	0.016
NONWAGE	−0.299	0.75	−0.066
WKSUNEMP	0.014	1.67	0.003
TLAYOFF	−2.689	2.30	−0.597
LEAVER	−0.289	0.47	−0.064
ENTRANT	−0.233	0.48	−0.052
Constant	0.330	0.68	
χ^2 (d.f.)	29.3 (12)		

Conclusion

Many economic analyses assume that the prime-age male unemployment rate has been unaffected by the factors that have increased the overall rate. But an exploratory study of longitudinal micro data from the CPS indicates that unemployed men are more likely to remain unemployed in the next month if they receive unemployment benefits and their wives work. This suggests the possibility that the increased labor force participation of married women and the expansion of UI coverage may have raised the rate of prime-age male unemployment corresponding to any level of labor market tightness.

The hypothesis that wives' earnings and UI exert an interaction effect on husbands' unemployment was based on the nontaxable status of unemployment benefits. Beginning in 1979, however, benefits paid to individuals in high-income families were subject to Federal income tax.[15] The effects of benefit taxation on recipients' unemployment should be investigated as new data become available.

Notes

1. See Cagan for a discussion of these factors.

2. Analyses that use adjusted unemployment rates and/or the rate for prime-age men are exemplified by *Economic Report of the President* (pp. 168–72), Modigliani and Papademos, Perry, and Wachter.

3. Classen, Ehrenberg and Oaxaca, Feldstein (1978), Holen, and Solon.

4. *Manpower Report of the President,* p. 68, and *Employment and Training Report of the President,* p. 64.

5. Lippman and McCall, pp. 176–78.

6. This follows from $0.5/(1 - 0.3) = 0.714$. The implications of not taxing unemployment benefits are considered in detail by Feldstein (1974).

7. Another possible reason for an interaction effect is that wives may be more likely to work if their husbands' earnings are low. Since benefits received by low-earnings husbands would not be restricted by the maxi-

mum weekly benefit amounts, their benefit/wage ratios would be higher than those of high earners and would encourage longer job search. Unfortunately, data on prior earnings were unavailable for a large portion of our sample.

8. Kalachek discusses some of the problems of longitudinal CPS data. The problem of "rotation group bias" should not seriously affect the present sample since data from the U.S. Bureau of the Census (p. 84) show the bias to be minor for unemployed men seeking full-time work. In an earlier analysis of our data, rotation group dummy variables exerted a statistically insignificant effect on the probability of remaining unemployed in the next month.

9. The sample actually included 211 such men, but 14 were eliminated from the analysis because of missing values.

10. Welfare income and food stamps were not included in the NONWAGE variable for fear that, as income-tested benefits, they would obscure the effect that wives' employment has on husbands' work status via family income. Inclusion of such income in the model, however, had only negligible effects on the results reported here.

11. See McGregor. Incidentally, several readers were so startled by the sample mean for WKSUNEMP, 21.02, that they assumed it was an error. But the published CPS data for May 1976 (see Bureau of Labor Statistics, p. 31, Table A–17) show mean unemployment duration of 18.1 weeks for men aged 25 to 34, 22.8 weeks for men aged 35 to 44, and 28.3 weeks for men aged 45 to 54.

12. Those on indefinite layoff, who have no definite recall dates or expect their layoffs to exceed 30 days, are grouped with permanent job losers because preliminary analysis showed them to have similar probabilities of escaping unemployment in the next month.

13. This estimate and the subsequently discussed estimate of the effect of working wives and unemployment benefits can be approximated by the derivatives in Table 2. These derivatives, though, are not strictly appropriate because a change of a dummy variable from 0 to 1 does not constitute an infinitesimal change in the vicinity of the variable's mean. The estimates presented in the text are based directly on equation 2 above and the parameter estimates shown in Table 2. For example, the effect of being on temporary layoff is computed as the change that results in p_j in equation 2 when TLAYOFF is changed from 0 to 1 while all other independent variables are held at their means.

14. Contrary to expectation, the derivative for WIFEWORK is negative and quite large. Though statistically insignificant, this finding deserves to be tested with other data. If other studies find a significant negative effect, one explanation may be that, if husbands' and wives' leisure is complementary, wives' employment may reduce the leisure value of husbands' unemployment and encourage more rapid return to work.

15. Unemployment benefits were taxable for single persons whose adjusted gross income plus benefits exceeded $20,000, joint filers whose adjusted gross income plus benefits exceeded $25,000, and all married persons who filed separately. Of course, more detailed information can be found in the instructions accompanying the familiar Form 1040.

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Occupation Decisions of Unemployed Workers

Joe A. Stone

The unemployment insurance (UI) system in the United States provides a temporary source of income to qualified workers who are unwillingly out of work. In doing so, the system seeks to reduce the possibility that a worker will be "forced by circumstances" to seek employment in a lower-paying and less productive occupation.[1]

How well does the UI system achieve this goal? Recent research supports the conclusion that UI payments tend to raise the minimum wage expectations of an unemployed worker and, at the same time, increase both the worker's duration of unemployment and the final reemployment wage.[2] However, interpretation of these wage gains becomes ambiguous. Do such gains merely represent a "zero-sum game" in which UI recipients have an edge over nonrecipients applying for the same job?[3] Or do they mean UI recipients are more likely to avoid jobs that pay less and that are ultimately less productive than their previous jobs?

The study reported here takes a more direct approach: all things being equal, will the provision of UI benefits to unemployed workers reduce the probability that they will abandon their usual occupations to seek employment in less productive areas?

Methodological Framework

The basic approach here is to view occupational choice as a function of both the wage and the cost of acquiring employment. An unemployed worker laid off from a job was assumed to have been in an optimal occupation. Based on standard occupational choice and job search models, the unemployed worker's decision to seek employment in a different occupation is expected to be inversely related to prior salary, positively related to the wages in alternative occupations, and positively related to the opportunity cost of continued search.

In compact form, we have

$$\text{OCCHG} = f(W_u, W_a, S) \qquad (1)$$

where

$$\frac{\partial \text{OCCHG}}{\partial W_u} < 0$$

$$\frac{\partial \text{OCCHG}}{\partial W_a} > 0$$

$$\frac{\partial \text{OCCHG}}{\partial S} > 0$$

and OCCHG represents the decision to seek employment in the same or in a different occupation (with values of 0 and 1, respectively), W_u the mean wage the person could expect in the usual occupation, W_a the corresponding wages in alternative occupations, and S the opportunity cost of continued unemployment (search).

The relationship between search costs and the decision to try a different occupation ($\partial \text{OCCHG}/\partial S$) depends on the individual's characteristics, the skills required for each occupation, and the characteristics of the search process for each occupation. It is assumed that finding employment in the optimal or previous occupation is more costly for a laid-off worker than qualifying for and finding a job in one of the lower-paying occupations. Consequently, decreases in search costs decrease the probability that an individual will seek employment in a different occupation.

In this context, a test of the UI benefits-occupation change hypothesis is a test of the joint hypothesis that (1) UI benefits significantly decrease the search costs and (2) such costs are positively related to occupation changes.

This approach has two major limitations. First, some unemployed workers who quit their jobs were not in an optimal occupation. A decrease in search costs for these

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workers could increase the probability that they will continue to look for employment in a different occupation. Typically, however, workers who leave a job voluntarily are not eligible for UI benefits. These workers are excluded from this analysis. Second, some unemployed workers may be qualified for an occupation that is higher paying than their previous one. For this group, the initial costs of obtaining higher-paid employment exceeded the potential gain. During insured unemployment, however, these costs may no longer exceed the potential gain. This group would be expected to change occupation, if possible, while drawing UI benefits. By concentrating on workers aged 25 to 55 and by counting only movements among broad occupation groups as occupation changes, this latter group is virtually eliminated from the study.

Sample data for an empirical test of the UI benefit–occupation change hypothesis were obtained from a national survey of unemployed workers taken as a supplement to the Current Population Survey in May 1976.[4] The respondents answered a variety of questions regarding personal and family characteristics, sources of income, prior employment, and job search activities. Most important for purposes of this study, respondents were asked to list their last occupations and the occupation they were currently seeking. These detailed (three-digit occupation) responses were aggregated into 18 broad occupation groups.[5] Thus, the dependent variable for this study (OCCHG) takes the value 1 when the occupation sought is different from the prior occupation, 0 otherwise.[6]

The wage at the prior job (PWAGE) is the measure of the wage (W_u) the worker could expect in that occupation. For a measure of wages the worker could expect in general (W_a), a traditional wage equation is substituted, with a measure of experience (AGE), years of schooling completed (EDUC), sex (FEMALE), and race (NWHITE) as explanatory variables. Measures of search costs are one household variable, four income variables, and a layoff variable. The household variable indicates whether the person is married with spouse present (MSP). The income variables indicate whether another member of the family is working (OTHWK), the presence of dividend income (DIV), the presence of other nonlabor income (ONLY), and the weekly UI benefit (WKUI). The latter, of course, is the central variable. The layoff variable (TLO) indicates whether a person is on temporary layoff. A worker on temporary layoff has a significant possibility of being recalled and is less likely to seek alternative employment.

A final set of variables remains to be discussed. Both a limited planning horizon and a limited benefit eligibility period suggest the importance of the elapsed duration of unemployment.[7] Duration of UI may also be important for the dynamics of the search process itself; expectations about the labor market may be revised, Bayesian fashion, as the job search continues.[8] The limit on expected UI may color the degree to which an unemployed worker is willing to pursue a different occupation as the date of UI expiration nears.[9] In these instances, elapsed duration contains important information about occupational choice. For this reason, estimates are also obtained for an equation that includes the number of weeks unemployed (WKUN). In this alternative set of estimates, regional binary variables (REG) are also included to test for regional differences in unmeasured variables (e.g., the cost of living and labor market composition and density).

Thus, the basic empirical specification takes the form

$$\begin{aligned} \text{OCCHG} = f(&\text{PWAGE, AGE, EDUC,} \\ &\text{FEMALE, NWHITE, MSP,} \\ &\text{OTHWK, DIV, ONLY,} \\ &\text{WKUI, TLO}) \end{aligned} \tag{2}$$

with elapsed duration of unemployment (WKUN) and regional binary variables (REG) added in an alternative set of estimates. Since occupation change is a qualitative variable, ordinary least squares estimates of the parameters are not normally distributed and are not efficient. Consequently, maximum-likelihood estimates are obtained based on the logistic functional form.[10]

Empirical Results

Table 1 presents maximum-likelihood estimates of the basic empirical specification of occupation change (equation 2), as well as estimates of the expanded specification, which includes weeks unemployed and regional binary variables (equation 2a). Below each coefficient are the asymptotic t-statistic and derivative, respectively. In addition, the table contains the variable definitions and sample means. Again, the sample consists of unemployed workers, aged 25 to 55, who were involuntarily laid off. Thirty-five percent of these workers were seeking employment in an occupation different from their previous one (i.e., the mean of OCCHG is .35).

The impact of the wage at the prior job (PWAGE) is significantly negative (.05 level), as expected. The impact of the remaining non-UI variables is much as expected, although all but FEMALE and TLO are insignificant.[11] Both FEMALE and TLO suggest a substantial, statistically significant decline in the probability of seeking employment in an alternative occupation. The impact of TLO reinforces recent speculation (and evidence) by Feldstein that the UI system plays a role in maintaining an accessible pool of employees available for recall by employers.[12]

Most important, the impact of the weekly UI benefit is also negative and statistically significant (.05 level). The estimate suggests that a UI recipient receiving the average weekly UI benefit (approximately $75 in 1976) was 19 percent less likely than a similar nonrecipient to

TABLE 1. Maximum-likelihood estimates of the determinants of occupational choice among the unemployed [1]

Variable	Mean	Equation 2	Equation 2a[2]
Constant	—	.5502 (1.106) .1229	.8647 (1.665) .1930
PWAGE: hourly wage at prior job.	4.43	−.1920 (4.527) −.0429	−.1912 (4.464) −.0427
AGE: age in years.	36.95	−.0078 (1.009) −.0018	−.0077 (.985) −.0017
EDUC: completed years of schooling.	11.50	.0392 (1.525) .0088	.0369 (1.425) .0082
FEMALE: 1 if female, 0 otherwise.	.43	−.7551 (4.624) −.1687	−.7585 (4.619) −.1693
NWHITE: 1 if nonwhite, 0 otherwise.	.16	.2128 (1.132) .0475	.2810 (1.455) .0627
MSP: 1 if married with spouse present, 0 otherwise.	.67	.0644 (.407) .0144	.0532 (.335) .0188
OTHWK: 1 if another member of household is employed, 0 otherwise.	.48	−.0329 (.206) −.0074	−.0438 (.274) −.0098
DIV: 1 if household receives dividend income, 0 otherwise.	.08	−.0331 (.127) −.0074	−.0312 (.119) −.0070
ONLY: 1 if household has other nonlabor income, 0 otherwise.	.38	.2151 (1.439) .0481	.2089 (1.394) .0466
WKUI: Weekly UI benefit.	40.33	−.0039 (2.254) −.00087	−.0039 (2.234) −.00087
TLO: 1 if on temporary layoff, 0 otherwise.	.25	−.7723 (4.334) −.1726	−.8140 (4.498) −.1817
WKUN: number of weeks unemployed.	19.21	NA	−.0020 (.587) −.0004
REG1: 1 if resident of northeastern U.S., 0 otherwise.	.30	NA	−.2231 (1.149) −.0498
REG2: 1 if resident of southeastern U.S., 0 otherwise.	.27	NA	−.4226 (2.116) −.0943
REG3: 1 if resident of western U.S., 0 otherwise.	.21	NA	−.2997 (1.408) −.0669
OCCHG: dependent variable. 1 if occupation currently sought is not prior one, 0 otherwise.	.35		
Observations		1,016	1,016
χ^2 (d.f.)		87.76(11)	92.72(15)

[1] The sample consists of unemployed workers, aged 25 to 55, who were involuntarily displaced from a prior job. Reported coefficients are maximum-likelihood estimates of the parameters of a logistic model. Below each coefficient is the asymptotic t-statistic and the derivative (at the sample mean), respectively. The χ^2 statistic tests the null hypothesis that all parameters but the constant are zero.

[2] Adds weeks unemployed and regional factors to equation 2.

NA: Not applicable.

seek employment in an alternative occupation.[13] This modest but significant effect means that UI recipients are more likely to remain in their usual occupations. Thus, we can see that at least part of the reservation wage effect of UI benefits found by previous studies reflects UI's role in enabling recipients to avoid employment in lower-paying occupations.[14] Whether this result is socially optimal remains to be considered.

It is important to note that the effect of WKUI is not sensitive to the expanded specifications—for region and for weeks unemployed—that equation 2a adds beyond equation 2 (see Table 1). The results for WKUI are virtually identical; the effect of WKUN is not significant, and the only significant regional variable is the one for the southern United States (REG2). Relative to similar workers in the North Central region, workers in the South are 27 percent less likely to seek an alternative occupation. This is consistent with a cost-of-living interpretation. That is, a given monetary variable (PWAGE or WKUI) for workers in the South is undervalued relative to the same variable for workers in other regions, and the regional variable captures this discrepancy. Clearly, other interpretations are possible.

The results for WKUI are also not sensitive to a number of other specifications. To examine the possibility that the WKUI variable actually captures other differences between those eligible for UI benefits and those not, a binary variable for eligibility was added in an auxiliary set of estimates. Estimates were also obtained for the subsample of males in the sample and the subsample of workers who had been at their prior job for at least 1 year.[15] In none of these alternative specifications is the estimate for WKUI substantially altered. Finally, to pursue the possibility that the expected inverse relationship between occupation change and UI benefits is attenuated by displaced workers who seek a more lucrative occupation when unemployed, estimates were also obtained for the subsample of workers whose reservation wages did not exceed their prior wages. The coefficient for WKUI is not sensitive to this distinction, suggesting that the attenuation is insubstantial.

Conclusion

Recent evidence strongly suggests that UI benefits raise the minimum wage an unemployed worker will accept. This reservation wage effect increases both the expected duration of unemployment and the expected reemployment wage. Results obtained here suggest that at least part of this wage gain is attributable to the fact that UI recipients are more likely to remain in their usual occupations and less likely to seek employment in a lower-paying occupation. This result is insensitive to a number of alternative specifications. Thus, the UI system appears to achieve (albeit modestly) one of its explicit objectives. Whether this achievement is socially optimal depends on a number of factors—the structure of relevant markets, the subsidy content of benefits, other objectives and effects of the system, and so forth—and awaits further research.

Notes

1. W. Haber and M. Murray, *Unemployment Insurance in the American Economy* (Homewood, Ill., Richard D. Irwin, 1966), pp. 26–35.

2. N. Kiefer and G. Newman, "An Empirical Job Search Model, with a Test of the Constant Reservation Wage Hypothesis," *Journal of Political Economy,* vol. 87, February 1979; and D. O'Hara and J. Stone, "Search Theory, Unemployment Insurance and Reservation Wages," BLS Working Paper 92, mimeographed, 1979.

3. In this instance, the advantage UI recipients have over similar nonrecipients is that the opportunity cost of their job search is lowered by UI benefits. Consequently, they obtain an average wage (for a particular sort of work) above that for similar nonrecipients.

4. For more details of the survey see C. Rosenfeld, "Job Search of the Unemployed, May 1976," *Monthly Labor Review,* vol. 100, November 1977, pp. 39–43.

5. Occupation groups were (1) engineers; (2) health workers; (3) teachers; (4) all other professional/technical; (5) managers and administrators; (6) retail sales workers; (7) other sales workers; (8) stenographers, typists, secretaries; (9) all other clerical workers; (10) carpenters and other construction craftsmen; (11) mechanics; (12) all other craft workers; (13) operatives (except transport); (14) transport equipment operators; (15) nonfarm laborers; (16) farmers, farm managers, and farm laborers; (17) service workers (except private household); and (18) private household workers. Respondents seeking "any type work" or answering "don't know" were deleted from the sample, as were those without a prior job.

6. A cardinal ranking of occupations was sought as an alternative measure of changes, but no comprehensively consistent ranking was possible.

7. J. Seater, "A Unified Model of Consumption, Labor Supply, and Job Search," *Journal of Economic Theory,* vol. 14, April 1977; and D. Mortensen, "Unemployment Insurance and Job Search Decisions," *Industrial and Labor Relations Review,* vol. 30, July 1977.

8. J. McCall, "Economics of Information and Job Search," *Quarterly Journal of Economics,* vol. 74, February 1970.

9. This is actually a sample selection process, since those who have longer expected durations of unemployment are more likely to remain unemployed (and be observed in a point-in-time survey of the unemployed). Elapsed duration of unemployment is an implicit control for this process. Because the sample attrition is not observed, alternative techniques (see, for example, O'Hara and Stone, 1979) are not applicable.

10. In the logit framework, the probability that individual j seeks an occupation different from the previous one is given by:

$$P_j = e^{b'X_j} / (1 + e^{b'X_j})$$

Where X_j is the jth individual's vector of explanatory variables. For a discussion of logit analysis, see M. Nerlove and S. Press, "Univariate and Multivariate Log-linear and Logistic Models," Rand Corp., mimeographed, 1973.

11. AGE, NWHITE, and ONLY are clear exceptions. The most expedient explanation for AGE and NWHITE is that these variables are surrogates for the wealth/income position of the worker. The result for ONLY is not entirely unexpected. Because public assistance forms a major part of this variable, ONLY may be a signal of financial distress.

12. M. Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* vol. 84, October 1976.

13. Obtained using the close approximation (75) (—.00087)/.35.

14. Here there is an investigation of the impact of UI benefits on changes in the occupation sought rather than directly on the occupation "outcome." Unfortunately, data sets detailing occupational outcomes are extremely limited compared to the CPS, and estimation of outcomes is complicated by sample selection issues—for example, that not all unemployed workers end a spell of unemployment with a job (hence an occupation). Although the difference between using intent instead of outcome warrants further research, O'Hara and Stone (1979), researching the impact of UI benefits on reservation wages of the unemployed, obtained virtually identical results using either hypothetical reservation wages claimed by surveyed workers or wages actually obtained.

15. The latter is a test for whether UI benefits are a surrogate for job tenure (benefit levels are conditioned by tenure) in the larger sample.

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Joint Determination of Quits and Layoffs

Robert M. Hutchens

Public concern over unemployment logically translates into concern over the forces influencing flows into and out of unemployment. Several recent studies indicate that the Unemployment Insurance (UI) system tends to exacerbate unemployment by encouraging layoffs and prolonging the search for a new job. For example, in a 1976 article Martin Feldstein argued

> . . . unemployment insurance subsidy has a potentially very large impact on the rate of unemployment, causing layoffs when they would not otherwise happen and substantially magnifying the size of layoffs that do occur.[1]

In a later work, Feldstein presented empirical estimates which ". . . imply that the current average level of UI benefits is responsible for approximately one-half of temporary layoff unemployment."[2] More recently, the present author has found evidence linking UI benefits to "permanent" layoffs.[3] Such findings raise the question of whether more adequate UI benefits will reduce employment stability and swell the ranks of the unemployed.

One aspect of this issue has not been explored: to what extent does UI simply alter the composition of the flows into unemployment, without increasing the size of the total flow? If UI leads workers to substitute layoffs for quits, then it is possible that in increasing the number of layoffs the program simultaneously reduces the number of quits. It is conceivable that these effects offset one another in such a way that UI has no effect on the total flow of workers into unemployment.[4]

This study examines whether the UI system does in fact lead workers to substitute layoffs for quits by developing and testing a theory of joint determination of quits and layoffs. Because the decision to lay off workers is made by firms, the theoretical and empirical literature on layoffs has largely concentrated on the determinants of the firm's behavior. There is, of course, another side to the issue. Although firms may rationally choose layoff policies, workers may rationally choose firms. The theory posits that workers exercise a degree of choice over their layoff probability. The approach taken here thus focuses on worker behavior and essentially takes firm behavior (which depends in part on UI taxes) as given. If workers exercise a degree of choice over layoffs, it is conceivable that higher UI benefits lead workers to substitute layoffs for quits. This possibility is developed in Section I.

The empirical analysis in Section II employs National Longitudinal Survey data on males aged 45 to 59 and females aged 30 to 44. Estimation of a multinomial logit model of quits and layoffs yields the following results:

- Results on layoffs generally conform to expectations. In particular, the evidence indicates that more generous UI benefits tend to raise the probability of layoff for both males and females.
- Results on quit probabilities are mixed; several of the quit hypotheses are confirmed in the male population, but few are confirmed for the females. The hypothesized negative relationship between UI benefits and quits is not confirmed for either population.
- There is no firm evidence that the UI system leads workers to substitute layoffs for quits. The results suggest that the UI system does indeed increase the total flow of workers out of employment.

Section I. A Theory of Jointly Determined Quits and Layoffs

At an intuitive level, it would be expected that an individual who perceives a high probability of not working (or of searching for a job) in the near future would prefer a current job with a high layoff probability. Contrasted to a quit, a layoff has several advantages. First, it may yield more UI benefits. Second, while workers on layoff may not lose employer-financed fringe benefits (such as pensions or health benefits), such benefits are usually denied to those who quit. Third, future job

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search will not be impaired by the stigma inherent in being branded a quitter. Finally, in taking a job with a high layoff probability, the worker may receive a higher wage. Indeed, the greater a person's perceived probability that not working will improve prospects of the near future (due perhaps to anticipated schooling, home responsibilities, leisure opportunities, and/or job search opportunities), the more willing that person should be to avoid a future quit by accepting a current job with a high layoff probability. Because UI is one of the reasons for preferring layoffs to quits one would expect this willingness to accept a job with a higher layoff probability increases with the level of expected UI benefits. In this way, UI should lead workers to substitute layoffs for quits.

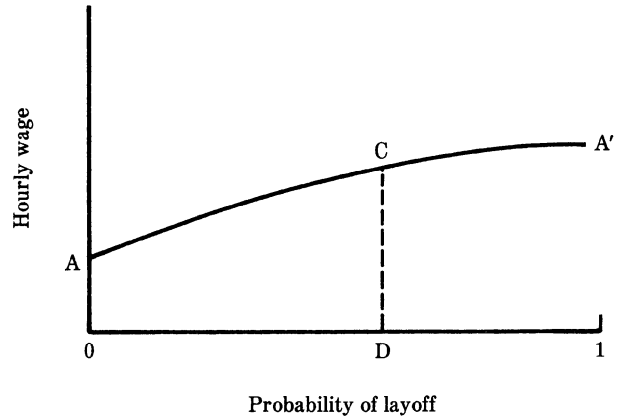
A theory of jointly determined quits and layoffs aids examination of the hypothesis that workers substitute layoffs for quits. Rather than attempt a rigorous exposition of the theory, a more heuristic approach is used. Theoretical details are relegated to Appendix A.

Imagine a world in which workers and employers agree to one-period contracts for labor services. At the end of the period, employers and employees decide whether they shall recontract for a second period. Workers may quit and employers may lay off workers. Assume in addition that:

- a worker who quits or is laid off shall not work during the second period;
- workers quit if second-period utility when not working exceeds second-period utility when working;
- the worker's second-period utility after a layoff exceeds the second-period utility after a quit (due to UI, fringe benefits, and problems associated with being labeled a quitter);
- when selecting jobs in the first period the worker perceives a finite probability of quitting at the end of the first period;
- jobs with higher layoff probabilities yield higher wages, *ceteris paribus*; and
- the worker behaves in a manner that maximizes expected utility in the two periods.

Given this, the following problem must be solved: assume that in the first period the worker selects a job from an array of jobs with different layoff probabilities, what layoff probability will the worker select? The figure in the next column illustrates the problem.

The curve AA′—here taken to be a line for convenience sake—describes the relationship between layoff probability and hourly wage for a set of jobs. At point A there is no possibility of layoff and the hourly wage is relatively lower; at point A′ the hourly wage is higher and a future layoff is certain. The intercept of AA′ gives the wage at point A, and the slope of AA′ gives the wage premium paid as a worker selects a job with increasing probability of layoff.



Given that a worker can choose any job in this set, what point on AA′ will the utility-maximizing worker choose? How will changes in the level of UI benefits and in the intercept and slope of AA′ affect this decision? How will this layoff probability affect quit decisions and how will anticipated quits affect layoff probability?

Appendix A details two efforts at solving this problem. The first analysis treats saving behavior as exogenous and leads to several interesting and unambiguous hypotheses. This treatment of the problem motivated the empirical work in Section II. The second analysis treats savings as endogenous and leads to several ambiguous hypotheses. This additional analysis was undertaken because the empirical work in Section II raised doubts about the initial set of hypotheses. In order to set the stage for the empirical results, however, it is useful to outline the primary hypotheses in the initial analysis and the logic which underlies them.

Hypothesis 1. Other things equal, an increase in UI benefits leads to an increase in the probability of layoff and a decrease in what shall be termed the "conditional quit probability." The conditional quit probability is the probability of a quit, conditional upon the probability that the worker is not laid off.

Argument: Higher UI benefits make a layoff less costly, because they diminish the utility loss which results from a layoff. Given this, higher UI benefits may induce workers to accept a higher layoff probability in order to obtain a job with a higher wage (i.e., to move to the right on AA′). The quit effect is related to these higher wages. Other things being equal, the higher a worker's wage, the less likely that worker is to quit in the second period. If UI induces workers to accept higher wages, the conditional quit probability should fall.

Hypothesis 2. If other things are equal, a downward shift in the wage-layoff probability relationship AA′ leads to an increase in the probability of layoff and an increase in the conditional quit probability.

Argument: As wages fall, the utility implicit in not working approaches the utility implicit in working. This may induce quits. In addition, the decrease in wages diminishes the utility loss from a layoff. This may induce workers to risk higher layoff probabilities in order to obtain higher wages (to move to the right on AA′).

Hypothesis 3. If other things are equal, an exogenous increase in the conditional quit probability (perhaps due to increased expected productivity in the home or in unemployed job search) leads to an increase in the probability of layoff.

Argument: In the context of this model, exogenous factors that increase the conditional quit probability must raise the utility of not working relative to the utility of working. As in Hypothesis 2, this implies a smaller utility loss from a layoff, which may induce workers to risk higher layoff probabilities in order to obtain higher wages.

Hypothesis 4. If other things are equal, a one-unit increase in the slope of the wage-layoff probability relationship AA′ (the premium paid when the worker selects a job with a higher layoff probability) leads to

- a reduction in the quit probability
- a reduction in the layoff probability for a given wage that is smaller than the reduction induced by an increase in the intercept of AA′ (i.e., the wage for a job with no possibility of layoff).

Argument: The interested reader is referred to the mathematics in Appendix A for a full explication of the hypothesis.

The inital analysis provides a network of testable and interrelated hypotheses. Hypothesis 1 introduces the idea that increased UI benefits lead workers to substitute layoffs for quits. Because the other hypotheses use the same behavioral model as Hypothesis 1, they provide a further means of testing the validity of the underlying theoretical framework. However, some of the hypotheses are therefore less useful for testing the framework. For example, the hypothesis that increased UI benefits reduce conditional quit probabilities relies on an elaborate path of causation (increased UI benefits cause increased willingness to accept a higher layoff probability, which leads to a higher wage, causing workers to be less willing to quit if not laid off). In this case, failure to find the hypothesized negative relationship would not constitute a fundamental failure of the theory. A zero effect is clearly plausible.

Section II. Empirical Test of the Theory

A two-stage estimation procedure was developed to test the hypotheses discussed above. In the first stage, the intercept and slope of the wage-layoff probability relationship (termed B_0 and B_1) were estimated from data on wages and layoff probabilities. These predicted values of the slope and intercept were used in the second stage test of the hypotheses. Next, the coefficient estimates on these predicted values were used to test Hypotheses 2 and 4 (above). Holding B_1 constant, a decrease in B_0 constitutes the downward shift of the wage-layoff probability relationship described in Hypothesis 2. Holding B_0 constant, an increase in B_1 constitutes the increase in the slope of the wage-layoff probability relationship described in Hypothesis 4. Sections A and B below outline the statistical methodology employed in testing hypotheses and Section C presents results.[5]

Section II.A: Estimating the intercept and slope of the wage-layoff probability relationship

Let the ith individual confront a wage-layoff probability relationship of the form

$$W = B^i_0 + B^i_1 P$$

where B^i_0 and B^i_1 are parameters for the ith individual, P is the probability of layoff, and W is the wage rate. Furthermore, let

$$B^i_0 = \mathbf{Q}'_i\mathbf{A};\ B^i_1 = \mathbf{Q}'_i\mathbf{D}$$

where $\mathbf{Q}_i$ is a vector of personal characteristics for the ith individual, and $\mathbf{A}$ and $\mathbf{D}$ are parameter vectors.

This formulation of the wage-layoff probability relationship implies that the individual confronts a relationship which depends upon his characteristics, $\mathbf{Q}_i$, and that individuals with different characteristics may confront different wage-layoff probability relationships.[6] This formulation also implies that the wage-layoff probability relationship takes the form,

$$W = \mathbf{Q}'\mathbf{A} + [\mathbf{Q}'\mathbf{D}]P + \epsilon \qquad (1)$$

(where ϵ is an error term) and that, given a measure of P, the parameter vectors $\mathbf{A}$ and $\mathbf{D}$ can be estimated with ordinary least squares (OLS). Of course, after such parameters are estimated, it is straightforward to compute B^i_0 and B^i_1 as $\mathbf{Q}'_i\mathbf{A}$ and $\mathbf{Q}'_i\mathbf{D}$. The essence of the first-stage procedure is then to estimate equation (1) and to compute B^i_0 and B^i_1 for each individual in the sample.[7] Appendix B details implementation of the first stage procedure. In essence this model was estimated with OLS, using variables in the $\mathbf{Q}$ vector, the UI coverage fraction and a proxy for the probability of layoff, which are traditionally employed in a wage equation.[8]

Section II.B: The estimation technique

The second stage of the estimation procedure uses predicted values of B_0 and B_1 as exogenous variables in a multinomial logit model of quits and layoffs. Multinomial logit modeling permits analysis of the determinants of multiple discrete events. To describe the technique, assume the ith worker faces three possibilities:

- Being laid off from the current job. Designate the probability of this event by θ_{i1}.
- Quitting the current job and not moving immediately to another job. Designate the probability of this event by θ_{i2}.
- Remaining in the current job. Designate the probability of this event by θ_{i3}.

Note that the sum of the probabilities equals 1, i.e.,

$$\theta_{i1} + \theta_{i2} + \theta_{i3} = 1$$

A multinomial logit model of the probability that the ith worker falls into category j may be written

$$\theta_{ij} = \frac{\exp(Z_{ij})}{\sum_{j=1}^{3} \exp(Z_{ij}),\ j = 1, 3}$$

where $Z_{ij} = \mathbf{x}'_i\rho_j$, $\mathbf{x}_i$ is a column vector of variables, ρ_j is a column vector of parameters, and $\exp(Z_{ij})$ is the exponential function of Z_{ij}. As a normalization is requisite, let $\rho_3 = 0$.

This model is estimated over those respondents in the National Longitudinal Survey (NLS) who at some time within one year after the 1969 interview worked in a job other than self-employment. The data indicate whether a layoff or quit occurred within what is termed the "exposure year"—the year after the interview date or the beginning of a post-interview job. B_0 and B_1 are computed for each individual, using the first stage models and data on the individual's socio-demographic characteristics. Workers were assigned to category "1" if they were either temporarily or permanently laid off during the exposure year, and to category "2" if they quit and did not obtain a new job prior to the quit.[9] The latter type of worker was presumably not employed after leaving the job.[10] The remaining population was assigned to category "3." Because workers who found new jobs prior to a quit—and thus changed jobs during the exposure year—are not exposed to the same risk of layoff or quit as otherwise identical individuals, the model is estimated in the population that did not arrange for another job prior to a quit. However, this group was included in a subsequent multinomial logit model with four categories of behavior.

For the males the vector of exogenous variables, $\mathbf{x}$, included:

1. the predicted values of B_0 and B_1;

2. nonwage income not conditioned on previous year's earnings or unemployment. Included were income from own business or farm, rents, interest, dividends, alimony, and pensions. Also included were forms of nonwage income received by other family members and not conditioned on the worker's labor market experiences such as worker's compensation, unemployment insurance, or disability benefits;

3. earnings of other family members;

4. determinants of unemployment insurance benefits. Specifically, the proportion of workers covered by the UI system in the individual's industry and State (henceforth termed the UI coverage fraction) and the maximum UI benefit in the State in 1970.[11] In addition, a set of variables were established to indicate the conditions under which States pay UI benefits for voluntary quits. The construction of three variables is documented in footnote 19;

5. proxies for the value of nonmarket time. Specifically, marital status (1 if married with spouse present; zero otherwise) and number of children under 18;

6. controls including age, health status, and residence in a Standard Metropolitan Statistical Area (SMSA).[12]

The model for the females included parallel measures of the above variables as well as

7. number of children under 6, which serves an additional proxy for value of nonmarket time.

Several of the variables in categories five, six, and seven above may be viewed as exogenous determinants of conditional quit probabilities. In the context of the theory outlined above, such variables will tend to affect the utility of not working relative to that of working. From the literature on labor force participation, good health is expected to be negatively associated with quits; and marriage and presence of children are expected to induce quits by women and to have the opposite effect for men.

Section II.C: Results

This section presents results from the multinomial logit analysis of quits and layoffs in the NLS male and female samples. Two research questions are addressed: First, are the results consistent with the initial set of theoretical hypotheses? Second, to what extent does UI lead workers to substitute quits for layoffs without increasing the total flow out of employment? The results presented here yield three general conclusions:

- Results on layoff probabilities generally conform to hypotheses; results are quite similar to those presented by the author in an earlier paper.[13]
- Results on quit probabilities are mixed; in the male population the quit hypotheses are generally confirmed, whereas in the female population they are generally not confirmed.
- There is no firm evidence that the UI system leads workers to substitute layoffs for quits. The results sug-

gest that the UI system does indeed increase the total flow of workers out of employment.

Results for males. Table 1 presents multinomial logit coefficients for the males. The coefficients in the first column indicate the relationship between an exogenous variable and the probability of layoff conditional upon the probability that an individual did not quit.[14] Coefficients in the second column indicate the relationship between an exogenous variable and the probability of a quit conditional upon the probability that the individual was not laid off. Two techniques are used to examine these results. First, they are discussed in the context of formal hypothesis testing, using t-statistics to ascertain whether the parameter estimates are consistent with the theoretical model. The present analysis seeks to reject the null hypothesis that the population parameter being estimated has an unexpected sign. Second, the estimated coefficients are employed in simulations of how changes in the variables measuring UI generosity would alter observed quits and layoffs in the NLS populations.

The results in Table 1 generally conform to expectations.[15] The layoff results are most consistent with the theory. By Hypotheses 1 and 2 the coefficients on B_0, the intercept of the wage-layoff relationship, are expected to be negative, and the coefficient on the UI coverage fraction is expected to be positive in the layoff model. The hypotheses are confirmed in that an appropriate null hypothesis can be rejected at a reasonable level of confidence for either coefficient. It is also expected that the coefficient on B_1 will exceed that on B_0 (Hypothesis 4) and the coefficient on the maximum UI benefit will be positive (Hypothesis 1). Although these expectations are met in the layoff model, in neither case can an appropriate null hypothesis be rejected with substantial confidence. Finally, from Hypothesis 3 the sign of the coefficient on variables which are exogenous determinants of quit probabilities (such as Married with Spouse Present, Age, Health Does Not Limit Work, Number of Children Under 18, and SMSA Resident) should be the same in both the layoff and quit models. Although this hypothesis is confirmed for the marriage and health variables, in the other cases low t-statistics preclude rejection of an appropriate null hypothesis.

The quit results in Table 1 pertain to the probability of a quit (without having obtained another job) conditional upon the probability of a layoff. As expected, the parameters of the wage-layoff relationship (B_0 and B_1) are negatively related to quits, although only the coefficient on B_0 attains a high level of statistical significance. Results on proxies for the generosity of the UI system do not conform to expectations. It was hypothesized that an increase in UI benefits leads workers to accept a higher layoff probability and thereby a higher wage and that this higher wage reduces the probability of quitting. The coefficients on both the UI coverage fraction and the maximum UI benefit should thus be negative. Other results essentially conform to expectations. In particular, married, healthy males are less likely to quit than their unmarried or unhealthy counterparts.

Table 2 uses the Table 1 model to simulate how changes in the UI system would alter quits and layoffs in the male NLS sample.[16] As indicated by the first row, if the parameters of the UI system are held at their 1970 levels, about 6 percent of the 2,843 males in the sample experience a layoff; about 3 percent quit. The second and third rows of Table 2 indicate that an increase in the generosity of the UI system tends to raise layoffs and total turnover without reducing quits. Thus, these data do not support the hypothesis that the UI system leads workers to substitute layoffs for quits.

Results for females. Table 3 presents results for the NLS females. As with the male workers, the layoff results are most consistent with the theory. The sign on the UI coverage fraction and the maximum UI benefit in the layoff model are positive, as expected, although only the UI coverage fraction coefficient attains an appreciable level of statistical significance. While the signs on B_0 and B_1 were expected to be negative, statistically

TABLE 1. Multinomial logit parameter estimates in a model of layoffs and quits for males aged 45 to 59

Variables	Probability of layoff [1]	Probability of quit [2]
B_0	− .3254	− .3946
	(4.0)[3]	(3.4)
B_1	− .2568	− .0100
	(2.6)	(0.1)
UI coverage fraction	2.0303	.1991
	(5.5)	(0.6)
Maximum UI benefit	.0053	.0241
	(0.7)	(2.2)
Earnings of other family members	− .3288 × 10^{-5}	.4277 × 10^{-5}
	(1.0)	(1.1)
Nonwage income of family	.0917 × 10^{-5}	− .1448 × 10^{-5}
	(0.3)	(0.2)
Number of children under 18	.0401	− .1119
	(0.8)	(1.2)
Age	.0223	.0191
	(1.1)	(0.7)
Health does not limit work	− .6306	−1.5302
	(3.6)	(6.6)
SMSA resident	− .1571	.2394
	(0.8)	(0.8)
Married with spouse present	− .6446	− .8496
	(3.0)	(3.1)
Constant	−3.3262	−3.3504
	(2.7)	(2.0)
Number of observations	2798	
Log likelihood	−933.5424	

[1] Includes layoffs followed by a job change as well as temporary layoffs.
[2] Includes voluntary separations in which the individual did *not* find a new job before the separation.
[3] The numbers in parentheses are t-statistics.

TABLE 2. Simulation of the effect of changes in UI benefits and coverage on layoffs and quits of males aged 45 to 59

	Number (percent) experiencing:		Total turnover
	Layoff [1]	Quit [2]	
No change	177 (6.2)	85 (3.0)	262 (9.2)
10 percent increase increase in the maximum UI benefit	157 (6.4)	227 (3.4)	384 (9.8)
Full UI coverage extended to all	239 (8.4)	85 (3.0)	324 (11.4)

[1] Includes layoffs followed by a job change as well as temporary layoffs.
[2] Includes voluntary separations in which the individual did *not* find a new job before the separation.

TABLE 3. Multinomial logit parameter estimates in a model of layoffs and quits for women aged 30 to 44

Variables	Probability of layoff [1]	Probability of quit [2]
B_0	.1302 (0.5) [3]	.0675 (0.4)
B_1	.3325 (1.5)	.2168 (1.2)
UI coverage fraction	.7240 (2.7)	.5893 (2.7)
Maximum UI benefit	.0030 (0.3)	$-$ .0103 (1.3)
Earnings of other family members	$-$ .5410 $\times$ 10^{-5} (2.1)	.2027 $\times$ 10^{-5} (1.4)
Nonwage income of family	$-$.0002 $\times$ 10^{-5} (0.0)	.3792 $\times$ 10^{-5} (1.2)
Number of children under 18	.0905 (1.6)	.0875 (1.9)
Number of children under 6	.0924 (0.5)	.1485 (1.1)
Age	.0121 (0.5)	$-$ .0504 (2.7)
Health does not limit work	$-$ .0158 (0.1)	$-$ .7060 (4.0)
SMSA resident	$-$ .0287 (0.1)	$-$ .0296 (0.2)
Married with spouse present	.6490 (2.5)	$-$ .0982 (0.5)
Constant	$-$4.1705 (3.6)	.5506 (0.6)
Number of observations	2031	
Log likelihood	$-$1178.840	

[1] Includes layoffs followed by a job change as well as temporary layoffs.
[2] Includes voluntary separations in which the individual did *not* find a new job before the separation.
[3] The numbers in parentheses are t-statistics.

insignificant positive coefficients were observed. This is not surprising. As noted in Hutchens (1979), when the theoretical model is developed with endogenous hours, sign hypotheses on B_0 and B_1 are ambiguous. As in the male model, the sign of the coefficient on variables which are exogenous determinants of quits (Married with Spouse Present, Age, Health Does Not Limit Work, Number of Children Under 18, Number of Children Under 6, SMSA Resident) would be expected to be the same in both the layoff and quit models. This hypothesis is weakly confirmed for number of children under 18. Due to low t-statistics on the other variables, little can be said about the validity of the hypothesis.

The female quit results in Table 3 are frequently at variance with the initial hypotheses. The coefficient on the UI coverage fraction has an unexpected sign and a large t-statistic; the coefficient on the maximum UI benefit has the expected sign, but fails to attain a high level of statistical significance. Thus, as in the male quit results, the UI variables do not conform to expectations. The other coefficients in the female quit model are similarly disappointing. The coefficients on B_0 and B_1 and on Married with Spouse Present have unanticipated signs. As predicted, however, healthy women are less likely to quit, and increased numbers of children raise quit probabilities.

Table 4 presents a simulation of how changes in the UI system would affect quits and layoffs in the female sample. As in Table 2, the data do not support the hypothesis that the UI system leads workers to substitute layoffs for quits. Although the second row indicates that a 10 percent increase in the maximum UI benefit leads to increased layoffs and reduced quits, the result arises from the signs on the UI maximum benefit coefficients. These coefficients are not statistically different from zero, though, so the result is of little consequence.

In summary, the data are frequently at variance with the theoretical hypotheses presented in Section I. However, before turning to a reassessment of the theoretical

TABLE 4. Simulating the effect of changes in UI system parameters upon layoffs and quits of women aged 30 to 44

	Number (percent) experiencing:		Total turnover
	Layoff [1]	Quit [2]	
No change	154 (7.2)	240 (11.3)	394 (18.5)
10 percent increase in the maximum UI benefit	157 (7.4)	227 (10.7)	384 (18.1)
Full UI coverage extended to all	184 (8.7)	276 (13.0)	460 (21.7)

[1] Includes layoffs followed by a job change as well as temporary layoffs.
[2] Includes voluntary separations in which the individual did *not* find a new job before the separation.

model, it is important to consider whether the empirical test yields a "fair" test of the theory.

One aspect of this issue concerns the extent to which the UI coverage fraction and the maximum UI benefit adequately capture interstate variation in the availability of UI benefits. The maximum benefit is admittedly an imperfect proxy, as many recipients do not receive the maximum benefit. With this in mind, several alternative measures of State generosity were tested in the model.[17] Results were virtually unaffected. Alternatively, it could be argued that the parameterization of the UI system is inadequate, because it does not control for interstate variation in the availability of UI benefits for voluntary quits.[18] For this reason, data on State policies toward quitters were entered into the model, but once again, the results were virtually unaffected.[19] Thus, similar results are obtained even under alternative parameterizations of State UI systems.

A second aspect of this "fair test" issue concerns the treatment of people who had obtained a new job prior to a quit. Such individuals are simply excluded from the model. To ensure that the results were insensitive to this procedure a four-category multinomial logit model was estimated in the full male and female samples. Thus, as well as the three categories listed above, the model included a fourth category indicating that the individual had lined up a job prior to a quit. Again, the results in both populations were inconsistent with several of the theoretical hypotheses.

It appears reasonable to conclude that, although there is solid evidence in support of the layoff hypotheses, many of the quit hypotheses are not valid. Of particular importance is the lack of evidence in support of the hypothesized negative relationship between UI benefits and quits. Had this hypothesis been confirmed (or had there been grounds for claiming a zero effect), there would be reason to argue that UI benefits lead workers to substitute layoffs for quits. UI apparently does lead to increased layoffs; it simply does not lead to decreased quits. A reassessment of the theory must deal with this central anomaly, as well as the possibility that layoffs are correctly modeled, while quits are not.

Given this, at least two explanations may be given for the anomalous results. First, it is possible that high layoff probabilities cause high quit probabilities. If this is the case, higher UI benefits may lead workers to accept jobs with a higher layoff probability and *thereby* exhibit a high quit probability. Two strands of the literature imply this positive linkage between layoffs and quits: the theory of job shopping and the theory of specific human capital. The theory of job shopping suggests that workers "try out" jobs as a way of learning about their own abilities or preferences or about working conditions.[20] This implies that workers are most likely to quit during the initial period of employment, for it is during this period that they are gaining the most information. Obviously, workers who are frequently laid off are more likely to be in this "try out" phase of employment. As higher UI benefits raise the probability of layoff, they may raise the probability that an individual is in the "try out" phase and thereby raise the probability of quitting.

The second strand of the literature which suggests this positive linkage is the theory of specific human capital. This theory asserts that the more cyclical or seasonal the job, the more reluctant workers and firms will be to invest in specific training, that is, training that is only of value to one specific firm and of no value to other firms. A second assertion of the theory is that quit probabilities are negatively related to worker-financed specific training.[21] This implies that, other things being equal, workers who choose to work in high layoff probability jobs will have higher quit probabilities because of their reluctance to invest in specific training. Because higher UI benefits may induce workers to accept higher layoff probability jobs, they may in this way be associated with higher quit probabilities.

A second possible explanation for the anomalous results centers on savings behavior. It is reasonable to hypothesize that, other things being equal, workers with a high level of savings are more likely to quit their jobs. It is conceivable that at least for some workers higher UI benefits may lead to increased savings and thereby to increased quit probabilities. This could occur if an increase in UI benefits leads workers both to work more hours in the first period and to accept a higher wage-layoff probability combination. In this case, it is conceivable that savings will increase so that a quit is more likely than it would have been with lower UI benefits.

The initial hypothesis in Section I implied a weak negative relationship between UI benefits and quits; however, both of the explanations above imply a positive relationship. It is possible that all of these theories are correct. In particular, it is possible that holding constant information about a job, savings, and worker-financed specific human capital, increased UI benefits are negatively related to quit probabilities. Fundamental problems arise, however, in measuring and holding constant such variables. The major lesson from this work is that even if the hypothesized negative link between UI benefits and quits exists, it is dominated by other unobserved economic forces.

Section III. Conclusions

The primary objective of this work has been to examine how the UI system affects quits and layoffs. It was hypothesized that increased availability of UI benefits will make workers more willing to accept higher layoff probabilities and to substitute layoffs for quits. If this were the case, these effects could conceivably offset each other so that UI would have no effect on the flow of workers into unemployment.

The empirical results presented here essentially confirm the layoff hypotheses; however, they raise serious questions about the validity of hypotheses concerning the relationship between UI benefits and quits. The evidence indicates that more generous UI benefits do raise the probability of layoff, but that no offsetting reduction in quits occurs. Thus, more generous UI benefits increase the flow of workers out of employment. The logical implication is that, even when quits are considered, increased generosity of UI benefits leads to a larger flow of workers out of employment.

Notes

1. Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy,* October 1976, p. 956.

2. Ibid., p. 834.

3. Robert M. Hutchens, "Layoffs and Labor Supply," Final Report under Research and Development Grant Number 91–36–78–37 (Employment and Training Administration, U.S. Department of Labor, 1979).

4. This issue is part of a broader problem in the study of labor turnover. Studies of quits and layoffs often view these transactions as independent phenomena. However, if individuals with high quit probabilities tend to select jobs with high layoff probabilities, it is likely their quits will not be observed, that is, they are laid off before they have a chance to quit. In this case quits and layoffs are linked, and evidence indicating that an observed quit is relatively unlikely for some socioeconomic group tells us little about the group's propensity to quit. To illustrate the problem, consider Mattila's often cited finding that "at least 50 to 60 percent of all quits move from job to job without ever experiencing unemployment" (Mattila, 1974, p. 238). Based on this, he questions the relevance of search theories which assume that quitters must pass through a period of unemployment. Yet, Mattila's statistic and his criticism of search theory are only meaningful if layoffs and quits are independent phenomena. If many of the individuals who would quit and experience unemployment choose jobs with high layoff probabilities, then some of the quits followed by unemployment which Mattila wishes to count are masked by layoffs. If these "missing" quits could be observed, Mattila's statistic would be smaller.

5. This section summarizes the author's discussion of the first stage model in a previous paper. See Hutchens, "Layoffs and Labor Supply."

6. Whereas the conventional labor supply analysis assumes that different individuals may confront different wages, this analysis assumes that different individuals may confront different wage-layoff probability relationships. As in the conventional labor supply analysis these differences may be attributed to variation in the demand for and the supply of workers with specific characteristics.

7. As noted in Appendix B, several specifications of the wage-layoff probability relationship were tested. Included in these alternatives were specifications with the dependent variable in logs, specifications which included the inverse of the Mill's ratio, and specifications which were quadratic in *P*. In general, second State results were insensitive to such changes in the first stage models.

8. To be specific, the vector **Q** includes variables measuring years of education, health status, years of work experience in the worker's lifetime and in the specific job, marital status, numbers of children, race, region of residence, residence in SMSA, and size of SMSA. These variables have been employed in the predicted wage equations previously used to estimate labor supply models. Finally, the UI coverage fraction is included because UI taxes and benefits may be shifted so that they influence the wage-layoff probability relationship.

9. The two types of layoffs are combined because the theoretical model does not distinguish between them. In addition, there are fundamental problems in separating permanent and temporary layoffs in the NLS data. A "permanent" layoff is observed when a worker is laid off and does not return to the pre-layoff job. It is then conceivable that workers will transform a temporary layoff into a "permanent" layoff by changing jobs. This element of worker choice implies that when estimating a model of "permanent" layoffs, we may in part be estimating the joint probability that a worker is placed in temporary layoff and decides to take another job.

10. A third model that distinguished quits followed by unemployment from quits followed by out of labor force status was considered and rejected. The NLS data are inadequate for this purpose, because they do not indicate whether unemployment directly followed the quit or whether unemployment was experienced after a period of being out of the labor force. Given the evidence of the low average intensity of search during unemployment that has been presented in recent studies of hours spent searching (see Barron and Mellow, 1977) it would be surprising to find that the determinants of two types of quits differ substantially.

11. The methods used to compute these variables are described in Ronald Ehrenberg, Robert Hutchens, and Robert Smith, "The Distribution of Unemployment Insurance Benefits and Costs," Technical Analysis Paper number 58 (ASPER, Department of Labor, 1978).

12. It should perhaps be noted that a variable measuring duration of employment with the firm is not used as an independent variable. The variable is excluded because it may be endogenous. If individuals primarily exercise choice over layoff probabilities and labor sup-

ply by changing firms, then duration of employment with the firm is a function of the worker's desired quit and layoff probabilities. For the same reason predicted values of B_0 and B_1 were computed using a fixed job duration of 365 days. However, models which included a measure of duration of employment with the firm were tested. Although the variable is statistically significant in both the quit and layoff models, its inclusion does not alter the conclusions presented here.

13. Hutchens, "Layoffs."

14. To see this, note that the probability of layoff conditional on the individual not quitting is,

$$\frac{\theta_1}{\theta_1 + \theta_3} = \frac{e^{Z_1}}{e^{Z_1} + e^{\theta}} = \frac{1}{1 + e^{-Z_1}} = \frac{1}{1 + e^{x'\rho_1}}$$

15. The coefficients in the first column are used in interpreting the layoff results. Because these coefficients apply to a model of layoffs conditional on the probability that the individual did not quit, and as hypotheses were established for unconditional layoff probabilities, one may reasonably question whether the test is appropriate. To explore this, the partial derivative of the unconditional layoff probability with respect to exogenous variables was computed at the sample means. Using the parameter variance-covariance matrix, it was possible to compute standard deviations and t-statistics for these partial derivatives. The t-statistics are essentially identical to those in column 1 of Table 1. For the sake of expositional clarity, then, the discussion focuses on the estimated coefficients.

16. The numbers in Table 2 are computed using the Table 1 coefficients to calculate the probability of quit and layoff for each individual in the sample. These probabilities are then summed, yielding the "expected" number of quits and layoffs in the sample. Changes in parameters alter quit and layoff probabilities for each individual and thereby alter expected numbers of quits and layoffs in the sample.

17. In particular, models were tested which employed the maximum UI benefit and/or the fraction applied to weekly earnings in computing UI benefits in the specific State (denote this as K). In addition, a model was tested using a predicted unemployment benefit of the form

$$\text{Min (Maximum UI Benefit; K * } B_0 \text{ * 40)}$$

where B_0 is the intercept of the wage-layoff probability relationship (the hourly wage at a zero layoff probability).

18. This issue is raised by Stephen Marston, "Unemployment Insurance and Voluntary Unemployment," A Final Report to the National Commission on Unemployment Compensation (contract number 99–92084–29–10, 1979). I have benefited from conversations with Professor Marston about this topic.

19. In particular three State-specific binary variables were established; they indicate how State UI systems treat quitters. These variables were then imputed to each individual, using data on the individual's State of residence. The three variables are:

- DELAY. A binary variable which takes the value "1" if quitters are permitted to receive any benefits after a waiting period;
- REDUCE. A binary variable which takes the value "1" if there is a reduction in the total amount of benefits an individual can receive for a spell of unemployment (if DELAY equals 0, REDUCE equals 1);
- STRICT. A binary variable which takes the value "1" if the State has a restricted definition of a "good cause" quit.

Data for these variables came from January 1970 data provided by the Unemployment Insurance Service.

20. For examples see W. Kip Viscusi, "Job Hazards and Worker Quit Rates: An Analysis of Adaptive Behavior," *International Economic Review*, February 1979, or William R. Johnson, "A Theory of Job Shopping," *The Quarterly Journal of Economics*, May 1978.

21. See Donald O. Parsons, "Models of Labor Market Turnover: A Theoretical and Empirical Survey," *Research In Labor Economics*, vol. 1, 1977.

Appendix A: Theoretical Analysis

This appendix presents the theoretical analysis underlying the hypotheses in the text. As the theoretical analysis modifies and extends the author's earlier theoretical analysis of layoffs, it is useful to introduce the conceptual formulation outlined in the previous work. Thus, assume that the worker confronts an exogenously determined wage-layoff probability relationship of the form

$$W = W(P, \alpha, \beta,) \tag{1}$$

where W is the hourly wage rate, P is the probability of layoff, and α and β are shift parameters. Labor supply studies treat the hourly wage confronting a given worker as determined by the market and thus exogenous. A similar approach is taken here. Individuals choose among jobs with different layoff probabilities and wages. The relationship between wage and layoff probabilities confronting the worker is determined by the forces of supply and demand in the market. (It is thus shaped partially by UI tax policy.) Assume in addition that

$$\partial W/\partial \alpha > 0; \quad \partial^2 W/\partial P \partial \alpha = 0 \tag{2}$$
$$\partial W/\partial \beta > 0; \quad \partial^2 W/\partial P \partial \beta > 0 \tag{3}$$
$$\partial W/\partial P > 0 \tag{4}$$

AA′ in the figure in Section I of the text illustrates the curve.

Assumption two is fundamental to the subsequent theory. It implies a compensating differential for layoff probabilities, that is, a worker who chooses a job with higher layoff probability will receive a higher wage than an identical worker who chooses a job with a lower layoff probability. From the perspective of classical economic theory, if workers are aware of differing layoff probabilities across jobs, if layoffs reduce consumption, and if workers can move between jobs, then wages in high layoff probability jobs should lie above those in otherwise identical low layoff probability jobs. Neoclassicists have refined and modified this argument by noting that it implicitly restricts the distribution of tastes and labor demand, that it applies to total compensation (money wages, fringe benefits, and job amenities), and that it assumes workers do not systematically underestimate risks.[1] Several previous works provide evidence for a positive relationship between wages and layoffs.[2]

The third and fourth assumptions are introduced to simplify the analysis. At a given value of P, a change in the shift parameter α is assumed to change the hourly wage W but not affect the first derivative of the wage-layoff probability relationship, $\partial W/\partial P$. At a given value of P, a change in the shift parameter β is assumed to change $\partial W/\partial P$, but not affect the hourly wage. In the figure in Section I, if an individual were in equilibrium at point C with layoff probability equal to D, an increase in β would cause a counter-clockwise rotation in AA′ around point C. An increase in α would cause a parallel upward shift in AA′.

In an approach similar to that of Bailey (1977), it is assumed that the worker maximizes a two-period intertemporal additive utility function of the form:

$$E = U\,(WN + Z, T - N) + \gamma\,(1 - P)\ \mathrm{Max}\{U(Z, T) + \delta;\ U(WN + Z, T - N)\} + P(U[Z + X, T] + \delta) \qquad (5)$$

where

W is the hourly wage ($W = W[P, \alpha, \beta]$),

N is hours worked,

Z is nonwage income which is independent of layoff (for example, property income),

T is the maximum amount of leisure which can be consumed in a period,

γ is $1/(1 +$ the discount rate$)$,

P is the probability of layoff,

δ is a discrete random variable which takes the value δ' with probability R and is zero otherwise.

$\mathrm{Max}\{A;B\}$ equals the larger of A and B, that is,

if $A > B$ then $\mathrm{Max}\{A;B\} = A$

if $A < B$ then $\mathrm{Max}\{A;B\} = B$.

X is nonwage income which is contingent on layoff (for example, unemployment insurance).

To break this down a bit, in the first period the worker obtains utility, $U(WN + Z, T - N)$. In the second period, the worker obtains expected utility,

$$\gamma\ \ (1 - P)\mathrm{Max}\{U(Z, T) + \delta;\ U(WN + Z, T - N)\}\ P[U(Z + X, T] + \delta)$$

Thus, while employment is certain during the first period, there is a probability P of layoff at the end of the first period. If layoff does occur, the worker receives income $X + Z$ and consumes the maximum amount of leisure, T. If layoff does not occur, the worker chooses to maximize utility either by quitting and obtaining utility $U(Z, T) + \delta$, or by continuing working and obtaining utility $U(WN + Z, T - N)$. Finally, assume that

If $\delta = \delta'$ then $\mathrm{Max}\{U(Z, T) + \delta;\ U(WN + Z, T - N)\} = U(Z, T) + \delta'$

If $\delta = 0$ then $\mathrm{Max}\{U(Z, T) + \delta;\ U(WN + Z, T - N)\} = U(WN + Z, T - N)$

Thus, there is a probability R that an event will occur such that period two utility from quitting and not working, $U(Z, T) + \delta$, exceeds period two utility from working, $U(WN + Z, T - N)$. Given this, the expected utility function can be rewritten

$$E + U(WN + Z, T - N) + \gamma\Big(R\{(1 - P)[U(Z, T) + \delta'] + P[U(Z + X, T)\ \delta']\} + (1 - R)\ \{(1 - P)U(WN + Z, T - N) + P[U(Z + X, T)]\}\Big)$$

Quits followed by unemployed or out of labor force status are then incorporated into this model by assuming that the individual believes that conditions may arise in period two that would make it preferable to not work in the market. This may be due to anticipated schooling, an expected increase in home productivity (an adult in the household becomes ill, additional children are present) or increased productivity of searching for jobs while unemployed.

Note that as long as $X > 0$ (the level of UI benefits is greater than zero), the worker will hold off a quit decision until after the layoff decision is announced. This is because if $\delta = \delta'$ (and a quit is rational), then utility of being laid off, $U(Z + X, T) + \delta'$ exceeds the utility of quitting, $U(Z, T) + \delta'$. The probability of an observed quit is then $(1 - P)R$. The probability of an observed layoff is P. Finally, the probability of a quit *conditional* upon the probability that the person is not laid off is $R(1 - P)/(1 - P) = R$.

At this point is would be beneficial to tap a literature on the determinants of R, the probability that an individual prefers to not work, that is, to be either out of the labor force or unemployed and searching. There is of course ample literature on the factors which lead people to prefer to be out of the labor force. Based on this literature one would expect that R is negatively related to market wages and good health and positively related to nonwage income. Marriage and presence of children, especially younger children, may raise R for women and reduce R for men.

In contrast to the large literature on determinants of out of labor force status, there is little formal theory on conditions under which unemployed search is preferable to employed search. Writes Parsons,

> Beyond some obvious assertions, little has been done to model the decision to quit one's job and bear unemployment while searching. What combination of money cost/time cost substitutability, taste for leisure, and work hours rigidities make that optimal behavior.[3]

A small literature on job search suggests that the probability of such quits should be larger for rural workers because of their geographical isolation from other areas of labor demand.[4] In addition, the search literature concludes that such quits will be negatively related to the current wage relative to the mean of one's offer distribution.[5] For present purposes, then write the probability that not working is preferred to working as

$$R = R(W, Z, S),$$

where S is a linear combination of the variables noted above, and W and Z are the hourly wage rate and nonwage income, respectively. Further assume that $\partial R/\partial W < 0$; $\partial R/\partial Z > 0$; $\partial R/\partial S > 0$.

In summary then, the individual's problem is to select a value of P (the probability of layoff) which maximizes

$$E = U(WN + Z, T - N) + \gamma \Big(R\{(1 - P)[U(Z, T) + \delta'] + P[U(Z + X, T) + \delta']\} + (1 - R)\{(1 - P)U(WN + Z, T - N) + P[U(Z + X, T)]\}\Big)$$

subject to the constraints

$$W = W(P, \alpha, \beta)$$
$$R = R(W, Z, S).$$

Exogenous variables are Z, X, T, N, S, α, and β.[6]

To simplify matters somewhat, let

$$V(Z + X, T) = U(Z + X, T)$$
$$Q(Z, T) = U(Z, T)$$

The maximand is then written as

$$E = U(WN + Z, T - N) + \gamma \Big(R(1 - P)[Q(Z, T) + \delta'] + P[V(Z + X, T) + \delta'] + (1 - R)\{(1 - P)U(WN + Z, T - N) + P[V(Z + X, T]\}\Big)$$

Let the derivatives of V, R, and U with respect to their arguments be denoted by V_y, V_1, Q_y, Q_1, U_y, and U_1, and let

$$\partial W/\partial P = W_p$$
$$\partial W/\partial \alpha = W_\alpha$$
$$\partial W/\partial \beta = W_\beta$$
$$\partial^2 W/\partial P\partial \alpha = W_{p\alpha}$$
$$\partial^2 W/\partial P\partial \beta = W_{p\beta}$$
$$\partial^2 W/\partial P^2 = W_{pp}$$
$$\partial R/\partial W = R_w$$
$$\partial R/\partial Z = R_z$$
$$\partial R/\partial S = R_s$$

Signs on derivations of U, V, R, Q, and W are:

$$V_y > 0,\ V_1 > 0,\ V_{yy} < 0;\ Q_y > 0,\ Q_1 > 0,\ Q_{yy} < 0;$$
$$U_y > 0,\ U_1 > 0,\ U_{yy} < 0,\ U_{11} < 0,\ U_{1y} > 0;$$
$$W_p > 0, W_\alpha > 0,\ W_\beta = 0,\ W_{p\alpha} = 0,\ W_{p\beta} > 0;$$
$$R_w < 0, R_z > 0, R_s > 0$$

In addition, assume that an exogenous change in the wage rate (a change in α), holding P constant, increases second-period expected utility. This implies

$$(1 - R)\ (1 - P)U_yN + R_w\{\delta' + (1 - P)[-U(WN + X, T - N) + Q(Z, T)]\} > 0 \qquad \text{(a)}$$

Finally, assume that if P rises, the probability of experiencing neither a layoff nor a quit falls. This implies

$$\partial[(1 - P)(1 - R)]/\partial P = -(1 - R) - (1 - P)R_wW_p < 0 \qquad \text{(b)}$$

Substituting $R(W, Z, S)$ and $W(P, \alpha, \beta)$ into the expected utility functions and differentiating with respect to P, the first-order condition for a maximum is

$$0 = [1 + \gamma(1 - R)(1 - P)]\ U_yW_pN + \gamma R[-Q(Z, T) + V(Z + X,T)] + \gamma(1 - R)[-U(WN + Z, T - N) + V(Z + X, T)] + \gamma R_wW_p\{(1 - P)[Q(Z, T) - U(WN + Z, T - N)] + \delta'\}$$

It is useful to note that given (a) above and the first-order conditions, it can be shown that

$$U(WN + Z, T - N) - Q(Z, T) - (1 - P)U_yW_pN > 0$$

Totally differentiating the first-order conditions one can write:

$$AdP = CdX + DdZ + Ed\alpha + Fd\beta + GdS$$

where:

$$A = 2\gamma R_wW_p[U(WN + Z, T - N) - Q(Z, T) - (1 - P)\ U_yW_pN] + \gamma R_wW_p\delta' - 2\gamma(1 - R)\ U_yW_pN + [1 + \gamma(1 - R)(1 - P)]\ U_{yy}(W_pN)^2 + W_{pp}U_yN + W_{pp}\{\gamma(1 - R)(1 - P)\ U_yN + \gamma R_w[(1 - P)Q(Z, T) - U(WN + Z, T - N)] + \delta'\}$$

$$
\begin{aligned}
C &= -\gamma V_y \\
D &= R_z\gamma[U(WN + Z, T - N) - Q(Z, T) \\
&\quad - (1 - P)\, U_y W_p N] \\
&\quad - [1 + \gamma(1 - R)(1 - P)]\, U_{yy} W_p N \\
&\quad - \gamma(V_y - U_y) - \gamma R(U_y - Q_y) \\
E &= -[1 + \gamma(1 - R)(1 - P)]\, U_{yy} W_\alpha W_p N^2 \\
&\quad - \gamma R_w W_\alpha [U(WN + Z, T - N) \\
&\quad - Q(Z, T) - (1 - P)\, U_y W_p N] \\
&\quad + \gamma U_y W_\alpha [N(1 - R) + R_w W_p (1 - P)] \\
F &= -U_y W_p\, N \\
&\quad - \gamma W_{p\beta}(1 - R)(1 - P) U_y N \\
&\quad - \gamma W_{p\beta} R_w \{(1 - P)[Q(Z, T) \\
&\quad - U(WN + Z, T - N)] + \delta'\} \\
G &= -\gamma R_s [U(WN + Z, T - N) - Q(Z, T) \\
&\quad - (1 - P)\, U_y W_p N]
\end{aligned}
$$

By inspection

$$
\begin{array}{ll}
A\ ?\,0 & E > 0 \\
C < 0 & F < 0 \\
D\ ?\,0 & G < 0
\end{array}
$$

Second-order conditions for an interior maximum require $A < 0$. It can be shown that a sufficient condition —though not a necessary condition—for $A < 0$ is $W_{pp} < 0$. If the second-order condition for a maximum is satisfied, then by Cramer's rule,

$$
\begin{aligned}
dP/dX &> 0 \\
dP/dZ &\ ?\,0 \\
dP/d\alpha &< 0 \\
dP/d\beta &> 0 \\
dP/dS &> 0
\end{aligned}
$$

Given these results,

$$
\begin{aligned}
dR/dX &= R_w W_p\, (dP/dX) < 0 \\
dR/dZ &= R_w W_p (dP/dZ)\ ?\,0 \\
dR/d\alpha &= R_w [W_\alpha + (W_p)\, dP/d\alpha] < 0 \\
dR/d\beta &= R_w W_p dP/d\beta < 0 \\
dR/dS &= R_s > 0
\end{aligned}
$$

The sign on $dR/d\alpha$ assumes that an increase in α does not cause such a large decrease in P that W falls below its initial level. The opposite sign is theoretically possible, but requires extreme assumptions on W_{pp}.

Section II.A introduces comparative static results for B_0 and B_1 when the wage-layoff probability relationship is specified as $W = B_0 + B_1 P$. Specifically, it is claimed that

$$\partial P/\partial B_0 < 0;\ \partial R/\partial B_0 < 0$$

Because an increase in B_0 leads to a parallel upward shift in the wage-layoff probability relationship, this claim follows from the definition of the shift parameter α and the hypotheses, $\partial P/\partial \alpha < 0$; $\partial R/\partial \alpha < 0$. It is also claimed that

$$\partial R/\partial B_1 < 0$$

An increase in B_1 can be decomposed into an increase in α and β. Thus, $\partial R/\partial B_1 = (\partial R/\partial \alpha)(\partial \alpha/\partial B_1) + (\partial R/\partial \beta)(\partial \beta/\partial B_1)$. This claim follows from the fact that $\partial \alpha/\partial B_1$ *and* $\partial \beta/\partial B_1$ are positive, and $\partial R/\partial \alpha$ and $\partial R/\partial \beta$ have identical signs (see Hypotheses 8 and 9 in the text). Finally, it is claimed that $\partial P/\partial B_1 > \partial P/\partial B_0$.

To observe this, note that $\partial P/\partial B_1 = [(\partial P/\partial B_0)P + (\partial P/\partial \beta)(\partial \beta/\partial B_1)]$. Since $\partial P/\partial B_0 < 0$, $\partial P/\partial \beta > 0$ and $1 > P > 0$, the statement follows.

The text concludes with a discussion of how savings behavior may lead increased UI benefits to be positively associated with quits. Assume that the worker saves $\$\sigma$ in the first period, and receives interest on savings such that he can spend $\$\sigma/\gamma$ in the second period. Further assume that $R = R(W, Z, S, \sigma)$ with $\partial R/\partial \sigma > 0$. In this case, the maximand is written as

$$
\begin{aligned}
E = {} & U(WN + Z - \sigma, T - N) \\
& + \gamma \Big(R\{(1 - P)[Q(Z + \sigma/\gamma, T) + \delta'] \\
& + P[V(Z + X + \sigma/\gamma, T) + \delta']\} \\
& + (1 - R)\{(1 - P)U(WN + Z + \sigma/\gamma, \\
& T - N) + P[V(Z + X + \sigma/\gamma\ T)]\}\Big)
\end{aligned}
$$

Letting P, N, and σ be the endogenous variables, differentiating with respect to them yields the first-order conditions. This formulation of the problem yields only ambiguous hypotheses. Thus, although this approach yields little guidance for empiricism, it does suggest a possible mechanism by which higher UI benefits may lead to increased quit probabilities.

Notes to Appendix A

1. See Thaler and Rosen (1975) and Oi (1973).
2. A positive relationship between wages and layoffs has been found by Parsons (1972), Telser (1972), Bloch (1976), and Feldstein (1978). Hall (1972) and Abowd and Ashenfelter (1978) find a positive relationship between unemployment and wages. Only Abowd and Ashenfelter interpret this finding as evidence for a compensating differential.
3. Parsons (1977), p. 217.
4. Parsons (1973).
5. Barron and McCafferty (1977).
6. In order to avoid greatly complicating the analysis, N (hours worked) is assumed to be exogenous.

Appendix B: Estimating the First-Stage Wage-Layoff Probability Relationship

This appendix provides technical details on the methods used to estimate the compensation equations described in the text. Section B.1 lays out the econometric theory underlying the estimation methodology, B.2 discusses the techniques used in obtaining predictions of the probability of layoff, and B.3 presents and discusses the estimated compensation equations. Readers interested in the final results may wish simply to turn to B.3.

B.1: Estimation methodology

An estimate of the model of the following form is sought:

$$W = \mathbf{Q'A} + P[\mathbf{Q'D}] + \epsilon$$

where W is the hourly wage rate (a random variable), P is the probability of layoff (causing another form of compensation, and also assumed to be random), $\mathbf{Q}$ is a vector of worker characteristics, $\mathbf{A}$ and $\mathbf{D}$ are the parameters to be estimated, and ϵ is an error term assumed to be independent of P and $\mathbf{Q}$. The probability of layoff (P) is not observed; only the layoff or continued employment of a specific individual can be observed. In consequence, a proxy, termed P^*, was developed for P. The proxy is a function of all of the variables in the $\mathbf{Q}$ vector, plus a set of industry and occupation dummies.

The assumption that ϵ is independent of the P and the variables in the $\mathbf{Q}$ vector implies that the equation can be estimated with ordinary least squares (OLS). The goal here is to fit a line through that set of observed wage-layoff probability pairs which traces out the market-clearing wage-layoff probability curve, and thereby describes the relationship confronting a worker with some set of personal characteristics. Following Rosen (1974) and Smith (1979), OLS is completely appropriate for this purpose. As argued by Rosen, a hedonic relationship estimated in this way does not reveal the underlying demand-supply relationships. To recover these it is necessary to apply a simultaneous equation methodology such as that proposed by Rosen.

B.2 Estimating the probability of layoff

It is desired to predict the probability that a specific individual in a specific job will experience a layoff over some period of time, and also to predict this probability for the two measures of layoffs used in this study. This section outlines a methodology for using National Longitudinal Survey data to compute the probability that a given individual in a given job with t_0 weeks of employment in this job will experience a layoff over the next year.

Estimation of the probability of permanent layoff over one year for a given individual in a given job begins by estimating a logistic model of the form

$$P(PL \mid t_i, \mathbf{Q}_i, \mathbf{S}_i) = f(F_0 + F_1 t_i + \mathbf{Q}_i'\mathbf{F} + \mathbf{S}_i'\mathbf{G})$$

where $P(PL \mid t_i, \mathbf{Q}_i, \mathbf{S}_i)$ is the probability that an individual with characteristics $\mathbf{Q}_i$ works at a job with characteristics $\mathbf{S}_i$ for a spell of employment of length t_i weeks, which is terminated in a layoff; and F_0, F_1, $\mathbf{F}$ and $\mathbf{G}$ are estimated parameters, the last two being vectors.

The unit of observation in this model is a spell of employment.[1] If a spell is terminated with a layoff, the dependent variable takes the value 1; otherwise it is zero. The $\mathbf{Q}$ vector includes individual characteristics such as education, region, race, work experience prior to current job, residence in a Standard Metropolitan Statistical Area (SMSA), and size of SMSA. The $\mathbf{S}$ vector employs industry and occupation binary variables as job characteristics.

The estimated model permits prediction of the probability that an employment spell of length t_i is terminated with a layoff. To compute the probability that a given individual with t_{0i} weeks of employment in a given job will be laid off in the next year, compute

$$P(PL\ 1\text{ yr.} \mid t_{0i}, \mathbf{Q}_i, \mathbf{S}_i) = 1 - \prod_{t_i=1}^{52} [1 - P(PL \mid t_i + t_{0i}, \mathbf{Q}_i, \mathbf{S}_i]$$

The term in brackets is the probability that the ith individual is not laid off in week $t_{01} + t_i$ of the employment spell. The product of these terms over $t_i = 1, 52$ is the probability that an individual *is not* laid off over any of the weeks between t_0 and $t_0 + 52$. One minus this probability is the probability that an individual is laid off during the period.

Estimation of the probability of either a permanent or temporary layoff for a given individual in a given job begins with estimation of a logistic model of the form

$$P(TL \mid t_i, \mathbf{Q}_i, \mathbf{S}_i) = f(H_0 + H_1 t_i + \mathbf{Q}_i'\mathbf{H} + \mathbf{S}_i'\mathbf{J})$$

where: $P(TL \mid t_i, \mathbf{Q}_i, \mathbf{S}_i)$ is the probability that an individual with characteristics $\mathbf{Q}_i$, employed for t_i weeks in a job with characteristics $\mathbf{S}_i$, experiences a temporary layoff at some time during this employment spell; and H_0, H_1, $\mathbf{H}$, and $\mathbf{J}$ are estimated parameters.

As in the model of permanent layoffs, the unit of observation is a spell of employment.[2] If the individual experiences unemployment attributable to a layoff during the spell, the dependent variable takes the value 1; otherwise it is zero. The $\mathbf{Q}$ and $\mathbf{S}$ vectors are identical to those used in the permanent layoff model.

The estimated model predicts the probability that a temporary layoff occurs during an employment spell of length t_i. To compute the probability that a given individual in a given job with t_{0i} weeks in the job will experience a temporary layoff during the next year, calculate [3]

$$P(TL\ 1\text{ yr.} \mid t_{0i}, \mathbf{Q}_i, \mathbf{S}_i) = \frac{P(TL \mid t_i = t_{0i} + 52, \mathbf{Q}_i, \mathbf{S}_i)}{1 - P(TL \mid t_i = t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)} - \frac{P(TL \mid t_i = t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)}{1 - P(TL \mid t_i = t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)}$$

To calculate the probability that a given individual in a given job with t_{0i} weeks in the job will experience either a temporary or permanent layoff during the year, calculate

$$P(PL \text{ or } TL \text{ 1 yr.} \mid t_{0i}, \mathbf{Q}_i, \mathbf{S}_i) = 1 - [1 - P(PL \text{ 1 yr.} \mid t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)] \times [1 - P(TL \text{ 1 yr.} \mid t_{0i}, \mathbf{Q}_1, \mathbf{S}_i)]$$

The first bracketed term is the probability of not experiencing a permanent layoff during the year. The second bracketed term is the probability of not experiencing a temporary layoff during the year. Their product, then, is the probability of experiencing neither a temporary nor a permanent layoff during the one year. One minus this product is the probability of experiencing either a temporary or a permanent layoff during the one year period.

Table B-1 presents the regressions and canonical correlations employed in computing the value of B_0 and B_1 used in the second stage estimation. The models implicitly assume that the compensation-layoff probability relationship is linear. This assumption was tested by entering into regressions and canonical correlations a set of interactions between the square of the layoff probability and variables 1 through 25 (shown in Table B-1). In most cases it was not possible to reject at the

TABLE B–1. Regressions used in predicting B_0 and B_1 in second stage model

Variables	Least squares regression Males (1)	Females (2)
1. Education	.2936	.2604
	(18.086)	(18.353)
2. Job duration (days)	.0002	.0000
	(12.643)	(1.619)
3. Non-white	−.7237	−.1568
	(5.769)	(1.817)
4. Work experience (years)	−.0108	.0363
	(1.245)	(5.976)
5. WKEXPM [1]	.3071	−.2643
	(.734)	(1.878)
6. SMSA size	.0002	.0001
	(4.327)	(3.219)
7. SMSASZPM [2]	−.6772	.0792
	(1.891)	(.344)
8. SMSA resident	.5999	.2980
	(4.975)	(3.658)
9. Age	−.0101	−.0223
	(.668)	(2.493)
10. Married with spouse present	.2787	.0528
	(1.655)	(.632)
11. Number of children under 18	.0942	−.0426
	(2.729)	(2.000)
12. Health does not limit work	.2695	.1152
	(2.132)	(1.205)
13. UI coverage fraction	.1383	−.0318
	(.857)	(.297)
14. New England region	−.8089	−.0562
	(2.946)	(.272)
15. Mid-Atlantic region	−.8862	−.1394
	(4.253)	(.976)
16. East North Central region	−.8665	−.2145
	(4.360)	(1.526)
17. West North Central region	−.8959	−.1764
	(3.305)	(.926)

TABLE B–1. Regressions used in predicting B_0 and B_1 in second stage model (*continued*)

Variables	Less squares regression Males (1)	Females (2)
18. South Atlantic region	−.5632	−.3146
	(2.718)	(2.228)
19. East South Central region	−.9448	−.4193
	(3.531)	(2.277)
20. West South Central region	−.9456	−.3967
	(3.900)	(2.451)
21. Mountain region	−1.1829	−.0590
	(3.436)	(.261)
22. Probability of layoff	1.7712	.9539
	(.885)	(.591)
23. Var 22 × Var 1	−.1881	−.3260
	(4.817)	(7.828)
24. Var 22 × Var 2	−.0002	−.0004
	(2.884)	(1.074)
25. Var 22 × Var 3	.4106	−.0909
	(1.400)	(.352)
26. Var 22 × Var 4	.0262	−.0380
	(1.601)	(2.236)
27. Var 22 × Var 5	−.9901	.6184
	(1.210)	(1.525)
28. Var 22 × Var 6	−.0005	.0001
	(4.217)	(.595)
29. Var 22 × Var 7	.4229	.1478
	(.633)	(.182)
30. Var 22 × Var 8	.1724	−.5167
	(.636)	(2.025)
31. Var 22 × Var 9	−.0116	.0420
	(.349)	(1.499)
32. Var 22 × Var 10	.6337	−.2255
	(1.826)	(.909)
33. Var 22 × Var 11	−.16670	.1097
	(2.288)	(1.807)
34. Var 22 × Var 12	−.0482	.0939
	(.182)	(.329)
35. Var 22 × Var 13	1.8945	.1569
	(5.285)	(.514)
36. Var 22 × Var 14	.2935	1.0879
	(.421)	(2.161)
37. Var 22 × Var 15	1.3998	.1431
	(3.222)	(.362)
38. Var 22 × Var 16	1.8751	.1536
	(4.129)	(.423)
39. Var 22 × Var 17	.2555	−.6752
	(.480)	(1.091)
40. Var 22 × Var 18	−.4182	−.0746
	(.958)	(.195)
41. Var 22 × Var 19	−.1149	.1556
	(.212)	(.257)
42. Var 22 × Var 20	.0234	−.2050
	(.045)	(.485)
43. Var 22 × Var 21	.9258	−.1717
	(1.323)	(.292)
44. Constant	1.0685	.2484
N	3538	2951
R^2	.3573	.2339

[1] In the 287 cases where no data were available on years of work experience, the years-of-work-experience variable was set to zero and this variable was set to zero. Otherwise, it equals 1.
[2] In the 88 cases where no data were available on SMSA size, SMSA size was set to zero and this variable was set to zero. Otherwise, it equals 1.

.10 level the hypothesis that the coefficients on these interaction terms were all equal to zero. Linearity was thus assumed in all efforts at estimating B_0 and B_1.

Several other specifications of the compensation-layoff relationship (and thereby B_0 and B_1) were tested. These models differ from that shown in Table B-1, in that they included:

- (education)^2, (work experience)^2, (job duration)^2, education $\times$ work experience, work experience $\times$ job duration, education $\times$ job duration; and/or
- the dependent variable specified in logs; and/or
- the inverse of the Mill's ratio (to control for self-selection). Versions of B_0 and B_1 computed from these models were tested in the second stage models. In general, second stage results were insensitive to such changes in specification.

Notes to Appendix B

1. NLS data on employment spells are obtained from individuals reporting at a given point on jobs held at earlier points. Thus, the data used in this analysis are based on employment spells which either had not terminated at the time of the interview or had terminated with a quit or a layoff. In the first case, t_i is measured as the period between the beginning of the job and the date of interview.

2. As in the analysis of permanent layoffs, the analysis is based on spells which terminated in a quit, a layoff, or which had not terminated at the date of the interview. In the latter case, t_i is measured as the period between the beginning of the job and the date of the interview.

3. Assuming statistical independence,

The probability of no temporary layoff over $t_0 +$ 52 weeks	=	The probability of no temporary layoff over t_0 weeks	$\times$	The probability of no temporary layoff between week t_0 and week $t_0 + 52$

then,

$$[1 - P(TL \mid t_i = t_{oi} + 52, \mathbf{Q}_i, \mathbf{S}_i)] = [1 - P(TL \mid t_i = t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)] \times [1 - P(TL \text{ 1 yr.} \mid t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)]$$

and

$$P(TL \mid \text{1 yr. } t_{0i}, \mathbf{Q}_i, \mathbf{S}_i) = 1 - \frac{[1 - P(TL \mid t_i = t_{0i} + 52, \mathbf{Q}_i, \mathbf{S}_i)]}{[1 - P(TL \mid t_i = t_{0i}, \mathbf{Q}_i, \mathbf{S}_i)]}$$

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The Effect of Unemployment Insurance Payments on Strike Duration

John Kennan

Public payments to striking workers have caused fierce political and legal controversies, but the actual effects of such payments on strike activity have received very little attention. Indeed, although labor economists have long been intrigued by the observation that strike activity is procyclical and therefore responsive to economic variables, there have been no detailed microeconomic analyses of the economic forces affecting strike activity and, more particularly, strike duration.

This paper examines the apparently narrow issue of whether payment of unemployment insurance (UI) benefits to striking workers in New York (and Rhode Island), after a waiting period of 8 weeks, tends to prolong strikes. This issue actually has rather broad implications. First, the time-series evidence showing procyclical variations in strike activity is open to serious question,[1] and fluctuations in strike activity may prove to be simply random. In any case, it is important to isolate those economic variables, if any, that significantly affect strike activity. Second, there is an interesting analogy between the economics of strike duration and the economics of unemployment duration, particularly when strikes are analyzed in terms of total cost. One may reasonably expect that a fruitful cross-fertilization of ideas would result when an analysis of the effects of UI on strike duration is placed beside an analysis of UI and unemployment duration.

This paper presents the results of a gross comparison of industry and age-specific conditional settlement probabilities for strikes in New York, with the corresponding probabilities in other States. It has not been possible to net out the effects of cost variables such as unemployment, sales, and unfilled orders, so the results must be interpreted cautiously (although it seems unlikely that the results will be greatly changed by the introduction of additional variables). The main result is that the settlement probability of New York strikes after the 8-week waiting period is substantially less than the probabilities for other States, and this difference is highly significant. On the other hand, the New York settlement probability before 8 weeks is substantially greater than the probabilities for other States, and this difference is even more significant.

The gap between the New York rate and the U.S. average is greatest when the strike is very young; the gap steadily closes as the strike grows older. After a cross-over at about 50 days, a gap opens in the other direction, widening steadily thereafter. In other words, the New York settlement probability as a function of strike age (the hazard function) is rotated clockwise in relation to the hazard function for other States. This difference between New York and other States is quite remarkable. It may not be due to UI payments, but if not, one is left with a very perplexing and interesting question of causation.

Models of Strike Activity

Bargaining models

The introduction of UI benefits for strikers will certainly cause workers to reject settlement proposals that otherwise would have been marginally acceptable. However, this does not imply that UI payments will prolong strikes because employers, who are certainly aware of the effect of UI payments, will make concessions they otherwise would not have made. It is thus reasonable to conclude that UI payments will lead to a settlement relatively favorable for workers, but it appears difficult to predict the effects UI payments will have on strike duration.

The effect on duration cannot be reliably predicted from a bargaining model such as the Cross model.[2] In a bargaining model, each side is assumed to have a subjective belief about the intentions of the other side; these beliefs are modified during the bargaining process. In the Cross model, for example, i begins with the

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belief that j will concede at the rate r_i per period, and this is adjusted in light of the actual concession rate q_j. The fundamental difficulty in extracting comparative statics predictions from bargaining models such as this is that the process by which beliefs are formed is not known, and, a fortiori, it is not possible to say how these beliefs will be changed by an intervention such as the payment of UI benefits to strikers.

The Ashenfelter-Johnson model

A similar difficulty arises in the well-known model of Ashenfelter and Johnson.[3] In this model, workers do not optimize, but instead follow an arbitrary resistance curve. If the model is to be used to predict the effects of UI payments, one must know how the resistance curve will shift, but as the original curve is unknown, the kind of shift that will occur is also unknown.

However, the Ashenfelter-Johnson (or AJ) model provides a useful framework for analyzing the implications of simple intuitive judgments about how workers might behave. For example, the effects of a change in the unemployment rate on the shape of the workers' resistance curve may be postulated and predictions about the frequency and duration of strikers derived. In this spirit, suppose that the prospect of UI payments after 8 weeks is so remote that it has no effect on the initial wage increase y_o demanded by the workers. It is natural to suppose that UI payments would raise y^*, the lowest acceptable wage increase after an indefinitely long strike. The resistance curve is exponential:

$$y(s) = y^* + (y_o - y^*)\, e^{-as} \tag{1}$$

The profit-maximizing strategy for the firm is to let the strike continue until $y(s)$ reaches a target

$$y(s) = \lambda y^* + (1 - \lambda)\, y_b \equiv y^T \tag{2}$$

where

$$\lambda \equiv \frac{a}{a+r} = 1/\left(1 + \frac{r}{a}\right) \tag{3}$$

$$v_b \equiv \frac{1}{S_L} - 1 \tag{4}$$

S_L is labor's share of total revenue, and r is the firm's interest rate.[4] If the initial demand y_o is already at or below the firm's target y^T, the firm will grant this demand, and there will be no strike. Y_b is the maximum increase that the firm could grant without incurring losses—the break-even wage increase. The target is a weighted average of this break-even level and of the workers' asymptotic demand y^*, and the weights depend on how rapidly the workers' demand declines (measured by a), relative to the firms' cost of waiting (measured by r). For example, if a is small relative to r, the target will be near y_b, which implies that strikes will tend to be infrequent and short.

From equation 2

$$(y^T - y^*) = (1 - \lambda)(y_b - y^*) \tag{5}$$

Let S_o be the time at which the resistance curve crosses the break-even level:

$$(y_b - y^*) = (y_o - y^*)\, e^{-aS_o} \tag{6}$$

(thus S_o may be negative). Then the optimal strike duration S^* is given by

$$\begin{aligned}(y_o - y^*)\, e^{-aS^*} &= (y^T - y^*) \\ &= (1 - \lambda)(y_o - y^*)\, e^{-aS_o}\end{aligned} \tag{7}$$

In other words $S^* - S_o$ is the length of time needed for the fraction λ to decay at the rate a; if $\lambda = 1/2$, $S^* - S_o$ is a half life. Thus $S^* - S_o$ depends only on a and λ:

$$S^* - S_o = -\frac{1}{a} \log(1 - \lambda). \tag{8}$$

The effect of an increase in y^*, other things being equal, can now be explained simply. From the above expression it is clear that the optimal strike duration changes only to the extent that S_o changes. Because the increase in y^* swivels the resistance curve about y_o, the distance of S_o from the origin must increase. Thus, if S_o was initially positive, S^* must increase; while, if S_o was negative, S^* must decrease (and may become negative). Noting that the sign of S_o is the sign of $y_o - y_b$, the results of an increase in y^* may be summarized:

- If the worker's initial demand (y_o) exceeds the firm's ability to pay (y_b), an increase in y^* increases the optimal strike duration S^*.
- If the workers' initial demand does not exceed the firm's ability to pay, an increase in y^* decreases the optimal strike duration S^*. This includes the possibility that S^* would turn negative: the increase in y^* causes the firm to settle at y_o without a strike, when it would otherwise have been optimal to take a strike.[5]

These results are discussed below, after the empirical conclusions are presented. At this point, it simply should be noted that the model predicts that, when UI payments are interpreted as an increase in y^* in the AJ model, loosely speaking, UI payments will make long strikes longer, will make short strikes shorter, and will abort some very short strikes that otherwise would have occurred.[6]

The total cost model

This author has proposed elsewhere a model of strike duration that cuts through the tangle of subjective beliefs in the bargaining process and posits a relationship between the probability distribution of strike duration and the total cost of a strike to both sides.[7] A simple version of this total cost model is outlined here and used to predict the effect of UI payments on strike duration.

Suppose a strike that has been in effect for some period of time is observed with an interest in the probability, p, that it will be settled within the next day. Continuation of the strike for 1 additional day involves a loss of sales revenue, which otherwise could have been divided between the employer and the workers. This loss will be offset to the extent that orders can be held until the strike is over. The loss is further reduced by the actual or imputed value of the time that otherwise would have been spent in production, and by the amount of any public or private subsidies that can be collected by either side. The marginal strike cost, c, is then defined as the net loss resulting from continuation of the strike for 1 additional day. No distinction is made on the basis of which side initially bears the costs of the strike, as these costs can be shifted from one side to the other in the bargaining process.

The main idea of the total cost model is that the conditional settlement probability p is an increasing function of the marginal strike cost c, other things being equal. This is advanced as a potentially testable hypothesis about collective behavior, which is not dependent on any particular model of the bargaining process. For any strike, the Pareto optimal outcome is that it be settled immediately; if it is not, c measures the magnitude of the collective error associated with continuation of the strike for 1 additional day. The continuation probability is then interpreted as the probability of drawing a number exceeding c from a distribution of errors that is fixed for a given bargaining situation:

$$1 - p = \text{Prob}\ (\epsilon \geqq c) \tag{9}$$

For given c, it seems likely that the settlement probability will also be affected by the size of the pie being divided between the two parties, or, in other words, by the stakes for which the game is being played. The pie is the net value of the partnership between the employer and the workers, defined as the maximal present value of total revenue less nonlabor costs minus the opportunity costs of each party.

Let w be the highest wage the representative worker can earn elsewhere and let v be the rate of profit the employer can obtain elsewhere. Then if the partnership can generate net revenue at the rate z, the pie is

$$\pi = A(z - v - wL) \tag{10}$$

where A is the present value of a \$1 annuity over the life of the partnership, and L is the number of workers, assumed fixed. Let I denote the total income from alternative sources received by both parties during the strike. Then marginal strike cost is

$$c = z - I = \frac{\pi}{A} + v + wL - I \tag{11}$$

For given c, the settlement probability will be a decreasing function of π. Thus, for example, a marginal strike cost of \$1,000 will be considered negligible by the parties if the pie is \$10 million, so it should have little effect on the bargaining process; whereas if π is \$50,000, a cost of \$1,000 per day should have a substantial effect. The most convenient specification of this relationship is

$$\omega \equiv \log\left[p/(1-p)\right] = k_o + k_1 + \frac{c}{\pi} \tag{12}$$

where k_1 is positive.

The effect of UI payments can now be considered in the context of this simple model. First, it is well known that the UI system subsidizes unemployment because of imperfections in experience rating, the provision of interest-free loans, and the exemption of UI payments from income tax.[8] A distinctive feature of the total cost model is that, if there were no subsidy, UI payments would not change the marginal strike cost, and, therefore, would not change the settlement probability. Suppose the subsidy is at the rate of J dollars per day in New York, after the initial waiting period of 56 days has passed. Let q denote the settlement probability in New York after 56 days and let ζ denote the logit of q. Then a comparison of settlement probabilities between New York and other States, other things being equal, yields

$$\delta \equiv \omega - \zeta = k_1 \frac{J}{\pi} \tag{13}$$

In principle, this equation could be used to obtain testable predictions as to the differential effects of UI payments across industries. This has not been attempted, however.

For strikes that are less than 56 days old, the total cost model predicts $\delta = 0$; the prospect of a subsidy at some future date is assumed to be irrelevant. If this assumption were relaxed, one might expect positive and gradually increasing values for δ before 56 days. This possibility is examined below. It is conceivable that the prospect of UI payments would actually increase the probability that a strike would occur in the first place. However, from a practical point of view this seems implausible; less than 10 percent of the strikes in New York last 56 days.[9]

The Econometric Model

The econometric model used below is largely self-contained. The purpose of the empirical work is to provide a summary of the data that might be used to make qualitative judgments as to how alternative theories conform with the evidence. The model, therefore, does not impose special assumptions or prior restrictions derived from any particular theory. It is hoped that the empirical results will have permanent and general value; for example, they should be of interest to those who do not accept either the total cost theory or the AJ theory.[10]

The data

All of the data used in this study were drawn from the Bureau of Labor Statistics (BLS) work stoppages historical file, released in early 1979. This is a microdata file describing each strike recorded by BLS over the period from 1953 to 1977. For each strike, the following data are included: duration, State, three-digit SIC code, major issue, contract status, number of workers involved, and beginning and ending dates. Unfortunately, the file contains no information on sales revenue, inventories, unfilled orders, local unemployment rates, industry turnover rates, or other variables directly related to marginal strike cost. It would be possible to match the historical file with other data sources, and record for each strike the average layoff rate for the industry at the time of the strike, for example, or the average unemployment rate in the State. This has not been done at the present time, however, and this absence of data relating to strike costs seriously weakens the empirical results reported below.

In order to obtain a relatively homogeneous sample, the data were first sorted by contract status and major issue. Most strikes fall in one of two categories: strikes over wages at contract expiration, here referred to as "primary" strikes; and strikes over plant administration while a contract is in effect, which are called "secondary" strikes. Because major issue was not recorded before 1961, the data for 1953 to 1960 were discarded. Two-digit industries in New York with a sample size of less than 90 were discarded. Multiple records (strikes spanning 2 States, 2 industries, or 2 years) were also discarded; the number of multiple records is small, and inclusion of these strikes is unlikely to influence the results. Finally, strikes still in progress when the data were released were discarded.

The likelihood function

Assume first that the probability distribution of strike duration, from which the data are drawn, remains fixed over the period of observation. Distinguish strikes that occurred in New York from those occurring elsewhere, and let Y_t, and X_t denote the number of strikes in New York and in other States, respectively, that lasted exactly t days. Let

$$A_t \equiv \sum_{s=t}^{\infty} X_s \qquad B_t \equiv \sum_{s=t}^{\infty} Y_s$$

so that A_t and B_t represent the number of strikes that lasted at least t days.

Now the statistical model is simple: for each day, for each strike, there is a Bernoulli trial that determines whether the strike will end that day, or continue to the next day. It is assumed that X_t is the number of successes in A_t independent trials, where each trial has the same probability, p_t, of success. Similarly, there are Y_t successes in B_t independent trials, each with probability q_t of success. It is assumed that the A trials and the B trials are mutually independent. The variables p_t and q_t denote the conditional probability that a strike that has already lasted t days will be settled before tomorrow. The null hypothesis is that p_t and q_t are the same for each t; the alternative hypothesis is that q_t differs from p_t because New York pays UI to strikers.

The likelihood function is

$$L = \prod_{t=t_0}^{t_1} \binom{A_t}{X_t} \binom{B_t}{Y_t} p_t^{X_t} (1-p_t)^{A_t-X_t} q_t^{Y_t} \times (1-q_t)^{B_t-Y_t} \tag{14}$$

Let

$$\omega_t \equiv \log \frac{p_t}{1-p_t} \quad \zeta_t \equiv \log \frac{q_t}{1-q_t} \tag{15}$$

Then the log likelihood may be written as

$$l = \text{constant} + \sum_{t=t_0}^{t_1} [A_t \log (1-p_t) + B_t \log (1-q_t)] + \sum_{t=0}^{t_1} [X_t\omega_t + Y_t\zeta_t]. \tag{16}$$

It is easily seen that if no restrictions are placed on the parameters, the maximum likelihood estimates are

$$p_t = X_t/A_t \quad q_t = Y_t/B_t \tag{17}$$

and the maximal log likelihood is

$$l = \sum_{t=t_0}^{t_1} \log \binom{A_t}{X_t} \binom{B_t}{Y_t} + \sum_{t=t_0}^{t_1} g(X_t,A_t) + \sum_{t=t_0}^{t_1} g(Y_t,B_t) \tag{18}$$

where the function g is defined by

$$g(x,a) \equiv x\log x + (a-x) \log (a-x) - a\log a. \tag{19}$$

Alternative models

Two distinct questions arise at this point: The first concerns the parameterization of the "hazard" p or q as a function of t; the second concerns the relationship between p_t and q_t.

Several forms of the hazard function have been studied in the engineering literature on reliability and in the biological literature on life distributions. The simplest model, which serves as a reference point for more complicated specifications, assumes that the hazard is constant as a function of time, so that the life distribution is exponential. A popular and flexible model that allows the hazard to vary is the Weibull hazard function:

$$z(t) = Kt^m \qquad K > 0 \qquad m > -1 \tag{20}$$

where z is the hazard, in continuous form. The Weibull model includes the constant hazard model as the special case $m = 0$, while $m > 0$ implies an increasing hazard, and $m < 0$ implies a decreasing hazard. Horvath and Lancaster have used the Weibull model in studies of strike duration, and Lancaster has also applied it to unemployment duration.[12,13]

A potentially important weakness of the Weibull model in applications to strike data is that it requires the hazard to be a monotonic function of age. There are theoretical arguments which suggest that on the contrary, the hazard should initially rise and subsequently fall with age; there seems to be some empirical evidence for this (see Table 5).[14]

For discrete data on strike duration, it is possible to avoid prejudging the shape of the hazard function by treating strike age as a qualitative variable. This is discussed in the following section.

The proportional odds model

A very convenient parameterization of the effect of UI payments is achieved by specifying

$$\zeta_t = \omega_t - \delta \tag{21}$$

which implies

$$\frac{q_t}{(1-q_t)} = e{-}\delta\ [p_t/(1-p_t)] \tag{22}$$

In other words, the odds in favor of a settlement, given payment of UI, are proportional to the odds when there is no UI payment; this proportional effect is constant across strikes of different ages.

The proportional odds model is a special case of the elegant conditional logit model developed by McFadden [15], and McFadden's analytical and computational results are available: a particularly useful result, for example, is that the log likelihood function is concave in the parameters $(\delta, \omega_{t_0} \ldots \omega_{t_1})$. On the other hand, the special features of the proportional odds model permit the derivation of results that are simpler and sharper than those available in the general case, including an analytic expression for the asymptotic standard error of the maximum likelihood estimator of δ. The relevant properties of the likelihood function are described here and detailed in the Appendix.

From equation (16) the log likelihood of the sample, considering strike ages from 1 to T days, is

$$\begin{aligned} l(\delta,\omega_1,\omega_2 \ldots \omega_T) &= \sum_{t=1}^{T} [X_t\omega_t - A_t \log(1+e^{\omega_t}) \\ &\quad + Y_t(\omega_t - \delta) - B_t \log(1+e^{\omega_t-\delta}) \end{aligned} \tag{23}$$

The likelihood equations are

$$l_\delta \equiv -\sum_{t=1}^{T} b_t = 0 \tag{24}$$

$$l_{\omega_t} \equiv a_t + b_t = 0 \tag{25}$$

where

$$a_t \equiv X_t - p_tA_t \tag{26}$$

$$b_t \equiv Y_t - q_tB_t \tag{27}$$

From equation 15 note that

$$\begin{aligned} pt &= e^{\omega_t}/(1+e^{\omega_t}) \\ qt &= e^{\omega_t-\delta}/(1+e^{\omega_t-\delta}) \end{aligned} \tag{28}$$

Now expand 25 as follows:

$$\begin{aligned} &(X_t+Y_t)(1+e^{\omega_t})(1+e^{-\delta}e^{\omega_t}) \\ &\quad - A_t e^{\omega_t}(1+e^{-\delta}e^{\omega_t}) \\ &\quad - B_t e^{-\delta} e^{\omega_t}(1+e^{\omega_t}) = 0 \end{aligned} \tag{29}$$

For given δ, this is a quadratic equation in e^{ω_t}, so if a value of δ is known or assumed, the maximum likelihood values of $(\omega_1, \omega_2 \ldots \omega_T)$ can be found analytically.[16] This fact is crucial for computation purposes when T is large, as in the case of strikes aged 1 to 56 days considered in Tables 3 and 4 below.

The Hessian of l has zeroes everywhere except for the first row and column and the main diagonal, which are as follows:

$$\frac{\partial^2 l}{\partial\delta^2} = -\sum_{t=1}^{T}\beta_t \tag{30}$$

$$\frac{\partial^2 l}{\partial\delta\partial\omega_t} = \beta_t \tag{31}$$

$$\frac{\partial^2 l}{\partial\omega_t^2} = -\alpha_t - \beta_t \tag{32}$$

where

$$\alpha_t \equiv p_t(1-p_t)A_t \tag{33}$$

$$\beta_t \equiv q_t(1-q_t)B_t$$

It is shown in the Appendix that the element in the top left-hand corner of the inverse of the Hessian is

$$h = -\left[\sum_{t=1}^{T}\alpha_t\beta_t/(\alpha_t+\beta_t)\right]^{-1} \tag{34}$$

The asymptotic standard error of $\hat{\delta}$ is then estimated as

$$\hat{SE}(\hat{\delta}) = -h \tag{35}$$

and this value is used in the tables below.

The formula for h is also used to compute the solution of the likelihood equations. Good initial values for δ are readily available: 0 is adequate, for example, and the value implicit in equation (17) is excellent. Given an initial value δ^0, equation (29) can be solved to obtain ω_t^0. Then, since $l_\omega(\delta^0,\omega^0)$ is 0, the Newton step for δ is simply

$$\delta^1 - \delta^0 = - h\, l_\delta(\delta^0,\omega^0) \qquad (36)$$

The process is then repeated, starting from δ^1. For practical purposes, convergence is achieved after a single iteration.

Empirical Results

Tables 1 to 5 contain estimates and hypothesis tests for "primary" strikes (defined above). Tables 1 and 2 cover the period (after 56 days) during which UI payments are available in New York, with an arbitrary upper age limit of 105 days imposed to simplify computations. Tables 3 and 4 cover 1 to 56 days, and Table 5 contains an analysis of the New York hazard function relative to all other States over 1 to 105 days broken down into overlapping 20-day periods. The tables are discussed in turn.

Tests based on a constant hazard assumption: manufacturing, 56–105 days

Table 1 refers to the aggregate of all manufacturing industries, considered over the period from 56 to 105 days. If hazard rates are assumed constant over this period, a simple extension of equation 17 shows that the maximum likelihood estimators are

$$\hat{p} = \sum_{t=56}^{105} X_t \Big/ \sum_{t=56}^{105} A_t \qquad (37a)$$

$$\hat{q} = \sum_{t=56}^{105} Y_t \Big/ \sum_{t=56}^{105} B_t \qquad (37b)$$

Using these formulae, $\hat{p}$ was estimated as 2.99 percent per day, while $\hat{q}$ was 2.32 percent per day for New York. This confirms the prediction that UI payments should reduce settlement probabilities in New York as compared with other States.

A much stricter test of this prediction is obtained when each other State is compared with the national average, to see whether New York is unique. As Table

TABLE 1. The proportional odds model, manufacturing aggregate, days 56 to 105

State	SIC	p	q	CON	HYP	HOM	PODDS	DELTA0	DELTA	T	$A(56)$	$B(56)$
AL	0	2.95	3.27	0.131	0.789	0.818	0.805	−0.11	−0.10	0.71	2,745	60
AR	0	2.96	2.65	0.094	0.355	0.724	0.698	0.11	0.11	0.49	2,777	28
CA	0	2.97	2.65	0.120	0.126	0.761	0.776	0.12	0.11	1.15	2,652	153
CT	0	2.96	2.72	0.099	0.389	0.744	0.716	0.09	0.09	0.41	2,772	33
FL	0	2.95	3.23	0.321	0.698	0.986	0.982	−0.09	−0.09	0.34	2,786	19
GA	0	2.97	1.98	0.068	0.048	0.496	0.585	0.42	0.41	1.67	2,777	28
IL	0	2.95	3.05	0.025	0.683	0.327	0.298	−0.04	−0.04	0.43	2,595	210
IN	0	2.93	3.46	0.031	0.955	0.292	0.338	−0.17	−0.16	1.59	2,680	125
IA	0	2.94	3.80	0.018	0.974	0.168	0.220	−0.27	−0.26	1.86	2,740	65
KS	0	2.95	3.81	0.231	0.879	0.940	0.941	−0.26	−0.26	1.00	2,785	20
KY	0	2.95	3.17	0.017	0.742	0.232	0.212	−0.08	−0.08	0.59	2,730	75
LA	0	2.96	2.27	0.149	0.203	0.841	0.843	0.27	0.27	0.95	2,787	18
MD	0	2.95	3.26	0.122	0.736	0.805	0.783	−0.10	−0.10	0.49	2,775	30
MA	0	2.95	2.98	0.011	0.562	0.172	0.149	−0.01	−0.01	0.07	2,720	85
MI	0	2.98	2.68	0.141	0.084	0.794	0.825	0.11	0.11	1.37	2,558	247
MN	0	2.94	3.51	0.110	0.917	0.725	0.747	−0.18	−0.18	1.28	2,735	70
MO	0	2.94	3.34	0.037	0.902	0.381	0.397	−0.13	−0.13	1.22	2,692	113
NJ	0	2.93	3.65	0.025	0.981	0.213	0.293	−0.23	−0.22	2.00	2,700	105
NY	0	2.99	2.32	0.082	0.009	0.453	0.643	0.26	0.25	2.30	2,676	129
OH	0	2.96	2.94	0.059	0.491	0.582	0.543	0.00	0.01	0.08	2,460	345
OR	0	2.96	2.68	0.047	0.364	0.501	0.469	0.10	0.09	0.44	2,775	30
PA	0	2.92	3.23	0.067	0.943	0.529	0.580	−0.10	−0.10	1.52	2,477	328
RI	0	2.96	2.27	0.258	0.263	0.961	0.959	0.27	0.27	0.79	2,792	13
TN	0	2.96	2.85	0.028	0.426	0.359	0.324	0.04	0.03	0.25	2,734	71
TX	0	2.97	2.34	0.051	0.044	0.407	0.490	0.25	0.24	1.70	2,731	74
VA	0	2.96	2.52	0.154	0.315	0.865	0.853	0.17	0.17	0.63	2,784	21
WA	0	2.96	2.43	0.041	0.156	0.417	0.424	0.20	0.20	1.06	2,764	41
WV	0	2.96	2.52	0.070	0.179	0.596	0.597	0.17	0.16	0.98	2,750	55
WI	0	2.95	2.93	0.003	0.506	0.053	0.043	0.01	0.01	0.04	2,711	94

LEGEND: p—national (excluding q State) average settlement probability, percent per day; q—State average settlement probability, percent per day; CON—critical level of the LR test for p,q constant; HYP—critical level of the LR test for $p = q$, given p,q constant; HOM—critical level of the LR test for $p(t) = q(t)$, all t; PODDS—critical level of the LR test for $\xi(t) + \omega(t) - \delta$, for all t; DELTA—maximum likelihood estimate of δ; T—asymptotic t-statistic for δ; A—national (excluding B State) sample size; B—State sample size.

1 shows, the results of this test are impressive: aside from Rhode Island, only Georgia and Louisiana have hazard rates lower than New York, and in both of these States the sample sizes are very small.[17]

Several hypothesis tests were performed to assess the statistical significance of the results. The critical levels of these tests are reported in Table 1. As defined by Lehmann,[18] the critical level is the smallest significance level at which the null hypothesis would be rejected, for the observed value of the test statistic.[19]

The restrictions $p_t = p$, $q_t = q$ for all t are tested in the usual way by calculating the ratio λ of the restricted maximum of the likelihood function to the unrestricted maximum, and using the fact that $-2 \log \lambda$ is asymptotically distributed as $\chi^2(N)$, where N is the number of restrictions imposed (98 in the present case). For New York, this test produces a critical level of 8.2 percent, indicating that the hypothesis of a constant hazard rate from 56 to 105 days is not strongly rejected by the data.

If the hypothesis of constant p_t, q_t is maintained, a UMP unbiased test of the null hypothesis $p = q$ against $p \neq q$ is available.[20] This test does not require the use of asymptotic approximations. Given the total number of successes $\Sigma_t(X_t + Y_t)$, consider whether New York had less than its share. The test may be described as follows: Let A represent $\Sigma_t A_t$ and let X, B, and Y be similar representations. The objective is to test $\delta^0 \equiv \zeta^0 - \omega^0$ against $\delta^1 \equiv \zeta^1 - \omega^1$. Considering the log-likelihood l as a function of δ, the log of the likelihood ratio may be written as

$$l(\delta^1) - l(\delta^0) = A \log \frac{1 - p^0}{1 - p^1} + B \log \frac{1 - q^0}{1 - q^1} + (X + Y)(\omega^0 - \omega^1) + Y(\delta^1 - \delta^0) \qquad (38)$$

Given $X + Y$, this is a monotonic function of Y, so the likelihood ratio test is based on the conditional distribution of Y, given $X + Y$. For the null hypothesis $\delta^0 = 0$ this distribution is the hypergeometric:

$$\text{Prob}\,(Y = y \mid X + Y = s)\ \frac{\binom{A}{s-y}\binom{B}{y}}{\binom{A+B}{s}}. \qquad (39)$$

If the critical level of the test is near 0, the null hypothesis is rejected in favor of the alternative $\delta > 0$; while if it is near 1, the null hypothesis is rejected in favor of $\delta < 0$. The results are shown in Table 1.

The hypothesis that the New York hazard rate (q) is the same as the average hazard rate for other States (p) is decisively rejected, with critical level 0.9 percent (given that the assumption of constant hazard rates is maintained).[21] Of the 28 other States considered, only two (Georgia and Texas) show critical levels below 5 percent; three States (Indiana, Iowa, and New Jersey) have critical levels above 95 percent, indicating hazard rates significantly above the national average.

These results suggest that there is some dispersion in hazard rates across the States, for reasons unconnected with UI. Nevertheless, the results provide impressive support for the hypothesis that UI payments after 56 days tend to prolong strikes in New York. The point estimates imply an increase of about 10 days in expected strike duration, given that the strike reaches an age of 56 days.

Tests based on the proportional odds model

When the constant hazard assumption is dropped, the exact distribution of the likelihood ratio statistic for testing homogeneity is unknown, and the usual large-sample χ^2 approximation must be used. In the present context, homogeneity involves 50 restrictions ($p_t = q_t$ for $56 \leqq t \leqq 105$), so the χ^2 (50) distribution was used.

For New York, homogeneity is accepted at 45 percent according to the asymptotic test, a result that is completely at odds with the hypergeometric test. The reason for this interesting conflict is apparently that when the constant hazard assumption is dropped the model is grossly overparameterized (relative to the amount of data available). In computing the unrestricted maximum of the likelihood function, the parameters are allowed to wander freely through the space I^{100} (where I is the unit interval), yet almost all of the points in this space are wildly implausible a priori. A more appropriate specification would require the hazard rate to be a smooth function of strike age, which could be described by a small number of parameters. Suppose, for example, that the hazard functions were specified as

$$p_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \alpha_4 t^4 \qquad (40a)$$

$$q_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \beta_4 t^4 \qquad (40b)$$

The maximal likelihood value given these functional form restrictions would surely be essentially the same as the unrestricted value. Yet given such functional forms, homogeneity involves just the five restrictions $\alpha_i = \beta_i \quad i = 0,1,2,3,4$, and the statistic $-2 \log \lambda$ would be judged against a $\chi^2(5)$ distribution, rather than a $\chi^2(50)$. The essential problem is that by admitting a wide variety of implausible alternative hypotheses, the power of the test against realistic alternatives is greatly diminished.

From this point of view, the asymptotic homogeneity tests reported in Table 1 cannot be taken very seriously.[22] On the other hand, a similar argument could be made regarding the constant hazard tests: if the constant hazard hypothesis were tested against a suitably restricted class of alternatives it would surely be rejected. Then the results of the hypergeometric test would be questionable, and would depend on the robustness of this test when the hazard rates are not constant.

A much sharper test of homogeneity is obtained by comparing the maximum likelihood estimate of δ in the proportional odds model with the estimated standard error of this estimate. In effect, this is a test of homogeneity conditional on acceptance of the proportional odds model, and, as only a single parameter is under consideration, the objections to the general homogeneity test do not apply.[23]

As reported in Table 1, the estimate of δ for New York is 2.30 times the estimated standard error of δ. This is the largest t-statistic found in the table; New Jersey is next at 2.0, followed by Iowa (1.86), Texas (1.70), Georgia (1.67), and Indiana (1.60). These statistics are in excellent agreement with the results of the hypergeometric tests, although the implied critical levels are somewhat higher. Another interesting result is that in all cases the initial estimate δ^0 obtained by solving equation 37 is almost exactly equal to the final maximum likelihood estimate.

In summary, the results shown in Table 1 agree remarkably well with the prediction that UI payments in New York should reduce the conditional settlement probability after 56 days.

Disaggregation by industry

In principle, a positive estimate of δ for New York could be caused by differences in hazard rates across industries in conjunction with differences in the mixture of industries found in New York and elsewhere. This possibility is rather implausible in light of the remarkably low t-statistics found for other States in Table 1; however, variations across two-digit industries are discussed briefly.

Table 2 reports the same statistics as Table 1, for each private two-digit industry (including nonmanufacturing industries); the table includes each State-industry pair with 90 (primary) strikes and ten 56-day strikes over the period 1961 to 1977.

At this level of aggregation, sample sizes become very small and there is little chance of finding statistically significant results for individual State-industry pairs. The flawed parameterization of the general homogeneity test shows up very clearly, while the hypergeometric and t tests continue to conform closely.

The most noteworthy result in Table 2 is that, for each of the six industries covered, the settlement probability in New York is less than the average for other States. This result is surely statistically significant, even if no single industry is significant. For example, a simple sign test gives a critical level of $(0.5)^6 = 1.56$ percent.

Settlement rates for days 1 to 56

The total cost theory described above predicts the results of Tables 1 and 2 remarkably well. However, the theory also predicts that during the first 56 days, when UI payments are not available, the hazard rate for New York should blend in with the distribution of hazard rates across other States. This prediction is tested in Table 3 for the manufacturing aggregate and in Table 4 for individual industries.

The results are dramatic and completely unexpected. Homogeneity of New York with other States is totally rejected in favor of the alternative that the settlement probability is higher in New York than in other States over the first 56 days. The result holds in each of 10 industries studied, and δ is significantly less than 0 in 7 of these 10. For the manufacturing aggregate the magnitude of δ is larger for New York than for any other State. It is worth noting that the settlement probability in Rhode Island is also above the national average, and it is significant.

In order to check the possibility that large values of δ over 56 to 105 days might be systematically related to small values over 1 to 56 days, a simple correlation coefficient was computed for the values of δ found in Table 1 against those found in Table 3 across 29 States. The result was completely insignificant. For New York, on the other hand, there is a negative relationship between the δ-values in Tables 2 and 4, across the six industries common to both tables.[24] This suggests that the effect of UI payments is to rotate the hazard function and that the degree of rotation varies across industries. This idea is explored in some detail below.

Disaggregation by strike age

It may seem plausible that New York's high settlement probability over the first 8 weeks is due to employers' anticipation of the effects of UI benefits. For example, the most favorable time for a settlement from an employer's point of view might come after a few weeks when the workers' resistance has been worn down to some extent and before they begin counting on the receipt of UI benefits. This suggests that the New York settlement probability initially should be the same as the probability for other States, with the difference $\delta_t \equiv \omega_t - \zeta_t$ falling gradually from 0 to some minimal value before $t = 56$ and then rising past 0 after $t = 56$. In any case, whether or not this intuitive argument is appealing, it is of interest to measure variations in δ_t.

Table 5 gives settlement probabilities and hypothesis tests for overlapping 20-day periods, starting with 1 to 20 days and ending with 86 to 105 days. The prediction that δ_t should fall from 0 to some minimal value is completely refuted. Instead, δ_t is found to be an increasing function of t, and the largest discrepancy between New York and other States occurs for the initial 20-day period. It is also worth noting that δ_t continues to increase after 56 days: this might be explained as the effect of a fixed UI benefit applied to a shrinking pie.

TABLE 2. The proportional odds model, 2-digit industries, days 56 to 105

State	SIC	p	q	CON	HYP	HOM	PODDS	DELTA0	DELTA	T	A(56)	B(56)
CA	15	3.94	6.56	0.782	0.983	0.971	0.988	−0.54	−0.52	1.99	370	18
CA	20	2.83	4.07	0.742	0.896	0.981	0.981	−0.38	−0.33	0.94	179	11
CA	32	3.28	4.85	0.948	0.917	0.904	0.916	−0.41	−0.43	1.28	191	10
CA	34	3.31	2.42	0.693	0.127	0.869	0.886	0.32	0.31	1.20	383	23
CA	35	2.96	2.16	0.788	0.151	0.938	0.946	0.33	0.32	1.12	492	19
CA	37	2.65	2.03	0.851	0.313	0.992	0.991	0.27	0.29	0.73	167	11
CA	50	3.07	3.24	0.905	0.647	0.918	0.902	−0.06	−0.05	0.20	235	20
FL	15	3.99	5.18	0.814	0.846	0.994	0.994	−0.27	−0.28	0.84	377	11
IL	15	3.96	5.22	0.405	0.909	0.702	0.711	−0.29	−0.27	1.13	366	22
IL	20	2.98	2.30	0.385	0.202	0.697	0.690	0.27	0.24	0.85	167	23
IL	28	2.62	1.68	0.645	0.180	0.952	0.959	0.46	0.47	1.10	171	10
IL	33	2.61	3.05	0.472	0.782	0.468	0.444	−0.16	−0.16	0.65	237	24
IL	34	3.25	3.34	0.449	0.607	0.633	0.594	−0.03	−0.02	0.10	375	31
IL	35	2.95	2.76	0.138	0.396	0.136	0.118	0.07	0.06	0.36	466	45
IL	36	3.16	2.56	0.765	0.268	0.947	0.943	0.22	0.20	0.71	180	21
IN	15	4.02	3.96	0.398	0.554	0.743	0.708	0.02	−0.01	0.02	375	13
IN	33	2.59	3.53	0.447	0.913	0.394	0.416	−0.32	−0.34	1.32	241	20
IN	34	3.19	4.75	0.786	0.966	0.926	0.951	−0.41	−0.40	1.66	383	23
IN	35	2.92	3.04	0.576	0.625	0.774	0.742	−0.04	−0.03	0.11	494	17
MA	15	3.95	8.87	0.904	0.996	0.994	0.999	−0.86	−0.82	2.52	377	11
MA	50	3.01	5.65	0.962	0.980	0.955	0.976	−0.66	−0.62	1.84	245	10
MI	15	3.96	5.19	0.352	0.905	0.626	0.644	−0.28	−0.29	1.23	367	21
MI	20	2.99	2.11	0.631	0.148	0.929	0.936	0.36	0.34	1.09	172	18
MI	33	2.64	2.70	0.707	0.601	0.802	0.772	−0.02	−0.02	0.08	240	21
MI	34	3.36	2.25	0.503	0.037	0.561	0.662	0.41	0.40	1.76	375	31
MI	35	2.87	3.33	0.201	0.872	0.201	0.202	−0.15	−0.16	1.07	440	71
MI	37	2.66	2.30	0.431	0.349	0.664	0.638	0.15	0.15	0.54	154	24
MI	50	3.04	4.05	0.899	0.860	0.896	0.891	−0.30	−0.28	0.84	244	11
MN	15	3.96	7.23	0.805	0.984	0.980	0.993	−0.64	−0.62	2.03	376	12
MN	35	2.92	3.06	0.662	0.640	0.865	0.841	−0.05	−0.04	0.19	484	27
MO	15	4.02	4.00	0.646	0.569	0.955	0.944	0.01	0.04	0.12	374	14
MO	50	3.08	3.08	0.917	0.581	0.935	0.921	0.00	0.00	0.00	242	13
NJ	15	4.03	3.85	0.488	0.512	0.845	0.819	0.05	0.05	0.16	374	14
NJ	28	2.42	4.60	0.415	0.992	0.628	0.783	−0.67	−0.70	2.45	165	16
NJ	32	3.40	2.65	0.944	0.289	0.910	0.905	0.26	0.27	0.76	190	11
NJ	34	3.25	3.57	0.821	0.697	0.977	0.971	−0.10	−0.09	0.29	393	13
NJ	35	2.90	5.17	0.913	0.968	0.990	0.995	−0.60	−0.59	1.69	501	10
NJ	50	3.12	2.56	0.972	0.332	0.989	0.987	0.20	0.19	0.58	240	15
NY	15	4.06	3.57	0.245	0.329	0.482	0.453	0.13	0.12	0.52	362	26
NY	32	3.36	3.16	0.988	0.508	0.992	0.990	0.06	0.08	0.24	187	14
NY	33	2.69	1.98	0.824	0.229	0.909	0.912	0.31	0.34	0.97	247	14
NY	34	3.32	2.14	0.619	0.084	0.765	0.814	0.45	0.45	1.45	390	16
NY	35	2.97	1.96	0.792	0.087	0.926	0.948	0.43	0.42	1.40	490	21
NY	50	3.16	2.03	0.982	0.114	0.991	0.994	0.45	0.44	1.27	240	15
OH	15	4.13	3.22	0.418	0.101	0.699	0.733	0.26	0.25	1.32	348	40
OH	20	2.81	5.06	0.895	0.962	[illegible]999	0.999	−0.61	−0.59	1.56	180	10
OH	28	2.64	1.84	0.761	0.164	[illegible]88	0.991	0.37	0.38	1.13	165	16
OH	30	3.10	5.30	0.629	0.982	0[illegible]54	0.978	−0.56	−0.53	1.90	99	19
OH	32	3.27	3.75	0.590	0.789	0.310	0.288	−0.14	−0.13	0.64	165	36
OH	33	2.72	2.20	0.535	0.187	0.529	0.532	0.22	0.22	1.00	228	33
OH	34	3.23	3.44	0.280	0.680	0.370	0.336	−0.06	−0.05	0.30	361	45
OH	35	2.93	2.93	0.606	0.536	0.809	0.779	−0.00	0.00	0.02	423	88
OH	36	3.13	2.88	0.550	0.414	0.766	0.738	0.09	0.09	0.36	176	25
OH	37	2.72	1.59	0.819	0.081	0.970	0.983	0.55	0.55	1.49	163	15
OH	50	3.14	2.50	0.792	0.236	0.722	0.714	0.23	0.22	0.82	233	22
PA	15	3.93	5.51	0.368	0.960	0.599	0.652	−0.35	−0.33	1.57	361	27
PA	20	2.90	2.77	0.524	0.521	0.883	0.862	0.05	0.05	0.14	176	14
PA	28	2.53	2.78	0.681	0.693	0.978	0.972	−0.09	−0.09	0.30	162	19
PA	32	3.30	3.72	0.913	0.737	0.855	0.839	−0.12	−0.14	0.55	180	21
PA	33	2.69	2.39	0.562	0.332	0.597	0.569	0.12	0.12	0.54	226	35
PA	34	3.19	3.61	0.091	0.829	0.078	0.073	−0.13	−0.13	0.87	337	69
PA	35	2.90	3.31	0.517	0.797	0.682	0.667	−0.14	−0.15	0.77	469	42
PA	36	2.99	3.97	9.493	0.914	0.642	0.656	−0.29	−0.28	1.19	175	26
PA	37	2.57	2.85	0.578	0.711	0.845	0.824	−0.10	−0.11	0.40	156	22
PA	50	2.98	3.75	0.452	0.907	0.231	0.241	−0.24	−0.24	1.22	217	38
TX	15	4.08	2.88	0.761	0.138	0.981	0.986	0.36	0.36	1.21	372	16
WI	35	2.91	3.24	0.441	0.739	0.586	0.555	−0.11	−0.11	0.48	486	25

LEGEND: p—national (excluding q State) average settlement probability, percent per day; q—State average settlement probability, percent per day; CON—critical level of the LR test for p,q constant; HYP—critical level of the LR test for $p = q$, given p,q constant; HOM—critical level of the LR test for $p(t) = q(t)$, all t; PODDS—critical level of the LR test for $\zeta(t) + \omega(t) - \delta$, for all t; DELTA—maximum likelihood estimate of δ; T—asymptotic t-statistic for δ; A—national (excluding B State) sample size; B—State sample size.

TABLE 3. The proportional odds model, manufacturing aggregate, days 1 to 56

State	SIC	p	q	CON	HYP	HOM	PODDS	DELTA0	DELTA	T	$A(1)$	$B(1)$
AL	0	3.41	2.71	0.0	0.000	0.254	0.664	0.24	0.24	3.42	17,915	278
AR	0	3.40	2.45	0.0	0.001	0.012	0.053	0.34	0.34	2.91	18,088	105
CA	0	3.37	3.70	0.0	0.999	0.019	0.066	−0.09	−0.09	2.93	16,912	1281
CT	0	3.39	3.94	0.0	0.987	0.003	0.006	−0.16	−0.16	2.28	17,942	251
FL	0	3.40	3.46	0.0	0.604	0.061	0.051	−0.02	−0.02	0.19	18,071	122
GA	0	3.40	3.12	0.0	0.181	0.319	0.314	0.09	0.09	0.94	18,043	150
IL	0	3.41	3.21	0.0	0.023	0.010	0.017	0.06	0.06	2.04	16,885	1308
IN	0	3.40	3.26	0.0	0.134	0.626	0.640	0.05	0.05	1.14	17,418	775
IA	0	3.41	2.96	0.0	0.008	0.442	0.632	0.15	0.15	2.39	17,848	345
KS	0	3.40	3.14	0.0	0.270	0.093	0.084	0.08	0.08	0.64	18,100	93
KY	0	3.41	2.69	0.0	0.000	0.050	0.346	0.24	0.24	3.84	17,861	332
LA	0	3.39	3.74	0.0	0.853	0.338	0.335	−0.10	−0.10	1.00	18,074	119
MD	0	3.40	3.44	0.0	0.584	0.920	0.905	−0.01	−0.01	0.16	17,992	201
MA	0	3.38	3.81	0.0	0.996	0.044	0.107	−0.12	−0.12	2.68	17,611	582
MI	0	3.43	3.00	0.0	0.000	0.042	0.427	0.14	0.14	4.30	16,876	1317
MN	0	3.40	3.06	0.0	0.024	0.024	0.039	0.11	0.11	1.98	17,790	403
MO	0	3.41	2.97	0.0	0.001	0.008	0.046	0.14	0.15	3.26	17,548	645
NJ	0	3.34	4.44	0.0	1.000	0.000	0.084	−0.30	−0.29	8.91	17,065	1128
NY	0	3.29	4.97	0.0	1.000	0.0	0.000	−0.43	−0.43	15.28	16,621	1572
OH	0	3.44	3.12	0.0	0.000	0.001	0.026	0.10	0.10	3.93	16,093	2100
OR	0	3.40	2.96	0.0	0.077	0.364	0.403	0.14	0.14	1.43	18,055	138
PA	0	3.39	3.45	0.0	0.792	0.564	0.551	−0.02	−0.02	0.80	15,979	2214
RI	0	3.39	4.29	0.0	0.991	0.051	0.096	−0.24	−0.24	2.39	18,079	114
TN	0	3.40	3.03	0.0	0.019	0.128	0.196	0.12	0.12	2.07	17,809	384
TX	0	3.41	2.53	0.0	0.000	0.001	0.078	0.31	0.31	4.67	17,877	316
VA	0	3.40	3.24	0.0	0.333	0.001	0.001	0.05	0.05	0.47	18,061	132
WA	0	3.40	2.90	0.0	0.014	0.005	0.011	0.16	0.16	2.17	17,968	225
WV	0	3.40	2.81	0.0	0.004	0.125	0.264	0.20	0.19	2.59	17,955	238
WI	0	3.40	3.13	0.0	0.044	0.771	0.829	0.09	0.09	1.67	17,693	500

LEGEND: p—national (excluding q State) average settlement probability, percent per day; q—State average settlement probability, percent per day; CON—critical level of the LR test for p,q constant; HYP—critical level of the LR test for $p = q$, given p,q constant; HOM—critical level of the LR test for $p(t) = q(t)$, all t; PODDS—critical level of the LR test for $\zeta(t) + \omega(t) - \delta$, for all t; DELTA—maximum likelihood estimate of δ; T—asymptotic t-statistic for δ; A—national (excluding B State) sample size; B—State sample size.

Theoretical Significance of the Results

The difference between the hazard functions for New York and other States may be conveniently summarized by saying that in New York the hazard function is rotated about some point near 56 days. As can be seen in Tables 2, 4, and 5, the rotation is consistent across all industries studied, and it is peculiar to New York. This is a rather fascinating and entirely unexpected result, which provides a challenge for any economic theory of strikes. The result is particularly damaging for the total cost theory, which seems totally unable to explain the very pronounced increase in the New York hazard rate for very young strikes.[25] There are, however, several ambiguities and qualifications to be considered before conclusions are drawn.

Omitted variables

Because of data limitations and computational difficulties, this study has ignored economic variables other than UI payments that might influence the shape of the hazard function either by modifying total strike cost or by some other means. An obvious possibility is that New York's strange hazard function is caused by some combination of omitted variables, and actually has nothing to do with UI payments.

The model could, in principle, be expanded to include labor market variables (such as local unemployment rate at the time of the strike) and product market variables (such as volume of industry sales at the time of the strike). Such extensions would certainly be worthwhile, although computations would be difficult, given the large volume of data. Suppose, for the sake of argument, that the hazard rotation in New York survives in an extended model, even after the most heroic efforts are made to consider all measurable variables that might conceivably be relevant. One would still be left with the possibility that there is a "New York effect" on the hazard function, due to unmeasurable variables such as the attitude and competence of the State mediation service, the political climate of the State, or the treatment of picket lines by local police.

It is certainly not difficult to think of omitted variables that might have the effect of increasing or decreasing the New York hazard rate relative to the national average. The empirical results presented here, however, cannot be dismissed so easily. The main result is, in effect, that the New York hazard function is found to be in the tail of the distribution of hazard functions

TABLE 4. The proportional odds model, 2-digit industries, days 1 to 56

State	SIC	*p*	*q*	CON	HYP	HOM	PODDS	DELTA0	DELTA	T	*A*(1)	*B*(1)
CA	15	4.13	4.58	0.0	0.927	0.023	0.026	−0.11	−0.11	1.44	3,994	208
CA	20	4.31	3.93	0.004	0.195	0.253	0.246	0.10	0.09	0.89	1,591	111
CA	32	3.29	4.15	0.002	0.986	0.057	0.098	−0.24	−0.25	2.24	1,240	102
CA	34	3.37	3.65	0.0	0.872	0.058	0.059	−0.08	−0.09	1.13	2,637	209
CA	35	2.87	3.61	0.174	0.994	0.547	0.743	−0.24	−0.24	2.58	2,441	147
CA	36	3.18	4.85	0.180	1.000	0.164	0.629	−0.44	−0.44	4.12	1,085	115
CA	37	2.93	3.35	0.000	0.901	0.001	0.001	−0.14	−0.15	1.32	891	100
CA	50	4.09	3.65	0.008	0.115	0.823	0.840	0.12	0.12	1.21	1,998	142
CT	15	4.15	3.95	0.0	0.329	0.016	0.013	0.05	0.05	0.47	4,097	105
FL	15	4.14	4.38	0.0	0.741	0.345	0.322	−0.06	−0.06	0.59	4,081	121
IA	15	4.13	4.71	0.0	0.946	0.216	0.254	−0.14	−0.14	1.61	4,053	149
IL	15	4.14	4.35	0.000	0.790	0.566	0.552	−0.05	−0.05	0.79	3,937	265
IL	20	4.35	3.62	0.041	0.019	0.672	0.777	0.19	0.18	1.96	1,548	154
IL	28	3.36	3.89	0.171	0.908	0.381	0.398	−0.15	−0.15	1.26	1,055	91
IL	33	3.14	3.06	0.052	0.428	0.080	0.068	0.03	0.03	0.25	1,356	129
IL	34	3.42	2.90	0.000	0.023	0.836	0.918	0.17	0.18	2.08	2,669	177
IL	35	2.92	2.78	0.009	0.278	0.076	0.069	0.05	0.05	0.65	2,362	226
IL	36	3.34	2.86	0.079	0.089	0.432	0.472	0.16	0.16	1.41	1,097	103
IL	50	4.03	4.48	0.000	0.877	0.155	0.153	−0.11	−0.10	1.01	2,016	124
IN	15	4.11	4.96	0.0	0.995	0.037	0.085	−0.20	−0.20	2.59	3,997	205
IN	33	3.15	2.86	0.341	0.223	0.591	0.580	0.10	0.10	0.82	1,388	97
IN	34	3.39	3.33	0.0	0.446	0.536	0.499	0.02	0.02	0.20	2,699	147
IN	35	2.89	3.20	0.028	0.829	0.201	0.194	−0.10	−0.11	0.89	2,494	94
MA	15	4.12	4.91	0.000	0.989	0.713	0.844	−0.18	−0.19	2.33	4,023	179
MA	50	4.03	4.67	0.000	0.935	0.169	0.187	−0.15	−0.15	1.41	2,030	110
MI	15	4.16	4.00	0.0	0.305	0.279	0.256	0.04	0.04	0.54	3,980	222
MI	20	4.36	3.37	0.006	0.006	0.182	0.320	0.27	0.26	2.38	1,591	111
MI	33	3.09	3.52	0.694	0.928	0.938	0.953	−0.13	−0.13	1.43	1,334	151
MI	34	3.39	3.36	0.0	0.477	0.368	0.333	0.01	0.01	0.10	2,630	216
MI	35	2.96	2.52	0.004	0.010	0.015	0.034	0.17	0.17	2.36	2,298	290
MI	37	2.97	2.92	0.068	0.462	0.798	0.770	0.02	0.02	0.16	880	111
MI	50	4.07	3.83	0.008	0.296	0.858	0.847	0.06	0.07	0.68	2,032	108
MN	15	4.17	3.34	0.000	0.022	0.343	0.468	0.23	0.23	2.05	4,109	93
MN	35	2.93	2.33	0.033	0.022	0.153	0.232	0.24	0.24	2.04	2,487	101
MO	15	4.17	3.27	0.0	0.013	0.043	0.084	0.25	0.26	2.24	4,107	95
MO	50	4.07	3.78	0.003	0.273	0.645	0.625	0.08	0.08	0.66	2,047	93
NJ	15	4.16	3.64	0.0	0.106	0.398	0.427	0.14	0.14	1.32	4,096	106
NJ	28	3.25	4.42	0.043	1.000	0.014	0.086	−0.32	−0.31	3.56	968	178
NJ	32	3.32	3.86	0.019	0.921	0.493	0.528	−0.16	−0.16	1.41	1,247	95
NJ	34	3.33	4.75	0.0	1.000	0.001	0.039	−0.37	−0.39	4.46	2,688	158
NJ	35	2.86	4.02	0.035	1.000	0.060	0.240	−0.35	−0.36	3.53	2,470	118
NJ	36	3.19	4.70	0.020	1.000	0.027	0.151	−0.40	−0.40	3.67	1,097	103
NJ	50	4.02	4.56	0.001	0.931	0.272	0.301	−0.13	−0.13	1.43	1,986	154
NY	15	4.14	4.33	0.0	0.775	0.314	0.297	−0.05	−0.05	0.73	3,916	286
NY	20	4.18	6.25	0.004	1.000	0.029	0.190	−0.42	−0.40	3.91	1,588	114
NY	25	3.89	5.11	0.134	0.993	0.090	0.183	−0.29	−0.31	2.61	641	97
NY	26	3.19	5.25	0.418	1.000	0.195	0.684	−0.52	−0.50	4.15	711	90
NY	32	3.29	4.09	0.001	0.984	0.052	0.090	−0.23	−0.24	2.24	1,227	115
NY	33	3.10	3.64	0.043	0.934	0.046	0.054	−0.17	−0.17	1.51	1,387	98
NY	34	3.29	4.81	0.0	1.000	0.000	0.081	−0.40	−0.42	5.83	2,602	244
NY	35	2.83	4.35	0.026	1.000	0.003	0.209	−0.45	−0.46	5.43	2,408	180
NY	36	3.12	5.58	0.025	1.000	0.001	0.186	−0.61	−0.61	6.15	1,070	130
NY	50	3.93	5.59	0.001	1.000	0.029	0.411	−0.37	−0.37	4.79	1,923	217
OH	15	4.19	3.67	0.0	0.017	0.224	0.336	0.14	0.14	2.16	3,902	300
OH	20	4.23	5.01	0.000	0.964	0.013	0.018	−0.18	−0.17	1.68	1,579	123
OH	28	3.38	3.54	0.096	0.694	0.247	0.222	−0.05	−0.04	0.37	1,033	113
OH	30	3.00	3.15	0.026	0.703	0.282	0.258	−0.05	−0.05	0.50	554	127
OH	32	3.51	2.52	0.000	0.000	0.002	0.038	0.34	0.35	3.81	1,170	172
OH	33	3.13	3.14	0.034	0.543	0.048	0.039	−0.00	−0.00	0.05	1,266	219
OH	34	3.40	3.30	0.0	0.326	0.048	0.041	0.03	0.03	0.50	2,507	339
OH	35	2.96	2.59	0.054	0.015	0.228	0.345	0.14	0.14	2.19	2,201	387
OH	36	3.36	2.82	0.165	0.047	0.660	0.733	0.18	0.18	1.69	1,072	128
OH	37	2.91	3.44	0.000	0.952	0.017	0.022	−0.17	−0.18	1.70	870	121
OH	50	4.07	3.97	0.000	0.398	0.060	0.051	0.03	0.02	0.30	1,950	190
PA	15	4.16	3.92	0.0	0.188	0.223	0.219	0.06	0.06	0.95	3,928	274
PA	20	4.24	4.71	0.001	0.907	0.079	0.080	−0.11	−0.10	1.13	1,535	167
PA	25	3.92	4.60	0.220	0.940	0.271	0.312	−0.17	−0.17	1.58	626	112
PA	28	3.46	2.84	0.047	0.044	0.075	0.101	0.21	0.20	1.72	1,047	99
PA	32	3.32	3.59	0.001	0.830	0.070	0.067	−0.08	−0.08	0.94	1,174	168
PA	33	3.07	3.47	0.595	0.947	0.853	0.892	−0.13	−0.13	1.63	1,256	229

TABLE 4. The proportional odds model, 2-digit industries, days 1 to 56 (*continued*)

State	SIC	p	q	CON	HYP	HOM	PODDS	DELTA0	DELTA	T	$A(1)$	$B(1)$
PA	34	3.44	3.10	0.0	0.030	0.149	0.214	0.11	0.11	1.97	2,422	424
PA	35	2.87	3.26	0.061	0.969	0.299	0.377	−0.13	−0.14	1.88	2,324	264
PA	36	3.33	3.07	0.028	0.212	0.217	0.207	0.08	0.08	0.82	1,054	146
PA	37	3.03	2.47	0.026	0.049	0.423	0.503	0.21	0.22	1.72	897	94
PA	50	4.13	3.61	0.002	0.027	0.480	0.582	0.14	0.14	1.88	1,876	264
TX	15	4.16	3.98	0.0	0.312	0.191	0.174	0.05	0.05	0.57	4,034	168
WI	15	4.14	4.46	0.0	0.829	0.001	0.001	−0.08	−0.08	0.96	4,056	146
WI	35	2.91	2.68	0.007	0.253	0.059	0.053	0.09	0.08	0.71	2,485	103

LEGEND: p—national (excluding q State) average settlement probability, percent per day; q—State average settlement probability, percent per day; CON—critical level of the LR test for p,q constant; HYP—critical level of the LR test for $p = q$, given p,q constant; HOM—critical level of the LR test for $p(t) = q(t)$, all t; PODDS—critical level of the LR test for $\zeta(t) + \omega(t) - \delta$, for all t; DELTA—maximum likelihood estimate of δ; T—asymptotic t-statistic for δ; A—national (excluding B State) sample size; B—State sample size.

TABLE 5. Analysis of New York hazard rates by strike age

From	To	SIC	p	q	CON	HYP	HOM	PODDS	DELTA	T	A	B
1	20	0	3.33	5.48	0.0	1.000	0.0	0.635	−0.53	15.87	16,621	1,572
6	25	0	3.52	5.49	0.000	1.000	0.0	0.321	−0.46	12.13	14,364	1,208
11	30	0	3.47	5.08	0.000	1.000	0.000	0.432	−0.40	8.75	12,013	887
16	35	0	3.32	4.57	0.000	1.000	0.000	0.523	−0.33	6.12	9,960	659
21	40	0	3.26	4.12	0.010	1.000	0.128	0.825	−0.24	3.86	8,348	506
26	45	0	3.20	3.87	0.007	0.997	0.013	0.064	−0.20	2.81	7,033	406
31	50	0	3.22	3.59	0.053	0.926	0.078	0.092	−0.11	1.42	5,973	324
36	55	0	3.19	3.53	0.002	0.891	0.002	0.002	−0.11	1.18	5,094	266
41	60	0	3.18	3.49	0.007	0.847	0.003	0.003	−0.09	0.96	4,310	222
46	65	0	3.16	3.26	0.077	0.642	0.030	0.022	−0.03	0.29	3,669	187
51	70	0	3.01	3.00	0.011	0.521	0.039	0.028	0.00	0.02	3,098	156
56	75	0	3.13	2.54	0.060	0.072	0.106	0.137	0.22	1.50	2,676	129
61	80	0	3.01	2.13	0.090	0.016	0.090	0.200	0.35	2.12	2,260	109
66	85	0	2.94	2.12	0.093	0.029	0.401	0.592	0.34	1.90	1,937	99
71	90	0	2.96	2.07	0.175	0.026	0.391	0.588	0.36	1.91	1,684	87
76	95	0	2.73	2.15	0.751	0.121	0.965	0.980	0.24	1.24	1,416	78
81	100	0	2.75	1.96	0.154	0.057	0.659	0.788	0.35	1.64	1,226	71
86	105	0	2.78	2.27	0.198	0.187	0.577	0.584	0.21	1.01	1,067	65
1	20	15	4.11	4.39	0.000	0.813	0.093	0.084	−0.07	0.88	3,916	286
6	25	15	4.48	4.28	0.068	0.326	0.505	0.456	0.05	0.50	3,304	228
11	30	15	4.24	3.98	0.674	0.285	0.707	0.673	0.07	0.63	2,571	178
16	35	15	4.13	4.24	0.799	0.623	0.665	0.606	−0.03	0.24	2,046	143
21	40	15	4.06	4.36	0.734	0.744	0.876	0.852	−0.07	0.56	1,666	118
26	45	15	4.02	4.60	0.553	0.860	0.856	0.862	−0.14	1.00	1,340	97
31	50	15	4.09	4.22	0.130	0.625	0.381	0.324	−0.03	0.20	1,085	79
36	55	15	4.23	3.82	0.210	0.323	0.399	0.361	0.12	0.62	881	58
41	60	15	4.47	3.72	0.342	0.205	0.356	0.350	0.19	0.95	737	48
46	65	15	4.55	3.26	0.405	0.084	0.314	0.385	0.35	1.46	591	38
51	70	15	4.41	5.15	0.276	0.808	0.248	0.221	−0.16	0.72	465	36
56	75	15	4.30	4.18	0.305	0.526	0.212	0.170	0.03	0.12	362	26
61	80	15	4.37	4.58	0.389	0.636	0.198	0.159	−0.04	0.14	296	22
66	85	15	4.32	4.91	0.354	0.733	0.144	0.115	−0.13	0.40	235	19
71	90	15	4.23	2.62	0.842	0.189	0.636	0.659	0.49	1.06	192	12
76	95	15	3.68	2.41	0.601	0.277	0.828	0.822	0.42	0.81	149	11
1	20	20	4.56	6.81	0.037	1.000	0.006	0.075	−0.42	3.48	1,588	114
6	25	20	4.47	4.92	0.026	0.761	0.279	0.243	−0.09	0.58	1,259	69
11	30	20	4.01	4.27	0.174	0.676	0.387	0.333	−0.06	0.32	965	50
16	35	20	3.75	4.57	0.159	0.863	0.166	0.156	−0.20	0.96	777	39
21	40	20	3.67	5.41	0.300	0.971	0.136	0.197	−0.41	1.83	634	34
26	45	20	3.50	5.81	0.834	0.986	0.238	0.402	−0.54	2.20	516	27
31	50	20	3.57	5.76	0.419	0.968	0.165	0.231	−0.51	1.81	430	21
36	55	20	3.47	4.32	0.386	0.801	0.610	0.570	−0.23	0.63	367	14
41	60	20	3.46	3.27	0.504	0.564	0.856	0.814	0.06	0.13	302	11
1	20	25	3.71	5.95	0.017	1.000	0.021	0.310	−0.52	3.84	641	97
6	25	25	4.19	5.82	0.560	0.988	0.510	0.749	−0.35	2.23	561	72
11	30	25	4.20	5.96	0.793	0.982	0.340	0.503	−0.36	2.01	456	56
16	35	25	4.31	4.94	0.608	0.778	0.340	0.302	−0.14	0.61	367	38
21	40	25	4.39	3.89	0.881	0.390	0.411	0.363	0.13	0.47	292	26
26	45	25	4.58	3.30	0.837	0.190	0.348	0.356	0.35	1.04	238	21

TABLE 5. Analysis of New York hazard rates by strike age (*continued*)

From	To	SIC	*p*	*q*	CON	HYP	HOM	PODDS	DELTA	T	*A*	*B*
31	50	25	4.58	3.45	0.579	0.253	0.247	0.227	0.28	0.78	195	18
36	55	25	4.19	2.64	0.465	0.174	0.469	0.485	0.45	1.06	151	15
41	60	25	3.76	2.48	0.237	0.243	0.434	0.428	0.43	0.91	115	12
46	65	25	3.52	2.84	0.133	0.424	0.430	0.381	0.22	0.46	91	11
1	20	26	3.43	6.11	0.332	1.000	0.022	0.564	−0.61	4.44	711	90
6	25	26	3.38	5.84	0.349	1.000	0.047	0.344	−0.57	3.50	598	67
11	30	26	3.21	6.01	0.330	1.000	0.040	0.287	−0.65	3.46	501	54
16	35	26	2.96	4.57	0.352	0.974	0.258	0.365	−0.45	1.88	423	32
21	40	26	2.77	3.35	0.612	0.797	0.378	0.342	−0.20	0.67	352	24
26	45	26	2.61	3.67	0.542	0.897	0.380	0.386	−0.36	1.12	301	21
31	50	26	2.94	4.51	0.465	0.936	0.387	0.434	−0.46	1.43	263	19
36	55	26	3.12	2.55	0.828	0.430	0.915	0.893	0.21	0.45	236	12
41	60	26	3.29	3.53	0.818	0.670	0.936	0.912	−0.07	0.16	201	12
46	65	26	3.47	3.45	0.921	0.611	0.909	0.877	0.01	0.02	177	10
1	20	32	3.12	4.67	0.000	0.999	0.005	0.060	−0.44	3.42	1,227	115
6	25	32	3.43	5.27	0.576	0.999	0.158	0.617	−0.45	3.27	1,081	98
11	30	32	3.51	4.52	0.626	0.951	0.872	0.933	−0.26	1.60	908	72
16	35	32	3.48	3.60	0.253	0.619	0.670	0.610	−0.04	0.18	758	55
21	40	32	3.64	2.99	0.455	0.232	0.593	0.580	0.20	0.85	644	42
26	45	32	3.72	2.54	0.176	0.091	0.292	0.356	0.39	1.42	540	35
31	50	32	3.57	2.92	0.233	0.273	0.154	0.138	0.21	0.76	444	30
36	55	32	3.45	3.40	0.272	0.548	0.346	0.290	0.02	0.06	372	28
41	60	32	3.46	3.82	0.264	0.705	0.409	0.355	−0.10	0.35	306	23
46	65	32	3.21	4.78	0.577	0.936	0.483	0.531	−0.42	1.38	252	21
51	70	32	3.00	4.23	0.340	0.883	0.681	0.677	−0.35	0.97	214	16
56	75	32	3.26	4.73	0.351	0.891	0.672	0.668	−0.37	0.97	187	14
61	80	32	3.01	2.86	0.585	0.588	0.821	0.773	0.06	0.12	151	10
1	20	33	3.08	3.67	0.006	0.905	0.012	0.013	−0.19	1.29	1,387	98
6	25	33	3.25	4.22	0.057	0.966	0.019	0.029	−0.28	1.81	1,215	85
11	30	33	3.40	4.01	0.170	0.859	0.167	0.160	−0.17	1.00	1,041	67
16	35	33	3.26	3.67	0.540	0.771	0.681	0.645	−0.13	0.63	867	52
21	40	33	3.27	3.63	0.317	0.735	0.480	0.431	−0.11	0.50	734	46
26	45	33	3.23	3.01	0.438	0.456	0.307	0.257	0.07	0.26	629	36
31	50	33	2.97	3.30	0.542	0.720	0.317	0.271	−0.11	0.42	522	30
36	55	33	2.94	2.57	0.469	0.412	0.213	0.176	0.14	0.42	447	24
41	60	33	2.64	3.89	0.379	0.933	0.182	0.201	−0.40	1.36	377	23
46	65	33	2.70	3.64	0.555	0.866	0.506	0.491	−0.31	0.92	329	20
51	70	33	2.62	2.12	0.563	0.419	0.663	0.617	0.22	0.48	287	15
56	75	33	2.64	1.87	0.505	0.339	0.720	0.698	0.37	0.71	247	14
61	80	33	2.63	0.50	0.784	0.035	0.922	0.995	1.67	1.66	222	10
66	85	33	2.65	0.52	0.809	0.039	0.922	0.995	1.67	1.66	190	10
71	90	33	2.73	1.07	0.803	0.121	0.907	0.956	0.95	1.32	169	10
76	95	33	2.65	1.73	0.726	0.334	0.915	0.909	0.45	0.74	143	10
1	20	34	3.19	4.84	0.000	1.000	0.009	0.802	−0.45	5.20	2,602	244
6	25	34	3.57	5.34	0.051	1.000	0.072	0.899	−0.43	4.49	2,300	200
11	30	34	3.56	5.01	0.103	0.999	0.248	0.746	−0.35	3.18	1,948	148
16	35	34	3.41	4.37	0.387	0.976	0.630	0.789	−0.26	1.92	1,600	108
21	40	34	3.36	4.89	0.049	0.997	0.083	0.267	−0.39	2.75	1,331	89
26	45	34	3.27	5.09	0.003	0.998	0.001	0.009	−0.47	2.99	1,104	69
31	50	34	3.50	4.78	0.011	0.967	0.014	0.022	−0.33	1.79	955	54
36	55	34	3.55	5.04	0.004	0.969	0.001	0.002	−0.36	1.81	805	44
41	60	34	3.59	3.69	0.019	0.607	0.008	0.005	−0.02	0.09	671	32
46	65	34	3.64	2.24	0.247	0.100	0.172	0.212	0.50	1.38	561	22
51	70	34	3.58	2.87	0.257	0.318	0.137	0.117	0.23	0.66	466	20
56	75	34	3.51	2.55	0.477	0.259	0.413	0.398	0.33	0.84	390	16
61	80	34	3.24	2.93	0.671	0.489	0.649	0.591	0.11	0.28	322	16
66	85	34	2.88	2.43	0.767	0.457	0.854	0.819	0.17	0.37	267	14
71	90	34	2.93	1.06	0.820	0.089	0.915	0.973	1.05	1.46	226	11
1	20	35	2.76	4.80	0.046	1.000	0.000	0.449	−0.59	5.78	2,408	180
6	25	35	2.96	4.97	0.482	1.000	0.003	0.332	−0.54	4.81	2,144	144
11	30	35	3.02	4.65	0.610	1.000	0.029	0.232	−0.45	3.43	1,851	107
16	35	35	2.96	4.35	0.191	0.996	0.053	0.163	−0.40	2.64	1,585	86
21	40	35	2.89	3.83	0.174	0.954	0.099	0.130	−0.29	1.62	1,362	67
26	45	35	2.90	3.45	0.190	0.840	0.230	0.214	−0.18	0.88	1,176	53
31	50	35	2.87	2.78	0.177	0.508	0.466	0.403	0.03	0.14	1,001	41
36	55	35	2.84	2.86	0.172	0.576	0.313	0.259	−0.01	0.03	871	37
41	60	35	2.91	3.09	0.345	0.659	0.619	0.558	−0.06	0.24	760	32

TABLE 5. Analysis of New York hazard rates by strike age (*continued*)

From	To	SIC	p	q	CON	HYP	HOM	PODDS	DELTA	T	A	B
46	65	35	2.81	2.61	0.199	0.483	0.553	0.491	0.07	0.23	655	27
51	70	35	2.70	2.46	0.395	0.472	0.615	0.556	0.10	0.28	556	23
56	75	35	3.01	3.12	0.327	0.625	0.719	0.660	−0.04	0.11	490	21
61	80	35	3.05	2.14	0.418	0.254	0.804	0.803	0.36	0.86	423	17
66	85	35	3.13	2.80	0.637	0.479	0.689	0.633	0.10	0.27	374	16
71	90	35	3.24	2.27	0.776	0.286	0.736	0.721	0.36	0.77	320	14
76	95	35	3.03	1.00	0.749	0.061	0.733	0.879	1.13	1.57	262	11
81	100	35	2.84	1.05	0.658	0.097	0.816	0.900	0.99	1.38	225	11
1	20	36	3.23	5.65	0.020	1.000	0.001	0.213	−0.61	5.15	1,070	130
6	25	36	3.49	5.67	0.084	1.000	0.014	0.200	−0.50	3.72	942	97
11	30	36	3.34	5.79	0.024	1.000	0.008	0.110	−0.56	3.61	787	74
16	35	36	3.13	5.30	0.018	0.998	0.010	0.046	−0.53	2.87	653	52
21	40	36	3.04	5.69	0.104	0.999	0.046	0.231	−0.65	3.17	545	41
26	45	36	2.91	5.28	0.324	0.995	0.093	0.238	−0.62	2.59	465	31
31	50	36	3.01	5.14	0.586	0.981	0.219	0.338	−0.56	2.03	404	24
36	55	36	2.96	4.85	0.363	0.957	0.241	0.293	−0.51	1.58	350	18
41	60	36	2.86	3.85	0.634	0.844	0.455	0.427	−0.31	0.79	294	13
46	65	36	3.12	3.36	0.814	0.676	0.687	0.627	−0.07	0.16	257	11
1	20	50	4.13	6.41	0.002	1.000	0.003	0.678	−0.48	5.38	1,923	217
6	25	50	4.37	6.02	0.018	0.999	0.189	0.628	−0.33	3.10	1,614	154
11	30	50	4.27	4.79	0.303	0.833	0.407	0.387	−0.11	0.84	1,280	106
16	35	50	3.90	4.32	0.502	0.781	0.505	0.468	−0.11	0.67	1,003	77
21	40	50	3.90	4.09	0.426	0.655	0.387	0.331	−0.05	0.28	817	61
26	45	50	3.79	3.67	0.374	0.485	0.333	0.279	0.04	0.18	673	49
31	50	50	3.49	4.52	0.537	0.916	0.406	0.437	−0.27	1.28	542	43
36	55	50	3.29	3.67	0.328	0.725	0.388	0.337	−0.11	0.41	457	32
41	60	50	2.97	3.66	0.820	0.824	0.506	0.476	−0.22	0.76	369	26
46	65	50	3.01	3.46	0.821	0.741	0.626	0.576	−0.15	0.46	314	23
51	70	50	2.90	2.57	0.864	0.469	0.658	0.601	0.12	0.31	268	17
56	75	50	3.15	2.08	0.869	0.238	0.762	0.764	0.42	0.90	240	15
61	80	50	3.10	1.90	0.737	0.224	0.808	0.821	0.50	0.97	202	12
66	85	50	2.96	2.66	0.747	0.520	0.897	0.865	0.11	0.24	169	12
71	90	50	3.27	2.45	0.701	0.388	0.903	0.885	0.30	0.58	148	10
76	95	50	3.33	2.80	0.872	0.487	0.941	0.921	0.18	0.34	128	10

LEGEND: p—national (excluding q State) average settlement probability, percent per day; q—State average settlement probability, percent per day; CON—critical level of the LR test for p,q constant; HYP—critical level of the LR test for $p = q$, given p,q constant; HOM—critical level of the LR test for $p(t) = q(t)$, all t; PODDS—critical level of the LR test for $\zeta(t) + \omega(t) - \delta$, for all t; DELTA—maximum likelihood estimate of δ; T—asymptotic t-statistic for δ; A—national (excluding B State) sample size; B—State sample size.

across all States. The point can best be made by abstracting from the detailed results. Suppose $\hat{\theta}$ somehow measures the angle of rotation of a State's hazard function relative to the national average, and let $\mathbf{v}$ be a vector of unmeasured State characteristics. Then $\theta(\mathbf{v})$ represents the distribution of individual State effects attributable to omitted variables, and positive or negative values of θ for a particular State would not be surprising. A fair summary of Tables 1 to 5, however, is that the value of θ observed for New York is greater than the value for any other State. To explain this would require arguing that New York has some unmeasured characteristics that are not only different from the national average but also are extreme relative to all other States. It is difficult to imagine what these characteristics might be, other than UI.

Thus, the fact that there is no other State that looks like New York in Tables 1 to 5 greatly strengthens the argument that the rotation of New York's hazard function is unlikely to be caused by omitted variables. There is a strong prima facie case that the rotation is caused by UI.

The selection problem

All of the empirical results reported above are conditional on the occurrence of a strike. There remains the possibility that for a given bargaining pair, the prospect of UI payments influences the probability that a strike will occur. If so, then even if the hazard function for a given strike were not affected by UI, the average hazard function for New York would differ from the hazard function for other States. This raises the possibility that a selection bias argument could be used to rescue the total cost model.

Suppose there is a distribution F of characteristics v over all bargaining pairs and that the pairs found in New York are drawn randomly from this distribution. Let $P(v)$ be the probability that a pair with characteristics v will have a strike, if no UI payments are available, and let $Q(v)$ be the corresponding probability if strike payments are available. Let $\omega_t(v)$ and $\zeta_t(v)$ be the logits of the hazard rates, as above, considered now as functions of v. Then the measured average values of ω and ζ will be

$$\omega_t = \int \omega_t(v)\, P_t(v)\, dF(v) \tag{41}$$

$$\zeta_t = \int \zeta_t(v)\, Q_t\,(v)\, dF(v) \tag{42}$$

where $P_t(v)$ represents the probability that a strike aged t with characteristics v will be found outside New York, and $Q_t(v)$ is the corresponding probability for New York.

Now suppose that Q selects, on average, characteristics associated with relatively large hazard rates. Then, for small t, while UI payments are not available, ζ_t will exceed ω_t. Later, when UI is available, this may be reversed if the direct effect of UI on the hazard rate outweighs the selection effect.

A simple example can be used to sharpen the argument. Suppose there are only two equally likely types of bargaining pairs, labeled v^1, v^2, and suppose that the hazard rates for each type are constant with respect to strike age, with logits ω^1 and ω^2, given no UI, and ζ^1, ζ^2, given UI. Then

$$\omega_t = \alpha(t)\omega^1 + [1-\alpha(t)]\omega^2 \tag{43}$$

$$\zeta_t = \begin{cases} \beta(t)\omega^1 + [1-\beta(t)]\omega^2 \text{ for } t < 56 \\ \beta(t)\zeta^1 + [1-\beta(t)]\zeta^2 \text{ for } t \geqq 56 \end{cases} \tag{44}$$

where $\alpha(t)$, $\beta(t)$ represent the fractions of type 1 strikes after t days. Then if $\omega^2 > \omega^1$, and $\beta(0) < \alpha(0)$, the New York hazard function will lie above the average for other States for $t < 56$, and below for $t \geqq 56$, if the direct effect of UI is sufficiently large.

The relevance of this argument is unclear from the point of view of the total cost model. Perhaps the prospect that the total cost of a long strike would be reduced by the UI subsidy might cause a bargaining pair to relax its efforts to settle without a strike. If so, New York would have a disproportionate number of strikes involving relatively well organized and fairly amicable bargaining pairs that would tend to have relatively large hazard rates. As strike age increases, the proportion of these "soft" strikes in the New York sample will decrease because they are settled relatively quickly, and so the New York hazard rate will fall toward the national average; when UI payments become available the New York hazard will fall below the national average. This explanation fits the empirical results very well, but it is hard to believe that the remote prospect of a UI subsidy would be sufficient to inject a quantitatively significant volume of "soft" strikes into the New York sample.[26]

Finally, it is possible that a kind of selection argument could be applied in the context of the AJ model. In that model the duration of a strike is fixed, so the hazard function is not well defined. In applying the model to a large number of bargaining situations, however, the reciprocal of duration might be considered as a pseudo-hazard rate, for the purpose of interpreting the empirical results above. Then, following the above analysis for this model, the main effect of UI payments will be to increase the hazard rate for most strikes (those for which y_o is less than y_1) while decreasing the hazard rate for a small minority of strikes, which would have been long in any case. Then, as the large-hazard strikes are settled and disappear from the sample, the strikes with reduced hazard rates will become more important, so that the average hazard rate may be increased for the set of older strikes.

This argument seems promising, but a complete analysis requires detailed consideration of the relationship between the observed distribution of strike durations and the distribution of the parameters of the AJ model across bargaining situations.

Conclusions

The results of this study are mixed. On the one hand, sharp differences have been found between strike settlement probabilities in New York and other States, and a substantial amount of circumstantial evidence points toward UI payments as the cause of these differences. The empirical results are final in the sense that they are not dependent on peculiarities of the theoretical model or of the data sample; thus the results have permanent value.

The theoretical analysis of the results, however, is inconclusive. The total cost theory of strikes, by far the most acceptable explanation, is clearly rejected by the data, although a more general version of this theory, covering both strike incidence and conditional settlement probabilities, might prove adequate. It cannot be said that the Ashenfelter-Johnson model is damaged by the empirical results here, but this is not necessarily a virtue of the model.

Notes

1. Gerald W. Scully, "Business Cycles and Industrial Strike Activity," *Journal of Business*, vol. 44, no. 4, October 1971, pp. 359–374.

2. John G. Cross, "A Theory of the Bargaining Process," *American Economic Review*, vol. 55, 1965, pp. 67–94.

3. Orley Ashenfelter and George E. Johnson, "Bargaining Theory, Trade Unions and Industrial Strike Activity," *American Economic Review*, vol. 59, March 1969, pp. 35–49.

4. Cf. H. S. Farber, "Bargaining Theory, Wage Outcomes, and the Occurrence of Strikes: An Econometric Analysis," *American Economic Review*, vol. 68, June 1978, pp. 262–271.

5. At this point one might object to the idea that the only effect of UI payments is to increase y^*, with y_o and a fixed. There is no way to refute such an objec-

tion, but this just reflects the weakness mentioned earlier, that since the resistance curve is not derived from any model of optimal behavior, one cannot say, a priori, how it will be affected by UI payments.

6. This statement is suggestive, but it must be handled with care as it assumes implicitly that the observed distribution of strike durations is generated solely by variations in $y_o - y_b$, with all other parameters held fixed. The observed distribution is a mixture of the conditional distributions given (a,r,y_b,y^*), so if a,r,y_b,y^*, are not observed, the observed distribution cannot be simply classified into "long" and "short" strikes.

7. John Kennan, "Pareto Optimality and the Economics of Strike Duration," *Journal of Labor Research*, vol. 1, Spring 1980, pp. 77–94.

8. Frank Brechling, "The Incentive Effect of the Unemployment Insurance Tax," in Ronald G. Ehrenberg, Ed., *Research In Labor Economics* (Greenwich, 1977). See also Martin Feldstein, "Temporary Layoffs in the Theory of Unemployment," *Journal of Political Economy*, vol. 84, October 1976, pp. 937–957.

9. It is very difficult to measure strike incidence, but there is no reason to believe that New York has more than its share of strikes. For example, New York had about 6.7 primary strikes per million workers per year over the period 1961–1977, while the U.S. figure was about 7.3.

10. This style of estimation has been strongly recommended by C. A. Sims. See "Macroeconomics and Reality," *Econometrica*, vol. 48, no. 1, January 1980, pp. 1–48.

11. Although UI benefits are also available to striking workers in Rhode Island, the number of strikes in Rhode Island is negligible in the present context.

12. William J. Horvath, "A Statistical Model for the Duration of Wars and Strikes," *Behavioral Science*, vol. 13, 1968, pp. 18–28; and Tony Lancaster, "A Stochastic Model for the Duration of A Strike," *Journal of the Royal Statistical Society, A*, vol. 135, no. 2, 1972, pp. 257–271.

13. Tony Lancaster, "Econometric Methods for the Duration of Unemployment," *Econometrica*, vol. 47, no. 4, July 1979, pp. 939–956.

14. Kennan, "Pareto Optimality."

15. Daniel McFadden, "Conditional Logit Analysis of Qualitative Choice Behavior," in Paul Zarembka, ed., *Frontiers in Econometrics* (New York, Academic Press, 1974).

16. It is easily seen that equation (29) will have a positive and a negative root (unless $X_t = Y_t = 0$). Because e^{ω_t} cannot be negative, only the positive root is relevant. If $X_t = Y_t = 0$ there is no solution except $\omega_t = -\infty$; this gives no trouble.

17. To qualify for inclusion in Table 1, a State was required to have 90 primary strikes in manufacturing, at least 10 of which lasted 56 days, over the period 1961–1977.

18. E. L. Lehmann, *Testing Statistical Hypotheses* (New York, Wiley, 1959), p. 62.

19. For example, in the case of a chi-squared test, the critical level is the area under the density function to the right of the observed value of the test statistic. The term "marginal significance level" has recently been introduced in the econometric literature in place of "critical level."

20. Lehmann, *Testing Statistical Hypotheses*, p. 143.

21. Although the hypergeometric test is based on the maintained hypothesis that p_t, q_t are constant over t, there is some intuitive reason to believe that this test is robust under varying p_t, q_t. The test works by comparing the total settlements in New York with the total in all States and asking whether New York had less than its share of strikes settled, given the numbers of trials in New York and elsewhere. It seems reasonable that this test procedure will still work well when the settlement probabilities are allowed to vary slightly with age.

22. Asymptotic tests of the proportional odds specification, also reported in Table 1, are not very useful either.

23. Note that the null hypothesis $\delta = 0$ in the proportional odds model is identical to the null hypothesis $p_t = q_t$ in the general homogeneity test. The tests differ only in the class of alternative hypotheses considered.

24. The correlation coefficient is -0.761 which has critical level 0.023 on the (heroic) assumption that the values of δ are normally distributed across industries.

25. It should be pointed out that, although the Rhode Island results are largely ignored because of small sample size, the point estimates for Rhode Island are fully consistent with the New York story.

26. New York might start out with a large number of soft strikes for reasons other than UI, and the explanation would work just as well, but in this case, by the argument discussed above, similar effects would be expected in other States.

Appendix: Estimation of the Proportional Odds Model

Write $\theta = (\delta, \omega_1, \omega_2 \ldots \omega_T)$. Then, from equations 30 through 32 the Hessian of the log-likelihood function is

$$\frac{\partial^2 l}{\partial\theta\partial\theta'} \equiv H = \begin{matrix} -(\beta_1+\beta_2+\cdots+\beta_T) & \beta_1 & \beta_2 & \cdots & \beta_T \\ \beta_1 & -\alpha_1-\beta_1 & 0 & \cdots & 0 \\ \beta_2 & 0 & -\alpha_2-\beta_2 & \cdots & 0 \\ \vdots & & & & \\ \beta_T & 0 & & & -\alpha_T-\beta_T \end{matrix} \tag{A–1}$$

Concavity of l is easily shown. For any θ, the quadratic form $\theta' H \theta$ is

$$\theta' H \theta = -\sum_{t=1}^{T} \alpha_t \omega_t - \sum_{t=1}^{T} \beta_t (\omega_t - \delta)^2 \leq 0. \qquad \text{(A–2)}$$

To obtain equation 34 first note that the cofactor of $l_{\delta\delta}$ is

$$| H_{oo} | = (-1)^T \prod_{t=1}^{T} (\alpha_t + \beta_t) \qquad \text{(A–3)}$$

Next, let $H^{(T)}$ be the Hessian for T observations. Then expand $H^{(T)}$ along the last column to obtain

$$| H^{(T)} | = -(\alpha_T + \beta_T) \, | H^{(T-1)} | + (-1)^{T+1} \frac{\alpha_T \beta_T}{\alpha_T + \beta_T} \prod_{t=1}^{T} (\alpha_t + \beta_t) \qquad \text{(A–4)}$$

This is a difference equation in $| H^{(T)} |$ whose solution is

$$| H | = (-1)^{T+1} \left\{ \prod_{t=1}^{T} (\alpha_t + \beta_t) \right\} \sum_{t=1}^{T} \frac{\alpha_t \beta_t}{\alpha_t + \beta_t} \qquad \text{(A–5)}$$

Now divide (A–3) by (A–5) to obtain equation 34.

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Overpayments and Fraud

Estimating Overpayments and Improper Payments

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This report is an interim report; the final report will be available early in 1981 from the following address: Chief, Division of Research, Unemployment Insurance Service, Employment and Training Administration, Department of Labor, Room 7402, 601 D Street, N.W., Washington, D.C. 20213.

To maintain its integrity, a social insurance program must have an effective system of payment controls. This is particularly difficult for the unemployment insurance (UI) program, since claimant eligibility is determined by complex factors, including availability for work, ability to work, active job search (a requirement in many UI jurisdictions), and earnings received while unemployed. Cost effectiveness and individual freedoms limit the scope and nature of monitoring procedures.

Because the UI program is cooperatively administered by the Federal Government and the 53 individual UI jurisdictions, provisions related to the prevention, detection, and recovery of overpayments are found both in Federal law and policy and in the employment security statutes and benefit policy rules established by the individual UI jurisdictions. The Secretary of Labor has interpreted section 3304(a) of the Internal Revenue Code to require that each UI jurisdiction detect overpayments due to willful misrepresentation by the claimant and those due to agency or other errors; prevent overpayments due to these causes; and recover the amounts overpaid in certain circumstances.[1] Both the national and regional offices of the Employment and Training Administration (ETA) of the U.S. Department of Labor (DOL) have staff to assist individual UI jurisdictions to control benefit payments and to monitor the effectiveness of these 53 benefit payment control programs. In addition, individual UI jurisdictions had a total of 2,063 positions in FY 1978 for benefit payment control activities.[2]

The summary statistics presented in Table 1 show that the dollar amount of detected overpayments has increased in recent years while total benefit payments have declined.[3] The dollar amount of annually detected overpayments rose from $100,977,018 in FY 1976 to $127,547,272 in FY 1979, an increase of 26 percent. Over this same period, total benefit payments declined by 34 percent from $13,195 million to $8,677 million. As a result, the ratio of dollars overpaid to total benefit payments increased substantially, from 0.8 percent in FY 1976 to almost 1.5 percent in FY 1979. The relative increase in this ratio was almost 91 percent. This large percentage increase, however, was preceded by a very low ratio recorded for FY 1976, resulting from the depressed economy and high claim load that year. The total number of overpayment cases actually declined by almost 10 percent during this interval, from 699,165 cases in FY 1976 to 631,639 cases in FY 1979. Detected fraud cases, however, increased by about 38 percent. Detected nonfraud cases declined by almost 18 percent. These trends reflect an increased emphasis on detection of fraud overpayment. These trends and those reported in Table 1—whether due primarily to improved detection efforts, to increased emphasis on overpayment detection, or to higher true overpayment rates—may have heightened public concern about fraud and abuse within the UI program.

Concern about fraud and overpayment in the UI system is not new,[4] but several events within the last decade have increased these concerns. The major recession in 1975 placed great pressures on the UI program as some $14 billion was paid out in regular and extended-duration programs. The burden of a greatly increased claim load was further increased by federally mandated timeliness requirements for making first payments and for issuing nonmonetary determinations.[5] Broad extension of coverage to previously ineligible workers and the extension of benefit payments up to 65

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TABLE 1. Selected data on benefit payment control activities in State programs: FY 1976 and FY 1979

Classification	FY 1976	FY 1979	Percent change
Amount of benefit payments (in millions of dollars)	13,195	8,677	−34.2
Number of fraud cases	103,306	142,726	38.2
Amount of fraud overpayment ($)	31,996,108	47,466,874	48.4
Number of nonfraud cases	595,859	488,913	−17.9
Amount of nonfraud overpayments ($)	68,980,910	80,394,984	16.5
Amount of total overpayments ($)	100,977,018	127,547,272	26.3
Total overpayments as a percentage of total benefits	0.77	1.47	90.9
Recoveries as a percentage of total overpayments	48.68	45.49	− 6.6
Number of convictions as a percentage of prosecutions recommended	64.64	54.12	−16.3

SOURCE: *Selected Administrative Data on Benefit Payments Control, State Programs*, Office of Program Management, Unemployment Insurance Service, Employment and Training Administration, U.S. Department of Labor, November 1979.

weeks contributed to public awareness and concern about the escalating size and scope of the UI program. Fraud and abuse in the UI program became a media topic focusing further attention on the issue.[6]

Basic Features of the Overall Study

In summarizing the principal aspects of this report, emphasis is placed on the following features: (1) objectives, (2) methodology for verifying benefit eligibility, (3) classification of investigative results, (4) other empirical results, (5) site selection considerations, (6) statistical design, and (7) limitations of the overall study. Procedures were developed to effectively coordinate and administer program activities among the several participating States and the project directors. Important aspects of these administrative arrangements —including the selection and training of project personnel, the monitoring of project operations in individual States, and the project schedule—are summarized in Appendix B. Also, a series of benefit payments control bulletins were written by the authors to assist the States in implementing various operational features of the study.

Objectives of the overall study

Subject to several limitations, the principal objectives of the overall study are to

- estimate the rate of detectable UI overpayments in each of the cities in the study;[7]
- provide a limited amount of disaggregated statistical detail on the estimated rate of detectable overpayment, classified by cause (e.g., unreported earnings) and type (e.g., fraud);
- provide a comparison of the rate of detectable overpayment estimated in this study with the rate of overpayment actually detected in the same populations by the benefit payment control procedures normally used by each participating State;
- summarize the findings of a survey of project personnel about specific problems related to the prevention, as well as the detection, of overpayment; and
- provide recommendations, where appropriate, based on the study results.

In developing estimates of the detectable rate of overpayment in the seven study populations, no attempt was made to estimate the overall error rate in UI, where the error rate would include underpayment as well as overpayment. Rather, the focus is strictly on the detectable overpayment rate, a concept that requires some clarification. An inherent factor in determining the actual rate of overpayment is that UI benefits are paid with at least a 1-week lag. The benefits claimed in any given week are for a week of unemployment that occurred 1 or more weeks earlier. It is neither feasible nor desirable to monitor the behavior of potential claimants before they file for benefits. Any study designed to estimate the rate of overpayment must therefore be based on ex post facto efforts to determine the eligibility of claimants during weeks of compensated unemployment.

Employment security laws and policies properly limit the extent to which an individual's activities can be investigated to determine whether UI benefits have been paid properly. Generally, before any intensive investigation of a claimant's activities during a particular week would be undertaken, some specific material fact must be found through a review of UI agency records, a personal interview with the claimant, or third-party verification of claimant's facts. The efforts made to verify benefit eligibility for this report were comprehensive, but they were conducted in accordance with the spirit of employment security laws and policies in the participating States. In any case, it never would be possible to determine with certainty whether each claimant actually abused the UI program by not meeting both the letter and the spirit of UI law and policy. Accordingly, the actual validity of any benefit claim can be verified only to a certain extent.

Thus, it is not possible to detect all "true" overpayments. A study such as this must therefore focus on estimating detectable overpayments, not "true" overpayments (which always would be somewhat greater than detectable overpayments). Even this limited objective is extremely important, because the current statistics on UI overpayments are clearly low estimates of the detectable rate of overpayment. This occurs because only limited resources are allocated to benefit payment control activities in the individual UI jurisdictions. In contrast, a very substantial resource commitment was made for each case included in this report to provide a much better estimate of the detectable overpayment rate for each of the participating cities.[8]

Methodology for verifying benefit eligibility

The essence of the methodology used in this study was to make a comprehensive determination about whether each of the weeks in the selected sample of weeks of compensated unemployment during the fourth quarter of 1979 (1979.4) and the first quarter of 1980 (1980.1) was properly paid.[9] During each week of the study period, approximately 10 compensated weeks of unemployment were selected in each city for intensive review and eligibility verification. The number of full-time field investigators normally assigned to these cases was two in two cities, three in four cities, and four in one city. The typical weekly caseload for these investigators has been 3⅓, and it has ranged from a low of 3 in 1 city to a high of 5 in 2 cities.[10]

The verification of benefit eligibility for each key week of compensated unemployment selected was designed to occur in two distinct phases. Phase I activities encompassed all efforts to verify benefit eligibility, except the postaudit procedures for detecting unreported earnings. Phase I included, but was not restricted to, the following steps:

1. The claims record card and a printout of the transaction file of UI activity for the current spell of unemployment were obtained and carefully reviewed by the investigator assigned to the case.[11]

2. The claimant was contacted and given an appointment for a personal interview. Normally, this interview was scheduled as soon as possible after the week of unemployment was selected.

3. The investigator conducted a personal interview with the claimant after a careful review of all agency records, to determine whether the requirements of employment security law and policy were followed during the week for which a claim was filed. (Earlier weeks in the unemployment spell also were scrutinized to determine whether prior violations of law or policy had occurred that would disqualify the claimant from benefits during the specific week under investigation.)

4. Following the personal interview, the project investigator conducted a series of third-party verifications, if appropriate, to substantiate the claimant's eligibility for benefits. Base-period employers were contacted routinely to ensure that the claimant was entitled to the amount of benefits actually received.

5. In verifying whether valid payments had been made, contacts with some of the following were made, depending on the particular circumstances of each case:

a. separation employers;

b. base-period employers;

c. work search/job referral and other employers;

d. babysitters or others who cared for the claimant's dependents;

e. school directories and other enrollment lists for academic and occupationally related schools or training programs;

f. hospitals or physicians;

g. industrial commissions and licensing agencies;

h. social service agencies;

i. the Job Service and other employment agencies;

j. unions;

k. other contacts, as appropriate, such as friends or coworkers.

6. When no suspicious issues were uncovered in the review of agency records, during the personal interview, or in third-party verifications, the phase I investigation was closed. When suspicious issues were uncovered, the investigations continued until they were resolved or it could be established that the week under investigation was improperly paid.

The process described in step 6 deserves additional emphasis. In contrast with the routine monitoring of benefit payments by State agencies, investigations in this project were never closed because of a lack of time. The average weekly caseload for each investigator in this study was slightly more than three, and it was not more than five in any city.

The phase II portion of the verification of benefit eligibility was designed to determine failure to report earnings/employment, as required by employment security law, during the weeks investigated. This phase will be accomplished through a postaudit for each study group claimant with any covered earnings reported by employers for the quarter including the key week selected for investigation.[12] The postaudit will determine whether each study group claimant had earnings during the key week from any employer who reported earnings during that calendar quarter. It is a violation of employment security law to receive UI benefits without reporting earnings (or days of work). Any overpayments found for the key weeks investigated in this process then will be pursued according to the law or policy of each State. An inherent limitation of this technique is that earnings in the cash economy or in noncovered employment cannot be detected by this method.

The postaudit procedure for detecting unreported earnings cannot be implemented until employer wage reports are filed. Phase II cannot be initiated in most States until at least 4 months after the close of the calendar quarter that includes the key week; thus this phase for weeks of compensated unemployment selected during 1979.4 will not be completed until approximately May–June 1980. Similarly, the postaudit procedures for the weeks selected during 1980.1 will not be completed until August 1980.

Classification of investigative results

Once the phase I verification of benefit eligibility for a sampled key week was completed, the payment for that week was classified as proper or improper. Each improper payment was further classified by both the type and cause of overpayment or improper payment.

Classification of key-week status. The objective of the intensive review of benefit eligibility was to accurately classify the status of each key week selected in the sampling process. Because the results of these eligibility verifications form the basis for the empirical estimates of overpayment rates presented in this report, it is very important to accurately classify the status of each week. Accordingly, a mutually exclusive and exhaustive schema for classifying the status of these key weeks was developed. The 13 categories used for classifying key-week status are described in the following list, which has two parts. In part I, following, the key week is not a waiting week or substitute waiting week.

1. *Proper payment/offset.* The investigation of the key week indicated that the payment was appropriate under the law and policy of the State, and no overpayment was established for the key week.

2. *Proper payment/offset.* The investigation of the key week indicated that the payment was appropriate under the law and policy of the State, but an overpayment was established or an offset voided for the key week because of disqualifying circumstances that did not apply to the key week. No overpayment will be coded for weeks in this category, because the weeks were properly paid.

3. *Improper payment/offset.*

a. *Recoverable overpayment established for key week.* The investigation of the key week indicated that the payment was not appropriate under the law and policy of the State, and a recoverable overpayment was established or an offset voided for the key week.

b. *Nonrecoverable overpayment established for key week.* The investigation of the key week indicated that the payment was not appropriate under the law and policy of the State, and a nonrecoverable overpayment was established for the key week.

4. *Improper payment/offset, no overpayment established for key week, but one or more subsequent weeks disqualified.* The investigation of the key week indicated that disqualifying circumstances occurred during the key week and continued in 1 or more subsequent weeks; as a result of these circumstances during subsequent weeks, an overpayment was established or an offset voided for 1 or more subsequent weeks, or a payment was not made for 1 or more of these subsequent weeks because it was determined that the claimant was ineligible for benefits. No UI agency action was taken against the key week.

5. *Improper payment/offset, but no overpayment established for key week and no subsequent weeks disqualified.* The investigation of the key week indicated that disqualifying circumstances occurred during the key week and continued in 1 or more subsequent weeks. Nonetheless, these subsequent week circumstances did not directly lead to the establishment of an overpayment, a voided offset, or a disqualification for any of these subsequent weeks. No UI agency action was taken against the key week.

6. *Improper payment/offset, but no overpayment established for key week and no subsequent weeks disqualified.* The investigation of the key week indicated that disqualifying circumstances occurred during the key week but did not continue in 1 or more subsequent weeks. As a result, the key-week circumstances did not directly lead to a disqualification, the establishment of an overpayment, or a voided offset for any of these subsequent weeks. No UI agency action was taken against the key week.

In part II the key week was a waiting week or substitute waiting week.

7. *Proper waiting week or substitute waiting week.* The investigation of the key week indicated that the waiting week provisions of law and policy were satisfied.

8. *Improper waiting week or substitute waiting week, this week disqualified, and overpayment established.* The investigation of the key week indicated that the waiting week provisions of law and policy were not satisfied, and this week was disqualified. As a result of this disqualification, an overpayment was established, an offset was voided, or a substitute waiting week was used.

9. *Improper waiting week, this week disqualified, but no dollar overpayment established.* The investigation of the key week indicated that the waiting week provisions of law and policy were not satisfied, and the waiting week was disqualified. Nonetheless, no overpayment was established (or no offset voided), because the claimants did not file for any additional benefits during their benefit year (prior to the close of this study). No dollar amount will be associated with improper payments in this category, since no benefits were actually overpaid.

10. *Improper waiting week or substitute waiting week and this week not disqualified, but 1 or more subsequent weeks disqualified.* The investigation of the key week indicated that disqualifying circumstances occurred during the key week, but this week was not disqualified. However, the circumstances detected during the key week continued in 1 or more subsequent weeks, and these circumstances directly led to the establishment of an overpayment (or voided offset) or to a disqualification of 1 or more of these subsequent weeks.

11. *Improper waiting week or substitute waiting week, but this week not disqualified and no subsequent weeks disqualified.* The investigation of the key week indicated that the disqualifying circumstances occurred during the key week and continued for 1 or more subsequent weeks, but none of these weeks was disqualified because of these circumstances, nor were overpayments (voided offsets) established for any of these weeks.

12. *Improper waiting week or substitute waiting week, but this week not disqualified and no subsequent weeks disqualified.* The investigation of the key week indicated that the disqualifying circumstances occurred during the key week, but this week was not disqualified. Because these key-week circumstances did not continue in 1 or more subsequent weeks, none of these subsequent weeks was disqualified, and no subsequent overpayments were established.

Several features of this classification system merit comment. First, offset weeks are treated on the same basis as weeks paid, and voided offset is treated on the same basis as overpayment. Second, the sequence of improper payment categories requires additional explanation. In some States, employment security law or benefit policy rules would not result in the establishment of an overpayment for the key week, even if certain types of disqualifying circumstances existed during that week. If such disqualifying circumstances continued into 1 or more subsequent weeks, overpayments might be established (or offsets voided) for those subsequent weeks; but this depends partly on law or policy and the official interpretation of that law or policy by those with the authority required to establish overpayments. In some of the empirical estimates, these improper payments are added to overpayments actually established (or offsets voided) to provide an estimate of a more broadly defined overpayment rate. In some States some types of overpayment are not recoverable, and this distinction between recoverable and nonrecoverable overpayment resulted in the inclusion of both items 3a and 3b in the classification system.

Three different overpayment rates based on this classification system are discussed in this report:

1. *Measure 1. Items 3a, 3b, 8, and 9.* In these instances, the key week was disqualified. In addition, an overpayment was established, an offset was voided, or a substitute waiting week was established for items 3a, 3b, and 8.

2. *Measure 2. Items 3a, 3b, 4, 8, 9, and 10 (or measure 1 plus items 4 and 10).* In these instances, either an overpayment was established (or an offset voided) for the key week; or the key week was a waiting week and was disqualified; or an overpayment was established (offset voided) for a subsequent week as a direct result of disqualifying key-week circumstances that continued for 1 or more subsequent weeks; or the claimant was disqualified for 1 or more subsequent weeks of unemployment claimed because of the continuation of disqualifying key-week circumstances during these subsequent weeks.

3. *Measure 3. Items 3a, 3b, 4, 5, 6, 8, 9, 10, 11, and 12 (or measure 2 plus items 5, 6, 11, and 12).* For this measure, the weeks for items 5, 6, 11, and 12 were included because the informed professional judgments of the project supervisors and investigative staffs in the participating States indicated that an improper payment had occurred for the key week, even though the UI agency took no action for these cases. This is the broadest measure of overpayment or improper payment used in the study. It is used with the understanding that probably not all the weeks included in this measure would have satisfied the scrutiny of the appeals process had overpayments actually been established.

Classification of overpayment causes. A classification system was also developed for categorizing the causes for the overpayments and improper payments found in this report. The six basic categories developed to classify these causes are presented in Table 2. The first two categories (A and B) include unreported earnings (or unreported days of work) during the key week, and errors in the reporting or recording of earnings (or days of work) during the key week. In five of the participating cities, benefits are reduced dollar for dollar for each incremental dollar earned, after some minimum forgiveness level, up to the maximum weekly benefit amount. In the two New York cities, the reduction in UI benefits depends on days worked rather than on dollars earned.

Overpayment or improper payment can also be caused by the incorrect reporting or recording of base-period earnings, since the weekly benefit amount in all the participating States depends on earnings and/or weeks of employment during the base period. Overpayment or improper payment that resulted from error in reporting or recording base-period earnings/employment is included in category C in Table 2.

Except for the possibility of quitting for "good cause" or "compelling personal reasons," allowed in some States, UI claimants who quit their last jobs are not eligible for benefits. Claimants who voluntarily quit or were discharged for cause would be denied benefits in most of the participating States. Improper payments and overpayments that resulted from these separation issues are included in category D in Table 2.

In all the participating States, claimants are required to be able to work and available for work. They may not refuse suitable work and remain eligible for UI

TABLE 2. Classification of the causes of overpayments and improper payments

A. Unreported earnings in the key week from[1]
   1. Self-employment
   2. Commission sales
   3. Concealed employment
   4. Other

B. Errors in reporting or recording of earnings in the key week due to[1]
   5. Reporting of net rather than gross earnings
   6. Underestimation of earnings
   7. Reporting of earnings when paid rather than when earned
   8. Reporting wages but not deducting them from benefits
   9. Over- and under-reporting of earnings
   10. Other

C. Errors in reporting or recording of earnings for the base period due to
   11. Incorrect reporting of earnings by employers
   12. Incorrect recording of earnings by the UI agency
   13. Incorrect estimation of base-period earnings
   14. Other

D. Separation issues due to
   15. Voluntary quits
   16. Discharges for misconduct
   17. Other causes

E. Eligibility issues related to
   18. Ability to work
   19. Availability for work
   20. Active job search
   21. Refusal of suitable work
   22. Other

F. Other causes; due to
   23. Benefits paid during a period of disqualification, even though a stop-pay order should have been in effect
   24. Reversals (appeal or higher authority)
   25. Redetermination (at deputy level)
   26. Back-pay award
   27. Reporting requirements
   28. Other

[1] In New York the law applies to unreported days of work rather than to unreported earnings.

benefits. All but two of the participating cities (Pittsburgh and Nashville) also have formal work search requirements. Improper payments and overpayments that resulted from these eligibility issues are included in category E.

Typically, most overpayments or improper payments found would be classified in categories A through E in Table 2; however, a residual category F was also developed for improper payments or overpayments that resulted from any other cause.

Classification of overpayment types. A classification system to distinguish among types of overpayments was also used. The basic types of overpayments distinguished are (1) fraudulent overpayments, (2) overpayments due to (nonfraudulent) error by claimants, (3) overpayments due to nonfraudulent errors by employers, (4) overpayments due to nonfraudulent errors by UI agency personnel, (5) overpayments established as a result of appeals procedures or higher-level reviews, and (6) cases in which the exact type of overpayment could not be identified.

Under the provisions of UI law and policy in the participating States, fraud overpayments are established (subject to certain conditions) only when there has been a willful attempt by the claimant to falsify statements or certifications to receive UI benefits. Often, legal action accompanies the establishment of a fraud overpayment.

Overpayments also arise as a result of errors that occur in the process of determining both the claimant's eligibility and the amount of benefits to which the claimant is entitled. Three different entities are involved in this process—the claimant, the UI agency, and the employer. Errors can originate from any one of these three sources or some combination. Claimant errors can occur, for example, when claimants fail to report illness or a vacation during the claim week. Employers' errors can occur in reporting base-period earnings. Agency errors can be made in nonmonetary determinations. Nonfraudulent overpayment and improper payment resulting from errors are classified by type in this report, using the informed judgments of the field investigators and project supervisors, subject to review by the project directors. In some instances, it was not possible to identify the principal source of error for a nonfraudulent overpayment. If sufficient information was not available to determine the primary source of the error, the overpayment was classified in the "uncertain" category. Also included in this category were any other instances in which the exact type of overpayment could not be identified.

Some overpayments are established as a result of the appeals process or review by higher authority. For example, if a higher-level review results in the disqualification of a week that has been paid, an overpayment is established for that week. In such instances overpayments may arise, not from erroneous local office decisions, but from reinterpretation of the information or from new information presented during the appeals process. Thus it often would not be appropriate to classify such an overpayment as due to agency error. Accordingly, a separate category was established for all overpayments established because of appeals or higher-level reviews.

Compliance deviation statistics. The project directors visited with representatives of the Auditor General's Office in Ottawa, Canada. In cooperation with Clarkson, Gordon & Company, a private accounting firm, the Auditor General's staff had conducted studies to estimate the amount and rate of UI overpayments throughout Canada, starting in calendar year 1976.[13] The Canadian studies gathered information on the frequency with which specific provisions of Canadian law and policy were not met by the claimant or by UI program personnel (e.g., the lack of specific written documentation for decisions reached or the failure of claimants to register for work). These and other departures from stated law or policy are referred to as *compliance deviations* in the Canadian studies.

Although it was not possible to fully incorporate a compliance deviation dimension into the present study, it was possible to obtain information on one specific type of compliance deviation. Information was obtained about the proportion of claimants registered with the Job Service (or union hiring hall, where appropriate), as required by UI law.[14]

Survey of project personnel. Many common issues related to benefit payment control activities occur among the participating States. A questionnaire, based on these common issues, was developed. It focused on topics such as (1) the impact on benefit payment control procedures of Federal timeliness requirements for first payments and for nonmonetary determinations, (2) the emphasis placed on the prevention and detection of overpayments in local offices, (3) the current level of training and additional training needs for local office personnel in benefit payment control procedures, (4) the emphasis placed on the prevention or detection of overpayments to intrastate versus interstate-agent claimants, and (5) the perceived impact on benefit payment control activities of providing additional resources for local office operations. The findings of this survey may provide some insights into basic problems in preventing or detecting overpayments.

Site selection considerations

The cities included in this study are Buffalo; Nashville; Oklahoma City; Phoenix; Pittsburgh; Queens, the borough of New York City; and Salt Lake City.[15] The participating local offices in each of these cities, with the exception of Phoenix, typically process claims for all individuals who file for benefits within their own city boundaries.[16] In Phoenix, however, the offices included in this study typically process all claims filed in the Phoenix metropolitan area.

Selection criteria. In the context of this study a random selection of UI jurisdictions or even major metropolitan areas was not feasible, given the time and resource constraints. Quite apart from these limitations, other factors precluded a random selection of UI jurisdictions, metropolitan areas, or local offices. Some States selected for participation in a random sampling process might have been unwilling to become involved in the study and could not have been required to participate. Refusal could have resulted from sensitivity to the issue of overpayments. Other States might have been unable to provide the required computer time, programming assistance, or other services necessary for the immediate implementation and execution of the project. Since the study seeks to compare its findings with the normal detection rate of overpayments revealed by routine State benefit payment control procedures, it was necessary not to interfere significantly with the routine activities of the participating States' benefit payment control units.

Another important consideration was the requirement that all personnel assigned to the project be very experienced and remain on the project for the entire study period. During the planning stages (July and August 1979), most informed observers believed that a major recession would begin during the study period. The increased workloads that a sharp downturn in economic activity could produce in any State may have convinced many State employment security agencies not to make the personnel commitments required as a condition of participation.

Finally, given the scope and restricted time frame, it was not feasible to introduce and operate this study in a State that did not willingly choose to participate. The cooperation and support required from various units in each State's UI bureau—the benefit payments control unit, the data processing unit, and local offices—for the successful implementation and completion of the project was and is substantial. In the absence of a good-faith effort on the part of all concerned, the project would fail in any State.

The six States and seven cities were chosen nonrandomly by the NCUC research staff. The cities selected provide an assortment of major metropolitan areas in terms of size, location, sociodemographic composition, economic structure, and UI law or policy. Even though random-selection techniques were not used, there was no conscious effort to bias the selection process in any predetermined manner.

UI characteristics of participating States. Some main UI law or policy characteristics of the States selected for participation in this study are summarized in Table 3. Only one State—Pennsylvania—does not have a waiting week requirement. This State also is the only one with dependents' allowance. The largest difference between minimum and maximum weekly benefit amounts (WBA) also occurs in Pennsylvania (a range of \$130 without dependents' allowances), followed closely by Utah (a range of \$127). In contrast, the narrowest WBA range (\$65) occurs in Arizona. Five of the six States provide for a maximum duration of regular benefits of 26 weeks, and the other (Pennsylvania) has a maximum duration of 30 weeks for regular benefits. All the States require claimants to be able to work and available for work, although two of the States (Pennsylvania and Tennessee) have no formal work search requirements. Four of the States are wage-reporting States, which require employers to file quarterly wage reports on all covered workers, whereas New York and Utah are request reporting States, which

TABLE 3. Selected aspects of employment security law/policy in participating States

Characteristics	Arizona	New York	Oklahoma	Pennsylvania	Tennessee	Utah
Dependents' allowance	No	No	No	Yes	No	No
Waiting week	Yes	Yes	Yes	No	Yes	Yes
Minimum WBA	$ 25	$ 25	$ 16	$ 13	$ 14	$ 10
Maximum WBA[1]	$ 90	$125	$116	$143	$100	$137
Weekly earnings forgiven	$ 15	NA[2]	$ 7	$ 6[3]	$ 20	30 percent of WBA
Able to work	Yes	Yes	Yes	Yes	Yes	Yes
Available for work	Yes	Yes	Yes	Yes	Yes	Yes
Active job search	Yes	Yes	Yes	No	No	Yes
Wage reporting	Yes	No	Yes	Yes	Yes	No
Base period is first 4 of last 5 completed calendar quarters	Yes	No[4]	Yes	Yes	Yes	Yes

[1] Excluding dependents' allowances.
[2] In New York there is no specific dollar amount forgiven, since reductions in the WBA due to employment are based on days worked, not dollars earned.
[3] The maximum of 40 percent of the WBA or $6.
[4] The base period in New York is defined as the 52-week period immediately prior to the filing of a valid original claim that opens a benefit year.
SOURCE: *Handbook for Interstate Claims Taking*, Unemployment Insurance Service, U.S. Department of Labor.

require employers to provide wage information only in the event that a claim for UI benefits is filed. With the exception of New York, these States normally define the base period as the first 4 of the last 5 completed calendar quarters, although substitute provisions are allowed in some cases.

Selected information on the benefit payment control activities and claim flows in the participating States during FY 1979 is provided in Table 4. The size of the claim loads varied widely among these States. For example, about 615,000 first payments were made during FY 1979 in New York and Pennsylvania, compared with only about one-sixteenth as many first payments in Utah, Arizona, and Oklahoma and about one-fourth as many in Tennessee. In terms of total overpayment cases (both fraud and nonfraud) per 1,000 first payments, only one State (Oklahoma) had a lower rate of detected overpayments (66 per 1,000 first payments) than that recorded for all UI jurisdictions combined (83 per 1,000 first payments); the other participating States ranged from rates of 88 per 1,000 first payments in Tennessee to 132 per 1,000 first payments in New York.

The distribution of total overpayment cases between the fraud and nonfraud categories also differed substantially among the participating States (see Table 4). In Pennsylvania, fewer than 5 percent of all overpayments established in FY 1979 were classified as fraudulent, whereas almost 37 percent of all overpayment cases established during the same year in Utah were classified as fraudulent. The percentages of total overpayment cases classified as fraudulent ranged from 24 percent to 35 percent in the other four participating States, compared with a national average of 23 percent.

Restitution as a percentage of total overpayments is also reported in Table 4. Two of the participating States (Pennsylvania and Tennessee) recovered about the same percentage of overpayments as was recovered in the nation as a whole (45 percent). In contrast, two States (New York and Oklahoma) recorded figures of 30 percent to 32 percent, and the remaining two States (Arizona and Utah) recorded figures of 65 peıcent to 68 percent.

The pattern emerging from these comparisons is that the participating States typically ranked well above the national average in reported overpayments per 1,000 first payments in FY 1979 on total cases and

TABLE 4. Selected administrative data on benefit payment control during FY 1979: national totals and participating States

UI jurisdiction	Number of first pays[1]	Number of fraud cases	Fraud cases/ 1,000 first pays	Total number of overpayment cases	Total overpayment cases/ 1,000 first pays	Restitution as a percentage of total overpayments
All jurisdictions	7,644,671	142,726	18.7	631,639	82.6	45.5
Arizona	37,844	1,264	33.4	3,600	95.1	65.0
New York	614,699	22,080	35.9	· 81,390	132.4	31.7
Oklahoma	42,012	710	16.9	2,788	66.4	30.4
Pennsylvania	614,650	2,895	4.7	60,532	98.5	43.2
Tennessee	160,381	3,368	21.0	14,055	87.6	44.2
Utah	37,068	1,330	35.9	3,600	97.1	68.3

[1] First pays approximated from other data in the table for individual States.
SOURCE: *Selected Administrative Data on Benefit Payments Control, State Programs*, FY 1979, Office of Program Management, Unemployment Insurance Service, Employment and Training Administration, U.S. Department of Labor, November 1979.

fraud cases alone. Estimates of the detectable overpayment rate developed in this report are presumably somewhat independent of the overpayment rates normally reported by the benefit payment control units in these States because the rates normally reported depend on both the "true" level of detectable overpayments and the effort expended to find these overpayments. The detectable rates found in this report presumably depend mainly on the "true" level of detectable overpayments, since substantial resources were available for detection.

Statistical design

Selection of the appropriate population. To interpret the empirical results it is necessary to have a clear understanding of the exact population definition used. The population is defined by weeks of compensated unemployment, rather than by claimants.[17] This makes it possible to consider each week in the population as a separate unit. Benefit eligibility can be verified for individual weeks of unemployment, allowing investigations to be terminated following the week selected for investigation.

The weeks included in the population are referred to as *key weeks* throughout this report. To be counted as a key week, a week had to be compensable and timely. Compensable weeks are defined as (1) waiting weeks (for States with a waiting week requirement); (2) total offset weeks (weeks in which benefits would have been paid but were offset because of a prior overpayment or accounting error earlier in the claim period); and (3) weeks in which a full or partial benefit check actually was issued to the claimant.[18] Disqualified weeks that were claimed but not paid were excluded, since they were not compensable and overpayments would not result. The effective verification of benefit eligibility for a specific week of unemployment declines as the time lapse lengthens between the key week and the beginning of the investigation. Thus, only weeks paid on a timely basis were included. The pay order for a timely week (or the certification for a waiting week) had to be forwarded from the participating local office or mail claims center to the central office for payment either within 7 calendar days of the week-ending date, for weekly certifications for benefits; or within 14 calendar days of the week-ending date, for biweekly certification for benefits.

Selection of sampled key weeks. Separate procedures were developed for sampling intrastate and interstate-agent key weeks because of differences in the claim processing.

Intrastate sampling. Model computer programs were made into flow charts and distributed to assist individual States in building the appropriate population files from which intrastate claimants were sampled.[19] Participating States were also given detailed instructions for developing data tapes containing information on the size and characteristics of both the relevant population in key weeks and of the weeks actually selected in the sampling process. Each week these computer files were used to select a random sample of the key weeks paid in each city. Before selecting the sample for each week, all key weeks included in the population for that week were arrayed by weekly amount and social security number to increase the chances of obtaining a representative sample in terms of weekly benefit amounts. A computerized procedure then was used to randomly select the weekly samples of key weeks from this array for eligibility verification.[20]

In States where no biweekly filing occurred, the key week selected by this sampling procedure was always the week investigated. In contrast, in States in which biweekly filing occurred, the key week selected was not always the week investigated. In instances of biweekly filing, each key week selected was tied to a companion week included on the biweekly pay order. The most recent of the 2 weeks on biweekly pay orders was usually chosen for investigation. Exceptions to this rule were made if the earlier of the 2 weeks was a waiting week or if the most recent of the 2 weeks was disqualified or otherwise did not satisfy the criteria for inclusion in the population of key weeks. The first of these exceptions was made to allow for the possibility of including waiting weeks among the weeks investigated in biweekly States. The second exception was made because the weeks covered by the exception actually were not part of the population for this study.

Interstate-agent sampling. Manual procedures were used to select the interstate-agent weeks sampled in participating cities. The criteria to define the population of interstate-agent weeks were the same as those for intrastate key weeks. The population of interstate-agent weeks used in the weekly sampling process was to include only compensated and timely weeks. It was possible that after a week claimed by an interstate-agent claimant had been selected for benefit eligibility verification, contact with the liable State would reveal that the liable State had denied payment to the claimant. In this event no overpayment could have occurred, and the key week was removed from both the sample and the population.[21] Because of the manual procedures used to select the sample of interstate-agent weeks, the timeliness criterion for key weeks was more difficult to ensure. In most instances, however, the sample of interstate-agent key weeks was selected out of the relevant population of timely key weeks.

Statistical reliability of estimates. The issues involved in determining the sample sizes for the study were clear. Proportionate sampling was not possible because the weekly claim load in any office was expected to vary over the 6-month sampling period. A fixed number of investigators had to be budgeted for the project in each city. The size of the sample involved tradeoffs between costs and statistical reliability. The larger the sample selected from each city, the more reliable the statistical estimate of the rate of overpayment would be. As the size of the weekly sample selected from each city increased, so would the cost of conducting the study in each city, assuming a fixed number of investigative hours for each case. If the cost and number of investigators were fixed but the sample size increased, a smaller number of investigative hours would be spent on each case. Because the basic objective of the study is to estimate the detectable rate of overpayment in the relevant populations, it was essential that sufficient investigative time be spent to thoroughly determine the status of the payment for each key week. It was estimated that approximately 8 to 10 hours of direct time should be allowed for each case and that each investigator could handle three to four cases per week (given some allowance for report writing, vacations, illness, and other activities). The only remaining issue was to determine the cost of producing a reliable statistical sample in each city for the 26-week sampling period.

The estimated effects of varying sample sizes on the statistical reliability of the study estimates are shown in Table 5. These estimates were used only to determine the minimum sample sizes acceptable in each city. In any case, the data reported in Table 5 indicate the estimated bounds on the errors of estimates for attribute sampling for hypothetical combinations of detectable overpayment rates and sample sizes. These estimates are provided both for individual city population estimates and for the composite multicity population.

The errors in the table are to be interpreted in the following manner: if the detectable overpayment rate found in one city's population was 10 percent, then the maximum absolute error of the point estimate (at a 95-percent level of confidence) would be approximately ± 4.2 percent with a sample size of 200, ± 2.9 percent with a sample size of 400, and ± 1.3 percent with a sample size of 2,000. Similarly, if the detectable rate of overpayment found in the composite population was 10 percent, then the maximum absolute error of the point estimate (given a 95-percent level of confidence) would be approximately ± 1.7 percent with a combined multicity sample of 200, ± 1.2 percent with a combined multicity sample of 400, and ± 0.5 percent with a combined multicity sample of 2,000.

Table 5 indicates that a doubling of the sample size would not proportionately reduce the size of the absolute errors associated with the estimates, either for individual cities or for the composite seven-city population. On the basis of this finding it was determined that a target figure of at least 200 key weeks should be sampled during the entire 26-week sampling period. An average weekly sample size of at least 8 (and preferably 10) should be obtained for each city during the 6-month sampling period. Given these considerations on weekly caseload size to be handled effectively by each investigator, a minimum of at least two and preferably three investigators should be assigned to the project in each city.

TABLE 5. Percentage distribution of estimated bounds on the errors of estimates of detectable overpayments for individual city populations and for the composite multicity population[1]

Percentage occurrence of detectable rate	Absolute errors for sampling period with various sample sizes: 200	400	2,000
	Individual city populations		
1.0	1.4	1.0	0.4
2.0	1.9	1.4	0.6
3.0	2.4	1.7	0.7
5.0	3.0	2.1	1.0
10.0	4.2	2.9	1.3
15.0	4.9	3.5	1.6
20.0	5.5	3.9	1.8
	Composite multicity population[2]		
1.0	0.6	0.4	0.2
2.0	0.8	0.6	0.3
3.0	1.0	0.7	0.3
5.0	1.2	0.8	0.4
10.0	1.7	1.2	0.5
15.0	2.0	1.4	0.6
20.0	2.3	1.6	0.7

[1] Estimates are for attributes sampling only. The absolute errors presented in the table relate to inferences about the presence or absence of an overpayment for each key week investigated. Somewhat different errors of estimate would result from variables sampling, in which the actual dollar amount of overpayments rather than the presence or absence of overpayments had been estimated. At the 95 percent confidence level the errors reported are upper bounds.

[2] The absolute errors for the multicity population were calculated by assigning weights to each individual city to reflect the approximate relative size of the Standard Metropolitan Statistical Area (SMSA) that included that city. It was also assumed in making the calculations reported that the detectable rate in all cities was identical.

Selection of elements from the nonsampled group. This study compares the estimated detectable rate of overpayments found in this study with the rate uncovered by routine procedures in the benefit payment control units in each city for the same period. Detectable rate of overpayment found in this study may be compared only with the rate found through routine State operations on intrastate weeks of unemployment. It would not be possible to compare the interstate rates found in this study with the rates established by routine State operations for interstate-agent weeks without conducting a review of overpayment rates for at least a random sample of all interstate-agent weeks in the study population. It was not possible to develop the required interstate-agent population computer file at reasonable cost levels.

Selection procedure. Overpayment established by routine State operations for intrastate weeks will be estimated by randomly selecting a group of key weeks from all nonsampled weeks included in the computerized population file developed in each city.[22] These randomly selected key weeks for the nonsampled population of intrastate claimants will be thoroughly checked against the overpayment records maintained by the participating States to determine all overpayments established for any of these particular key weeks of compensated unemployment. On the basis of these findings the total amount and rate of overpayment detected by routine operating procedures will be estimated. Often there is a substantial lag between the time a specific week of unemployment is compensated and the date an overpayment is established and recorded in the State's overpayment files. Therefore, the clerical review of overpayment files of participating States to identify routine overpayment will not begin until summer 1980.[23]

Because postaudit investigations are planned for the sample key weeks investigated, it would be desirable to have the results of the overpayments routinely established by State procedures include the postaudit findings each State routinely conducts for the calendar quarters of this study. The rigid time frame of this project and the required delays before postaudit procedures can be implemented, however, necessitated a compromise in this ideal design. The approach taken will permit a comparison of the estimated detectable rate of overpayment (based on phase I and II investigations) in this study with overpayment rates detected through routine State operations that include postaudit procedures only for 1979.4. It will not be possible to obtain the results of the postaudits that may be conducted for the nonsampled key weeks selected for 1980.1. However, comparisons of the detectable rates of overpayments estimated in this study can be made with the rates actually detected through normal State benefit payment control procedures for both 1979.4 and 1980.1, by excluding the results of all postaudit investigations from the study rates and from the rates for routine State operations.

Statistical reliability of estimated rates. The (maximum) absolute errors associated with the point estimates developed for the rates of overpayments detected through routine benefit payment control procedures are reported in Table 6. These estimates are to be interpreted in the same way as estimates for Table 5. Because the clerical costs per case for nonsampled cases will be substantially less than for each sampled week, much larger samples could be used to determine the overpayment rate established by routine State operations. Since the routine State overpayment rate will be directly compared with the detectable rate found in this study, there should be relatively small absolute errors associated with routine rates. Approximately 1,000 nonsampled weeks would be selected for each quarter in each city for estimating the routine overpayment rate for the populations of nonsampled weeks.

TABLE 6. Percentage distribution of estimated bounds on the errors of estimates of overpayment rates detected through routine State benefit payment control procedures for individual city populations and for the composite multicity population[1]

Percentage occurrence of State-detected rate	Absolute errors for sampling period with various sample sizes		
	500	1,000	2,000
	Individual city populations		
1.0	0.9	0.6	0.4
2.0	1.2	0.9	0.6
3.0	1.5	1.1	0.7
5.0	1.9	1.3	1.0
10.0	2.6	1.9	1.3
15.0	3.1	2.2	1.6
20.0	3.5	2.5	1.7
	Composite multicity population[2]		
1.0	0.4	0.3	0.2
2.0	0.5	0.4	0.3
3.0	0.6	0.5	0.3
5.0	0.8	0.6	0.4
10.0	1.1	0.8	0.6
15.0	1.3	1.0	0.7
20.0	1.5	1.1	0.8

[1] Estimates are for attributes sampling only. The absolute errors presented in the table relate to inferences about the presence or absence of an overpayment for each key week investigated. Somewhat different errors of estimate would result from variables sampling, in which the actual dollar amount of overpayments rather than the presence or absence of overpayments are estimated. At the 95 percent confidence level the errors reported are upper bounds.

[2] The absolute errors for the multicity population were calculated by assigning weights to each individual city to reflect the actual population sizes for all weeks in these cities during 1979.4. The estimates are based on the assumption that the rate of overpayments is the same in each city.

Limitation of the overall study

The detectable rate of overpayment found in any study is likely to be lower than the "true" rate of overpayment. This occurs because UI benefits are paid for weeks of prior unemployment and because there are appropriate constraints on monitoring funds expended in social payment systems to guarantee individual freedoms for those participating in such programs. The growth of the cash economy in recent years also reduces the extent to which unreported earnings can be detected by normal postaudit procedures (which are based on employer-reported earnings). Furthermore, the gap between the detectable and the "true" rates of overpayment for any city is not fixed, but depends on the priorities assigned to detection efforts and the amount of resources allocated for investigative work.

For these reasons, the main goal of this study is to provide estimates of the detectable rate of overpayment in the project cities. However, this study cannot provide statistically reliable estimates of the (presumably higher) "true" rate of overpayment in these project cities.

Additional specific factors of this study may limit further the usefulness of its results. Most of these limitations arise because of either time or resource constraints. These additional limitations include the following:

1. The six States and seven cities selected for this analysis were not randomly selected from a nationwide sample of UI jurisdictions or metropolitan areas. Hence, the results of this analysis can be appropriately generalized only to the populations of claimants who filed timely claims for benefits at the local offices (or mail claims centers) encompassed by this study. These results cannot be generalized to the other metropolitan areas in these six participating States; to the entire UI jurisdictions encompassed by these States (including both urban and rural areas); or to the nation as a whole, since only claimants in seven specific (nonrandomly selected) metropolitan areas were included in the study.

2. The rate of overpayment found may be subject to seasonal variation that will not be evident in the empirical findings. A 26-week sampling period, which encompasses 1979.4 and 1980.1, was used to draw the entire sample of key weeks investigated. Hence, inferences developed on the basis of sample data for this study are strictly valid only for the study population of claimants who filed for benefits during the 2 calendar quarters of the sampling period.

3. Information on overpayment in any individual project city will be confidential, and all empirical findings of this study will be reported so as to preclude the identification of any individual city in the reported statistical data. As a result, estimates of the total amount of overpayment in these populations cannot be reported even anonymously for individual cities, because the greatly differing sizes of the cities would make it possible to identify a city from these data. This confidentiality requirement also limits the amount of information that can be provided to explain differences among the results for the various cities. An additional limitation of confidentiality is that the weighted rate and amount of overpayment for the composite multicity population cannot be reported in this *Interim Report* and perhaps not in the *Final Report*.

4. The number of compensated weeks of unemployment selected is quite small; only about 10 such weeks were selected in each city during each week of the sampling period. Since fewer than 315 weeks have been selected from any one city, it will be nearly impossible to provide reliable evidence on differences in overpayment rates for different subgroups (e.g., regular UI versus Unemployment Compensation for Federal Employees [UCFE] or intrastate versus interstate-agent claimants). Although limited attempts will be made to provide some information on certain disaggregated categories, the primary objective of the analysis was to develop reliable estimates of the rate of overpayment for the total population samples in each city. The sampling plan was not designed to produce reliable estimates for detailed subgroups within the individual city populations.

5. Though much interest exists in the differences in overpayment rates in States that do versus those that do not primarily use mail claims, such comparisons cannot meaningfully be developed from the present study. It is not possible to identify in this study any two participating States that are essentially identical with respect to employment security law, benefit policy rules, administration, and other factors, except for the presence or absence of mail claims filing. Furthermore, in States that use mail claims for some of their total claims filing, claimants are not typically assigned randomly to mail claims filing. Hence, even within a single State it would not be possible in this study to determine whether the use of mail claims filing alone had any measurable effect on the rate of overpayment.

6. Similarly, much interest has been expressed about whether overpayments tend to be more frequent in request reporting versus wage-reporting States. Although both types of States are among the six participating in this study, it is not possible to isolate the effects of these reporting requirements on overpayment rates. In particular, it will not be possible to identify any two participating States that are essentially identical with respect to employment security law or policy, administration, and other relevant factors, with the exception of wage-reporting requirements for employers.

7. The inclusion of only timely weeks of compensated unemployment resulted in the exclusion of certain types of claims from the population. Specifically, the criterion of timeliness excluded claims involved in appeals, those involved in labor disputes, and those held by an adjudications deputy for any length of time. These exclusions may result in a slightly higher overpayment estimate for the remaining population. This estimate is based on the assumption that the excluded weeks were less likely to be overpaid than the included ones because of the extra scrutiny that presumably accompanied the delay in paying excluded weeks. Claims subject to any agency errors that could have delayed their processing and claims for which late certifications were received were also omitted.

8. The time frame for this study will make it impossible to include any postaudit results in calculating the overpayment rate for routine State procedures during 1980.1 for each city. As a result, it will be possible to compare the estimated detectable rate of overpayment (based on both phase I and phase II investigations) found in this study with the rate of overpayment detected by normal State benefit payment control procedures (for both phase I and phase II investigations) only for a single calendar quarter, 1979.4. Hence this comparison may not provide a valid measure of the gap between the estimated detectable rate and the normally detected rate of overpayment for more than a single calendar quarter.

9. Comparisons of the estimated detectable rate of overpayment with the rate detected through normal State procedures are valid only if the implementation and operation of this special study did not significantly affect the routine control/detection activities of the participating States. Although substantial efforts were made to ensure that the operation of this study did not influence either positively or negatively the routine operations of State benefit payment control units, the potential for such influence does exist. Such influences could significantly affect the comparison of the detectable rate of overpayment estimated in this study with the rate normally detected by routine State procedures.

TABLE 7. Sample and population sizes in participating project cities: 1979.4

City	Intrastate key weeks		Interstate-agent key weeks		Total key weeks	
	Sample	Population	Sample	Population	Sample	Population
Total	860	322,742	61	23,773	921	346,515
Buffalo [1]	129	32,041	1	570	130	32,611
Nashville	120	31,915	4	1,305	124	33,220
Oklahoma City	112	10,345	14	1,361	126	11,706
Phoenix [2]	98	64,062	25	15,894	123	79,956
Pittsburgh	154	91,856	3	1,401	157	93,257
Salt Lake City	122	30,696	12	2,304	134	33,000
Queens [3]	125	61,827	2	938	127	62,765

[1] Both the sample population numbers for Buffalo reflect claims activity in a single local office. Two offices, however, serve the city of Buffalo. Claimants report to one or the other of these offices on the basis of the last digits of their social security numbers.

[2] Sampling occurred in five local offices in the Phoenix metropolitan area, and the population totals encompass claims filing at all these local offices. Hence the values for Phoenix include the entire metropolitan area, not just the city of Phoenix.

[3] Both the sample and the population numbers for Queens reflect claims activity in a single local office. Two offices, however, serve Queens. Claimants report to one or the other of these offices on the basis of the last digits of their social security numbers.

Formulation of the Analysis for This Report

The preceding sections have outlined the basic features of the entire study, which will not be completed until January 1981. The purpose of the *Interim Report* is to provide to the NCUC empirical results on currently available (and somewhat incomplete) information for the Commission's use in preparing its report to Congress. Hence, the remainder of this report focuses on the procedures used to develop the estimated overpayment rate and other empirical evidence currently available from project data.

Sample selection: 1979.4

The sample and population sizes for both intrastate and interstate-agent key weeks for each project city during 1979.4, the quarter analyzed in this report, are presented in Table 7. Overall, a total of 921 key weeks (93 percent of which were intrastate weeks) were selected out of the total population of 346,515 weeks (93 percent of which were intrastate weeks). The largest sample (157 key weeks) was selected in Pittsburgh, where four investigators were assigned; the sampling proportion in this city was relatively low, however (.17 percent), because of the relatively large population of key weeks paid in Pittsburgh during 1979.4. In contrast, the largest sampling fraction (1.08 percent) was recorded for Oklahoma City. The overall sampling fraction for all cities considered together was .27 percent.

Interstate-agent key weeks accounted for the largest proportion of the total quarterly sample in Phoenix (20.3 percent), followed by Oklahoma City (11.1 percent) and Salt Lake City (9 percent). In each of the remaining project cities fewer than 3.5 percent of the total weeks selected during the quarter were interstate-agent weeks.

Nonproportionate sampling was used because a fixed number of investigators was assigned to investigate the key weeks selected from a fluctuating claim load. It was necessary to weight the weekly samples to account for the varying weekly sampling fractions before developing the empirical estimates presented. For the empirical analysis in which only intrastate key weeks are analyzed (overpayment rate expressed in terms of dollars), the weekly weights assigned reflect only the varying sampling proportions for the weekly intrastate claims flow.[24] For the analysis in which both intrastate and interstate-agent key weeks are analyzed (overpayment rates expressed in terms of weeks of compensated unemployment), the weekly weights assigned reflect the varying sampling proportions for the *combined* intrastate and interstate-agent weekly claims. The weight assigned to the sample for any given week in any city was equal to the proportion of the relevant population of total weeks in the quarter filed during that given week in that city.

After appropriate weekly weights had been applied to the sample selected during each week in a given city, it was necessary to determine whether the entire (weighted) sample selected in that city was representative of the entire population from which the sample was drawn. Because no information was available on the personal or labor-market characteristics of the population of interstate-agent claimants, tests to assess the representativeness of the samples selected in the project cities could be conducted only for intrastate claimants.[25] Appropriate statistical tests were conducted to determine whether sample- versus entire-population proportions for each city were significantly different for the following characteristics: sex, age, ethnic affiliation, industry of prior employment, and size of the weekly benefit amount.[26] In the six cities for which tests could be conducted, no statistically significant differences (at the 0.10 level of significance) were found for any of these characteristics. Hence, even though very small samples were selected in each city, the samples in six of the seven cities nonetheless appropriately represent their respective populations. Thus, the empirical results based on the sample data in these six cities may be generalized to the populations from which these samples were drawn.

In the one remaining city it is not possible to determine whether the sampled key weeks are representative of the population of timely key weeks filed in that city during 1979.4. This fact is due to errors found in computer programs designed to construct the cumulative population files from which the weekly samples were drawn. Although it is possible that these errors may be resolved, it was not possible to do so prior to the deadline for the *Interim Report.* As a result, estimated overpayment rates are provided in this report for only the six project cities [27] where the sampled key weeks were representative of the appropriate timely populations. The only viable alternative to this approach was unacceptable. It would have necessitated presenting empirical results for the seventh city before the sample population could be precisely defined; determined to be reresentative of the appropriate population; and appropriately weighted, if unrepresentative.

Limitations of the *Interim Report* analysis

In addition to the limitations for the overall study, several other limitations of the *Interim Report* should be emphasized:

1. All the formal empirical evidence presented is based on a sample selected during a single calendar quarter; sampling for 1980.1 and efforts to verify benefit eligibility for those key weeks were still in progress as this report is prepared, so statistical estimates of overpayments for 1980.1 were not available.

2. The estimated overpayment rate in this report excludes all results from the postaudit of the sampled group of key weeks for 1979.4, because these results for unreported earnings were not yet available. The results of the postaudit portion of the study will increase somewhat the overpayment rates reported for 1979.4. Although it was not possible to obtain precise information on the relative importance of the postaudit in the six cities for which results are reported, rough estimates provided by three of these six cities indicate that from 40 to 90 percent of all overpayment normally established in their States is due to the postaudit. It is highly doubtful that the postaudit will be relatively as important in detecting overpayment in this study, but the inclusion of postaudit results certainly will tend to increase the overpayment rate above the levels estimated in this report.

3. In some cities the phase I verification of benefit eligibility was not completed as of the February 8, 1980, cutoff date for preparation of this report. Overall, the investigations for 4.8 percent of the total cases for 1979.4 had not been completed prior to submission of the data on which overpayment rates in this report are based. In instances in which the phase I investigations were not completed, the key week was coded as a proper payment for this report. However, some overpayments will probably be established for some of these weeks. A few of these investigations were not closed because complicated investigations of suspicious issues were in progress as of February 8, 1980. The completion of these phase I investigations for the 1979.4 sample of key weeks may increase overpayment rates in this report for some project cities.

4. Some of the overpayments for 1979.4 analyzed in this report may be reclassified because of appeal reversals or because of the availability of new information. The magnitude of this factor is not known, but it is expected to be relatively minor. However, the effect of any such changes would be to reduce the overpayment rate for 1979.4 below the level presented in this report.[28]

5. The overpayment rate estimated in terms of total dollars of benefits paid is based only on the samples of intrastate claimant key weeks selected during 1979.4. Overpayment rates estimated in terms of weeks of compensated unemployment are based on the samples of key weeks for both intrastate and interstate-agent claimants. This estimation procedure was necessary because appropriate information was unavailable on the total dollars of benefits paid to the appropriate population of interstate agent claimants in each city during 1979.4.

6. No comparisons of the estimated detectable rate of overpayment developed in this study with the rates of overpayment detected through routine State procedures could be provided in this report. These comparisons cannot be made until data are gathered from benefit payment control until files for the nonsampled key weeks selected for 1979.4 and 1980.1.

An important issue in assessing these limitations is whether the overpayment rates estimated in this report for 1979.4 are likely to be increased more than they will be decreased. Although this issue will not be resolved until the *Final Report* is issued, it seems unlikely that reversals and new information could offset the rates developed through investigations and postaudits of unreported earnings for all sample cases. It appears extremely likely that the overpayment rates reported here will be lower than the overpayment rates estimated in the *Final Report* for the same quarter for these same cities.

Specific objectives of the *Interim Report*

Given the limitations of the *Interim Report,* specific objectives are as follows:

1. Develop estimates of several measures of the rates of detectable overpayment for the relevant populations served by the participating local offices (and mail claims centers) during 1979.4 in six of the participating project cities.

2. Provide some additional evidence on the causes and types of overpayment/improper payments found in these cities during 1979.4.

3. Provide some evidence on the frequency of compliance deviations on registration for work with the Job Service or, where appropriate, with union hiring halls.

4. Provide a summary of some of the information obtained from a survey of project personnel on their perceptions of the strengths, limitations, and possible improvements in the existing UI benefit payment control system.

5. Provide recommendations to the NCUC suggested by the study results.

Measures of overpayment

The measures of overpayment analyzed in this report are based on the system developed for classifying each key week at the close of the phase I investigation. Four different measures of overpayment are estimated. These measures are expressed in terms of weeks of compensated unemployment and total dollars of benefits paid. On the basis of the classification system explained in Table 1, these measures are defined as follows:

Measure 1. This measure includes all key weeks classified into categories 3a, 3b, 8, and 9 in Table 1. These codes include all cases in which the key-week investigation resulted in the disqualification of a waiting or substitute waiting week or led to the establishment of a recoverable or nonrecoverable overpayment (or a voided offset). for the key week. This measure included all instances in which key-week circumstances led to specific agency action against the key week.

Fraud. This measure represents a subset of measure 1 and includes only instances in which a fraud overpayment (or voided offset) was established against the key week.

Measure 2. This measure is defined to equal measure 1 plus key-week status codes 4 and 10. These codes are assigned to the key weeks in which an improper payment offset, an improper waiting week, or a substitute waiting week was found by the key-week investigation, but the UI agency did not establish an overpayment or void an offset and did not disqualify the waiting (or substitute waiting) week. However, the improper circumstances observed during the key week continued in 1 or more subsequent weeks; and, as a direct result of the key-week investigation, 1 or more of these subsequent weeks was disqualified or established as an overpayment (or a voided offset) because of those circumstances.

Measure 3. This measure is defined to equal measure 2 plus key-week status codes 5, 6, 11, and 12. These codes are assigned in instances in which the following conditions are true: in the opinions of the project supervisors or field investigators, an improper payment, an offset, a waiting week, or a substitute waiting week occurred during the key week; but, on the basis of the key-week investigation, the UI agency did *not* establish an overpayment or void an offset for the key week or any subsequent week and did *not* disqualify the key week or any subsequent week. This is the broadest measure of overpayment used in the study. It includes all key weeks in which UI agency action was taken against the key week or a subsequent week as a direct result of the key-week investigation, plus instances in which such action was not taken but *should* have been taken, according to project personnel. Some of the latter weeks included in this measure could have been reversed by appeals or higher-level review had the UI agency actually taken the action recommended by project personnel.

Empirical Results

The empirical results, which are based on the investigations of sampled key weeks selected during 1979.4, are presented in this section. A total of 48 different overpayment rates are presented: the four measures defined previously, each expressed in terms of weeks and dollars, for each of the six project cities. (Recall that overpayment rates for weeks of compensated unemployment are based on both intrastate and interstate-agent key weeks, whereas overpayment rates for dollars of benefit payments are based on only intrastate key weeks.) Although the discussion focuses on overpayment rates defined by dollars of benefits paid, the eight overpayment rates estimated for each of these cities are presented in Appendix E. To preserve the confidentiality of individual city results, the cities are numbered from 1 through 6, based on the values (from low to high) of the measure 1 overpayment rates for weeks of compensated unemployment. These same city numbers are used in all tables in which overpayment rates for individual cities are presented. In addition, after presenting the formal estimates of overpayment rates, some empirical results are provided: the types and causes of the overpayments found in this study; and the extent to which UI claimants were registered for work with the Job Service (or union hiring hall, where appropriate), as required by UI law or policy.

Measure 1: Weeks versus dollars

The estimated overpayment rates for measure 1, expressed both in weeks of compensated unemployment and in dollars of benefits paid, are presented in Table 8 for each of the six project cities, together with the upper and lower bounds of the confidence intervals constructed for each point estimate. For weeks of compensated unemployment, the estimated measure 1 overpayment rates range from a low of 2.9 percent in city 1 to a high of 28.7 percent in city 6. The estimated rates for weeks of compensated unemployment in the remaining four cities are 3.9 percent, 5.2 percent, 8.0 percent, and 24.1 percent. The lower limit of the confidence interval constructed about each of the six point estimates of the overpayment rates indicates that the estimated rates are significantly greater than zero for the relevant populations at the 10 percent level of significance.[29] The lower limits of these confidence intervals indicate that one can be 90 percent confident that the rate for the population in city 1 (the city with the lowest rate) is at least 1.1 percent and that the rate of overpayment for the population in city 6 (the city with the highest rate) is at least 23.5 percent. In contrast, one also can be 90 percent confident that the estimated rates of overpayment for the relevant populations (based on exactly replicating the same methodology in repeated studies) is no greater than 4.8 percent in city 1 and 33.8 percent in city 6.[30]

An important factor in evaluating the range of results for weeks of unemployment is the percentage of cases for which phase I investigations were not completed in each of the six project cities (see Table 8). In cities 2, 3, and 5 the completion of these phase I investigations will have little or no effect on the overpayment rates reported in Table 8 and elsewhere in this report, because few of the cases were incomplete when data had to be submitted for this report. In contrast, the completion of investigations for 1979.4 key weeks in cities 1 and 6 (and in city 4 to a more limited extent) may very well increase the overpayment rates estimated for 1979.4 in these cities, especially since a few of these cases involved complicated investigations of suspicious issues as of February 8, 1980. The potential underestimation of overpayment presented for cities 1 and 6 should be emphasized, since these cities currently have the lowest and highest rates, estimated from available data. Very probably, the completion of these cases will thus increase somewhat both the lowest and the highest rates for weeks of unemployment shown in Table 8. The completion of these cases may increase somewhat the overpayment rates estimated for the other overpayment measures for cities 1 and 6, and this possibility should be considered in evaluating the remaining results.

TABLE 8. Percentage of estimated total overpayment rates (measure 1) for weeks of compensated unemployment and dollars of benefit payments: six project cities, 1979.4[1]

City[2]	Total sample cases for which phase I investigations not completed[3]	Rates in weeks of compensated unemployment			Rates in dollars of benefits paid		
		Point estimate	Confidence interval limit (pct)[4]		Point estimate	Confidence interval limit (pct)[4]	
			Lower	Upper		Lower	Upper
1	12.7	2.94	1.10	4.78	3.12	0.77	5.46
2	0.6	3.89	1.82	5.96	2.70	1.13	4.28
3	1.5	5.22	2.91	7.52	4.23	1.98	6.49
4	4.0	8.02	4.89	11.15	7.92	4.49	11.35
5	0.0	24.08	19.05	29.10	17.83	13.21	22.45
6	11.0	28.68	23.51	33.85	22.22	17.39	27.05

[1] Rates calculated in terms of weeks of compensated unemployment are based on both intrastate and interstate-agent key weeks. Rates calculated in terms of dollars of benefits paid are based on intrastate key weeks *only*.

[2] Cities ordered from 1 to 6 on the basis of the value of the estimated overpayment rate (measure 1) calculated in terms of weeks of compensated unemployment. This ranking will be used to identify cities in all subsequent tables in which empirical results appear for these individual cities.

[3] Each of the intrastate and interstate-agent cases for which the phase I investigation had not been completed for the purposes of this analysis was coded as a proper payment in calculating all overpayment rates presented in this report. It is extremely likely that at least some of these cases will be established as overpayments or improper payments once these investigations have been completed.

[4] For the experiment conducted for this study the sampling distribution for the mean can be approximated very closely by a normal distribution. When the sampling distribution is normal, the best (i.e., narrowest) $100(1-\alpha)$ percent confidence interval is symmetrical. It is possible to interpret such intervals in three ways; (a) $100(1-\alpha)$ percent of the intervals so constructed will encompass the true values of the population mean; (b) $100(1-\alpha/2)$ percent of the intervals so constructed will have an upper bound that exceeds or is equal to the true value of the population mean; and (c) $100(1-\alpha/2)$ percent of the intervals so constructed will have a lower bound that is less than or equal to the true value of the population mean. Hence, one can be 90 percent confident that the true value of the population mean is at least as large as the lower limit of the 80 percent confidence intervals reported here.

The estimated overpayment rates for dollars of benefits paid typically are somewhat less than the estimated rates for weeks of compensated unemployment (see Table 8). This relationship between rates of overpayment for weeks and dollars is the expected one for any overpayment study. To illustrate the main reason for this expected relationship, consider a key week selected for investigation in which a claimant received a weekly benefit amount of \$80. If the investigation were to reveal that a partial overpayment of \$20 had occurred, the entire week would be coded as an overpaid week in the overpayment measure calculated for weeks of compensated unemployment, but only 25 percent of the dollar payment received in that week would be calculated as an overpayment in the overpayment measure calculated for total benefits paid.[31] In addition, these rates differ somewhat, because only intrastate weeks are included in the overpayment rate for dollars, whereas both intrastate and interstate-agent weeks are included in the overpayment rates for weeks. However, not enough evidence was available when this report was prepared to determine whether the overpayment rates for interstate-agent weeks actually are higher than the comparable rates for intrastate weeks. It may be possible to assess this issue in the *Final Report.*

The estimated overpayment rates for dollars of benefits paid also vary widely, from a low of 2.7 percent (city 2) to a high of 22.2 percent (city 6). The dollar rates of overpayment found for the other cities are 3.1 percent (city 1), 4.2 percent (city 3), 7.9 percent (city 4), and 17.8 percent (city 5). The simple average of the overpayment rates for benefits paid in all six cities equals 9.7 percent. Both these overpayment rates for dollars and the ones for weeks of unemployment exclude any results from the postaudit portion of the study that will be conducted to detect cases of unreported earnings. As a result, the estimated overpayment rates for measure 1 presented in Table 8 very probably represent underestimates of the detectable rates of overpayment in the project cities during the fourth quarter of 1979 (even given the possibility that some overpayments could be reversed on appeal).

Because the rates of overpayment calculated for dollars of benefits paid and weeks of unemployment are very similar, and because the primary policy concern presumably is with the rate at which dollars are overpaid, most tables on overpayment rates include results only for dollars of benefits paid. However, calculations for weeks of overpayments comparable to the tables on overpayment rates for benefits paid are in Appendix E.

Measure 1 versus fraud overpayments

Total overpayment rates, expressed in total benefits paid and calculated for both measure 1 and fraud overpayment, are presented in Table 9. (See Appendix Table E–7 for a similar comparison of overpayment rates expressed in weeks of compensated unemployment.) Overall, the estimated fraud overpayment rates so far detected are extremely low. The largest fraud overpayment rate detected for any city is well below 2 percent (about 1.6 percent for both cities 2 and 6), and the estimated fraud rates are not significantly greater than zero in two other cities. An important implication of the large differences between the total overpayment rates and the fraud rates estimated for most of these cities seems to be that a very intensive verification of benefit eligibility, mainly through third-party verification of claimant statements, uncovered very little fraud in these six cities. Yet the same investigations did reveal very high total overpayment rates in some of these cities. Either very little fraud actually exists in these cities or the phase I eligibility verifications conducted are not well suited to detecting the higher levels of fraud that may actually exist in some of these cities. Unfortunately, the results for the *Interim Report* clearly cannot shed much light on either of these issues, particularly not on what fraud rates actually may be. The reasons for these deficiencies are as follows: a few of the investigations in process when this report was prepared probably will result in findings of fraud overpayments; and a high percentage of the fraud cases normally established by some of these State agencies are based on postaudits that detect unreported earnings, and these postaudits have not yet been conducted. Thus, the fraud rates reported in the *Final*

TABLE 9. Percent distribution of estimated total overpayment rates (measure 1) and fraud overpayment rates for dollars of benefit payments: Six project cities, 1979.4[1]

City [2]	Total overpayment rate: Point estimate (pct)	Total overpayment rate: Confidence interval limit (pct) [3] Lower	Total overpayment rate: Confidence interval limit (pct) [3] Upper	Fraud overpayment rate: Point estimate (pct)	Fraud overpayment rate: Confidence interval limit (pct) [3] Lower	Fraud overpayment rate: Confidence interval limit (pct) [3] Upper
1	3.12	0.77	5.46	0.86 [4]	0.00	1.96
2	2.70	1.13	4.28	1.62	0.40	2.85
3	4.23	1.98	6.49	1.26	0.09	2.43
4	7.92	4.49	11.35	0.24 [4]	0.00	0.56
5	17.83	13.21	22.45	0.23	0.01	0.44
6	22.22	17.39	27.05	1.58	0.18	2.99

[1] Overpayment rates calculated only for intrastate claimants' key weeks.
[2] Cities ordered from 1 to 6 on the basis of the value of estimated overpayment rates (measure 1) calculated in terms of weeks of compensated unemployment.
[3] For the experiment conducted for this study, the sampling distribution for the mean can be approximated very closely by a normal distribution. When the sampling distribution is normal, the best (i.e., narrowest) $100(1-\alpha)$ percent confidence interval is symmetrical. It is possible to interpret such intervals in three ways: (a) $100(1-\alpha)$ percent of the intervals so constructed will encompass the true value of the population mean; (b) $100(1-\alpha/2)$ percent of the intervals so constructed will have an upper bound that exceeds or is equal to the true value of the population mean; and (c) $100(1-\alpha/2)$ percent of the intervals so constructed will have a lower bound that is less than or equal to the true value of the population mean. Hence, one can be 90-percent confident that the true value of the population mean is at least as large as the lower limit of the 80 percent confidence intervals reported in this table.
[4] Lower bound of 0.00 percent indicates that the lower limit of the confidence interval encompassed zero. Thus the point estimate is not significantly greater than zero at the 10 percent significance level.

Report, which will be based on completed investigations and will include the findings of postaudit investigations designed to detect unreported earnings, will undoubtedly be higher than the rates reported here.

Measure 1 versus measure 2 overpayments

A comparison of the measure 1 and measure 2 estimates of the overpayment rates for dollars of benefits paid in the six cities is provided in Table 10 (see Appendix table E–8 for a similar comparison, based on weeks of compensated unemployment). A major finding shown is that there is little or no difference between the measure 1 and measure 2 overpayment rates in most cities. In fact, in three cities (cities 1, 2, and 6) the estimated rates of overpayment are identical for measures 1 and 2. In two additional cities (cities 4 and 5), the overpayment rates calculated for measure 2 are only slightly higher than those for measure 1. In the remaining city (city 3), however, the measure 2 overpayment rate is much larger than the measure 1 overpayment rate (12.2 percent versus 4.2 percent).

These findings indicate that the UI agency in city 3 often did not establish overpayments for the key week or disqualify waiting weeks that were key weeks on the basis of improper or disqualifying circumstances found to exist during the key week; yet when the disqualifying circumstances found for the key week continued into 1 or more subsequent weeks of the benefit period, the UI agency did act to disqualify these subsequent weeks or to establish overpayments (or void offsets) for these subsequent weeks. Perhaps similar circumstances in cities 5 and 6 (and possibly in city 4) actually led to the establishment of an overpayment for the key week, so that such overpayments were captured by measure 1. This possibility, however, does not explain why the relatively low rates in cities 1 and 2 did not increase at all from measure 1 to measure 2, although the picture for city 1 is clarified somewhat by the results presented later for measure 3. Apart from these possibilities, there is no apparent basis for explaining the differences between city 3 and the other project cities (especially cities 1 and 2), unless it stems from differences in administrative policy among these cities, or unless it reflects fundamental differences in claimant behavior among cities. In any case, the simple average of the overpayment rates for all six cities increased from 9.7 percent for measure 1 to 11.2 percent for measure 2.

TABLE 10. Percentage distribution of estimated total overpayment rates (measures 1 and 2) for dollars of benefit payments: six project cities, 1979.4[1]

City [2]	Measure 1 overpayment rates: Point estimate (pct)	Measure 1: Confidence interval limit (pct) [3] Lower	Measure 1: Confidence interval limit (pct) [3] Upper	Measure 2 overpayment rates: Point estimate (pct)	Measure 2: Confidence interval limit (pct) [3] Lower	Measure 2: Confidence interval limit (pct) [3] Upper
1	3.12	0.77	5.46	3.12	0.77	5.46
2	2.70	1.13	4.28	2.70	1.13	4.28
3	4.23	1.98	6.49	12.19	8.51	15.87
4	7.92	4.49	11.35	8.39	4.91	11.87
5	17.83	13.21	22.45	18.31	13.68	22.93
6	22.22	17.39	27.05	22.22	17.39	27.05

[1] Overpayment rates calculated only for intrastate claimants' key weeks.
[2] Cities ordered from 1 to 6 on the basis of the value of estimated overpayment rates (measure 1) calculated in terms of weeks of compensated unemployment.
[3] For the experiment conducted for this study, the sampling distribution for the mean can be approximated very closely by a normal distribution. When the sampling distribution is normal, the best (i.e., narrowest) $100(1-\alpha)$ percent confidence interval is symmetrical. It is possible to interpret such intervals in three ways: (a) $100(1-\alpha)$ percent of the intervals so constructed will encompass the true value of the population mean; (b) $100(1-\alpha/2)$ percent of the intervals so constructed will have an upper bound that exceeds or is equal to the true value of the population mean; and (c) $100(1-\alpha/2)$ percent of the intervals so constructed will have a lower bound that is less than or equal to the true value of the population mean. Hence, one can be 90 percent confident that the true value of the population mean is at least as large as the lower limit of the 80 percent confidence intervals reported in this table.

Measure 1 versus measure 3 overpayments

Overpayment rates, calculated for measures 1 and 3 for benefits paid, are provided for the six project cities in Table 11. Comparable overpayment rates for weeks of compensated unemployment are in Appendix Table E–9. The overpayment rates for measure 3 differ little from those for measure 1 for all cities except cities 1 and 3. The measure 3 rate for city 3, 14.3 percent, is only slightly higher than the measure 2 rate for this city, previously discussed. The only difference between the measure 2 and measure 3 rates for city 3 is that a few key weeks considered to be improper in the opinion of the project staff did not result in any direct UI agency action. These weeks were excluded from measure 2 but are included in measure 3. Thus, the discussion in the previous section for city 3 is also the basic explanation for the large difference between measures 1 and 3 for this city.

The situation for city 1, however, contrasts sharply with that for city 3 and for any other city in the study. In particular, the increase in the overpayment rate from measure 1 to measure 3 recorded for city 1 is remarkably large: the measure 3 rate (26.2 percent) is over 8 times larger than the measure 1 rate (3.1 percent).[32] Moreover, the measure 1 and measure 2 overpayment rates are identical for city 1. As explained previously, the principal difference between measures 2 and 3 is that the latter measure includes key weeks considered by project personnel to be improper payments, on the basis of key-week investigations, even though the UI agency took no action to establish overpayments or stop payments to the claimants who filed for benefits during these key weeks. The fact that project personnel and official UI agency views about the appropriateness of key-week payments diverged so frequenlty in city 1 suggests that one or more of the following conditions may be true of city 1: project personnel there applied eligibility criteria more stringently than appropriate

TABLE 11. Percentage distribution of estimated total overpayment rates (measures 1 and 3) for dollars of benefit payments: six project cities, 1979.4 [1]

City [2]	Measure 1 overpayment rates: Point estimate (pct)	Confidence interval limit (pct) [3]: Lower	Upper	Measurement 3 overpayment rates: Point estimate (pct)	Confidence interval limit (pct) [3]: Lower	Upper
1	3.12	0.77	5.46	26.25	20.05	32.44
2	2.70	1.13	4.28	2.70	1.13	4.28
3	4.23	1.98	6.49	14.30	10.46	18.14
4	7.92	4.49	11.35	8.39	4.91	11.87
5	17.83	13.21	22.45	18.90	14.23	23.57
6	22.22	17.39	27.05	23.58	18.64	28.52

1 Overpayment rates calculated only for intrastate claimants' key weeks.
2 Cities ordered from 1 to 6 on the basis of the value of estimated overpayment rates (measure 1) calculated in terms of weeks of compensated unemployment.
3 For the experiment conducted for this study, the sampling distribution for the mean can be approximated very closely by a normal distribution. When the sampling distribution is normal, the best (i.e., narrowest) $100(1-\alpha)$ percent confidence interval is symmetrical. It is possible to interpret such intervals in three ways: (a) $100(1-\alpha)$ percent of the intervals so constructed will encompass the true vaule of the population mean; (b) $100(1-\alpha/2)$ percent of the intervals so constructed will havean upper bound that exceeds or is equal to the true value of the population mean; (c) $100(1-\alpha/2)$ percent of the intervals so constructed will have a lower bound that is less than or equal to the true value of the population mean. Hence, one can be 90-percent confident that the true value of the population means is at least as large as the lower limit of the 80 percent confidence intervals reported here.

under prevailing employment security law or policy; UI agency personnel there applied too lenient eligibility criteria in light of prevailing employment security law or policy in deciding whether to take action on these cases; partly because of lenient criteria, the UI agency was unwilling to acknowledge overpayments detected through this special project, even though the evidence provided was substantive.

On the basis of a review of information currently available to project directors about the situation in city 1, the researchers' judgment is that the differences between measures 1 and 3 for city 1 are not due primarily to overstringent criteria. Preliminary review of brief summaries of the cases in which improper payments were found in city 1 indicates substantive evidence of disqualifying circumstances in these cases. Clearly, there is room for disagreement about whether any positive UI agency action was warranted in each instance; but the available evidence supported some UI agency action for the large majority of these disputed cases, given the applicable laws and written policy for that city. In contrast, neutral referees might well agree that no UI agency action was an appropriate response. All factors considered, the weight of available evidence strongly suggests that application of lenient criteria and an unwillingness to alter the initial decision is the major explanation for the discrepancy between the overpayment rates for measures 1 and 3 in city 1. It will be possible to conduct a thorough review of all disputed cases in city 1, and other cities, before the *Final Report*. On the basis of the final review (in which it is hoped that UI agency personnel not assigned to this project will participate), it will be possible to make a much more definitive statement.

Whatever the full explanation for some of the patterns reported in Table 11, the simple average of the overpayment rates for measure 3 in these six cities during 1979.4 (15.7 percent) is substantially larger than the simple average of the measure 1 overpayment rates for these cities (9.7 percent). City 2 falls well below the simple average overpayment rate for measure 3, whereas cities 1 and 6 are well above the average. These results suggest a wide diversity in detectable overpayment rates among these cities. What cannot be fully answered by this study is whether (1) the "true" overpayment rates vary this much among these cities; (2) the human factor of project personnel and administrative framework varied enough to substantially affect these rates; (3) the inclusion of postaudit results in the *Final Report* will narrow considerably the range of overpayment rates; or (4) State laws and written policies or the interpretation of these laws or policies varied enough to account for these large rate differences. The full explanation probably includes some elements of all these factors.

Other empirical results

Other empirical evidence includes (1) a distribution of measure 3 overpayments detected, classified by the type of overpayment (either fraud or error); (2) a distribution of measure 3 overpayment detected, classified by the cause of the overpayment (e.g., failure to conduct active work search or unavailability for work); and (3) a distribution that indicates the percentage of study group claimants who did not register for work with the Job Service or union hiring halls in each of these cities, as required by law. Note that results for (1) and (2) are provided for all six cities combined, whereas the results for (3) are presented separately for each of the six cities. The reason for reporting (1) and (2) combined is to protect the identity of certain cities.

Types of overpayments. The measure 3 overpaid key

TABLE 12. Percentage distribution of overpayment types for six cities: sampled key weeks, 1979.4 [1]

Type of overpayment	Percent
Total	100.0
1. Fraud	9.7
2. Claimant error	46.9
3. Employer error	7.6
4. Agency error	22.1
5. Reversal (appeal or higher authority)	1.3
6. Uncertain [2]	12.4

[1] Based on the broadest measure of overpayments (measure 3).
[2] If sufficient information was not available on which to base an informed judgment about the primary source of the error, the overpayment was classified in this category.

weeks, classified by overpayment type, are presented in Table 12. The distribution indicates that almost one-half (47 percent) of all overpayments detected in the six cities combined were due to claimant error. The next largest category was agency error (22 percent), followed by the "uncertain" category (12 percent) and employer error (8 percent). Overall, the results indicate that over three-fourths of the measure 3 overpayments detected in the key weeks sampled during 1979.4 were due to identifiable errors by claimants, employers, or the UI agency. The relative size of the error rates reported for these three groups merits additional comment. Almost all UI agency and employer errors certainly are directly attributable to these sources, but this is not necessarily true for the 46.9 percent of the claimant error cases. Although some claimant errors are due to the inability or unwillingness of claimants to comprehend their responsibilities under the UI program, it also is possible that some claimant errors are caused by lack of proper instruction by local office personnel or by the absence of effective techniques for monitoring and correcting improper claimant behavior. The potential reduction in overpayment that might result from a reduction in agency error (broadly defined) is likely to be somewhat larger than is indicated by the proportion of total overpayment reported as agency error in Table 12.

Only about 10 percent of the measure 3 overpayments detected in the sample of key weeks selected during 1979.4 were classified as fraudulent. Given the intensive nature of the field investigations conducted—averages of 4.5 hours and 4.5 contacts per case in these six cities combined—the relatively small number of fraud overpayments certainly did not result from a lack of investigative time.

Causes of overpayments. Because of the overall complexities of UI law and policy, as well as some important differences in these laws and policies among the participating States, 28 separate possible reasons for overpayments or improper payments was developed (see Table 2). The distribution of the causes of the overpayments found in all six project cities during 1979.4, based on the measure 3 definition of overpayments, is presented in Table 13. By far the most conspicuous finding in this table is that over half of all measure 3 overpayments were due either to the failure of claimants to conduct active job searches or to the claimants' inability to work. Over half of all overpayments in this combined category were due to the failure of claimants to conduct active job searches (See footnote 2 in Table 14). Thus, inadequate job search was by far the largest single reason for the overpayments and improper payments found in this study. It should be noted that only five of the six project cities have job search requirements, and yet inactive job search was still the major source of the overpayments found. Other work-related reasons found for overpayments include unavailability for work (7.6 percent) and refusals of suitable work (2.7 percent). Thus the requirements that claimants be able to work and available for work, conduct active job searches (where appropriate), and not refuse suitable work accounted for nearly two-thirds of all overpayments or improper payments uncovered in the phase I verification of benefit eligibility. The next largest single reason (after job search or ability to work) for all measure 3 overpayments found was the voluntary quit category (9.1 percent); the combination of voluntary quits with discharges for misconduct (2.1 percent) indicates that

TABLE 13. Percentage distribution of causes for overpayments in six cities: sampled key weeks, 1979.4 [1]

Reason for overpayment	Percent
Total	100.0
Unreported earnings due to concealed employment	2.1
Unreported earnings due to other reasons	0.7
Over- and underreporting of key week earnings	0.7
Base-period earnings incorrectly reported by employer	7.6
Base-period earnings incorrectly recorded by agency	0.7
Base-period earnings incorrectly estimated	0.7
Other errors in reporting or recording of base period earnings	0.7
Voluntay quit	9.0
Discharged for misconduct	2.1
Unavailable for work	7.6
No active job search or unable to work [2]	54.4
Refusal of suitable work	2.7
Other eligibility issues	3.4
Reversals (appeal or higher authority)	0.7
Redetermination (at the deputy level)	1.4
Reporting requirements	0.7
Other	4.8

[1] Based on the broadest measure of overpayments (measure 3).
[2] Because one of the six cities included in the study has no work-search requirements, the percentage of overpayments that resulted from the failure to conduct an active job search is not reported separately in this table, since such overpayments could have been found in only five of the six cities for which results are presented. Thus, overpayments due to failure to conduct active job searches were combined with those due to inability to work in reporting the results for this table. This procedure was adopted to avoid presenting evidence relevant for only a subset of the six project cities. However, far more than half of the cases included in this combined category were for failures to conduct active job searches.

one-ninth of the measure 3 overpayments were due to separation issues. The only other major reason for the measure 3 overpayments or improper payments is that some employers incorrectly reported base-period earnings; 7.6 percent of overpayments or improper payments detected were due to this reason.

Compliance deviations for work registration. Further evidence on the extent to which the UI claimants met the requirement that they be available for work (and actively seek work, where appropriate) is indicated by the frequency with which beneficiaries failed to register with the Job Service or with a union hiring hall in lieu of the Job Service. Apart from the effectiveness of the Job Service in finding suitable work for UI claimants, registration with the Job Service or with a union hiring hall is a condition of benefit eligibility. To assess the extent of work-registration violations, the project supervisors were asked to determine the proportion of the 1979.4 sampled group in their respective cities that was not registered with the Job Service or union hiring hall. The results of this survey are presented in Table 14. Note that a very large percentage of the study group typically was required to register for work in these cities.

These results indicate that all study group claimants required to register for work actually were registered with either the Job Service or a union hiring hall in two of the six cities. However, the results for the other four project cities suggest that work registration requirements often were not enforced. At least one-eighth of those required to register did not do so in these four cities. Moreover, Job Service registration compliance deviations were found for over one-fourth of those required to register in three of these four cities. Compliance deviations for registration with union hiring halls (in lieu of Job Service registration) were recorded in three cities (1, 5 and 6); the largest percentage was reported for city 1 (23.1 percent). In three cities, however, no compliance deviations in work registration with union hiring halls were recorded.

Taken together, these results suggest that the enforcement of work registration requirements varied greatly across the project cities during 1979.4. These findings also suggest that work registration requirements are evidently often ignored in some project cities; at least this was the case for these study group claimants in cities 1, 2, and 5 (and to a smaller extent in city 6).

TABLE 14. Percentage of compliance deviations on work registrations: six participating project cities, 1979.4 [1]

City	Percentage of total sample required to register with Job Service that did not register	Percentage of total sample required to register with union hiring hall that did not register
1	26.2	23.1
2	31.1	0.0
3	0.0	0.0
4	0.0	0.0
5 [2]	40.8	19.4
6 [2]	12.6	5.3

[1] Cities ordered from 1 to 6 on the ascending values of the measure 1 overpayment rates calculated for weeks of compensated unemployment.
[2] The figure reported represents an underestimate of the percentage that did not meet registration requirements. In none of the cases could a complete accounting of registration requirements be completed for the *Interim Report.*

TABLE 15. Percentage summary of estimated overpayment rates: six project cities, 1979.4

City [1]	Measure 1 (pct)	Fraud (pct)	Measure 2 (pct)	Measure 3 (pct)
Rates for weeks of compensated unemployment [2]				
Simple average for six cities	12.14	1.58	13.69	18.47
1	2.94	1.37	2.94	26.87
2	3.89	2.47	3.89	3.89
3	5.22	1.19	13.14	15.87
4	8.02	0.67	8.68	8.68
5	24.08	1.62	24.78	25.39
6	28.68	2.16	28.68	30.12
Rates for dollars of benefits paid [4]				
Simple average for six cities	9.67	0.96	11.16	15.69
1	3.12	0.86 [3]	3.12	26.25
2	2.70	1.62	2.70	2.70
3	4.23	1.26	12.19	14.30
4	7.92	0.24 [3]	8.39	8.39
5	17.83	0.23	18.31	18.90
6	22.22	1.58	22.22	23.58

[1] Cities ordered 1 to 6 on the basis of the value of the estimated overpayment rates (measure 1) calculated in terms of weeks of compensated unemployment.
[2] Based on both intrastate and interstate-agent key weeks.
[3] Not significantly greater than zero at the 10 percent level of significance.
[4] Based on only intrastate key weeks.

Summary of empirical results

The 48 overpayment rates estimated for the six participating project cities during 1979.4 are presented in Table 15. On the basis of these overpayment rates and other empirical results, the following conclusions appear warranted:

1. The overpayment rates, whether calculated in terms of measures 1, 2, or 3 (for either weeks or dollars), varied greatly across the six cities during 1979.4 (see Table 15). The wide range of results for any given overpayment measure may partially reflect differences in project administration among these cities, as well as differences in employment security law, benefit policy rules, and the emphasis given to benefit payment control activities in the administration of the UI program in these cities. Whatever the exact reasons for the range of results found, they indicate that there was a substantial benefit payment control problem for these cities, considered as a whole, during 1979.4.

For dollars of benefits paid: measure 1 overpayment rates averaged 9.7 percent and varied from a low of 2.7 percent to a high of 22.2 percent; measure 2 overpayment rates averaged 11.2 percent and varied from a low of 2.7 percent to a high of 22.2 percent; and measure 3 overpayment rates averaged 15.7 percent and varied from a low of 2.7 percent to a high of 26.2 percent. Moreover, the average overpayment rates for weeks of compensated unemployment were even higher (and the ranges somewhat larger) than the rates for dollars of benefits paid. These findings are based on only partially completed investigations in some cities, and no postaudits for unreported earnings have yet been completed in any project cities. These facts suggest that the magnitude of this benefit payment control problem is understated in the empirical results currently available.

2. Fraudulent overpayments constitute a very small part of the total overpayments found to date (see Table 15). The largest fraud rate detected in any city is well below 2 percent, and the simple average of these fraud rates across the six cities is about 1 percent. Hence the same benefit eligibility verification techniques that resulted in high estimated overpayment rates, at least for some cities, did not reveal a high proportion of fraudulent overpayments in any project city. These findings indicate either that very little fraud actually existed in these cities or that the phase I eligibility verifications conducted were not well suited to fraud detection. However, the completion of phase I investigations for all cases, along with the postaudit investigations of unreported earnings that have not yet been conducted, may uncover additional instances of fraudulent behavior. Given that a large percentage of all fraud cases typically found through routine State benefit payment control procedures are detected through the postaudit, it is quite likely that the estimated rates of fraud overpayments presented in the *Final Report* for these cities will exceed the estimates summarized here.

3. In four of the six project cities, improper circumstances detected for the key week generally resulted in the establishment of an overpayment or a voided offset for the key week. In city 3, however, evidence of improper behavior or circumstances during the key week often did not result in the establishment of overpayments or voided offsets for the key week, but rather resulted in the disqualification of claimants from additional benefits in cases where such behavior or circumstances continued in one or more subsequent weeks. In city 1 an extremely large difference between measures 2 and 3 was recorded, and this indicates that a substantial difference in viewpoints existed between the project staff and the UI agency as to what constituted improper behavior or disqualifying circumstances.

Although considerable room for disagreement may exist on some of these disputed cases for city 1 (and each of these cases will be further reviewed prior to the preparation of the *Final Report*), the authors' opinion is that, for the most part, these disputed cases arose because the UI agency in city 1 was not willing to establish overpayments, even though substantive evidence of improper behavior or disqualifying circumstances was presented. These divergent findings for cities 1 and 3 clearly indicate the importance of using more than one measure of overpayment in attempting to assess the detectable rate of overpayment.

4. Almost one-half of the measure 3 overpayment recorded in all project cities combined during 1979.4 was due to claimant error; agency error accounted for an additional one-fifth of this overpayment. Identifiable errors on the part of claimants, employers, and UI agency personnel together accounted for over three-fourths of all measure 3 overpayment. Fraud overpayment accounted for about one-tenth of the overpayment detected.

5. Over one-half of all measure 3 overpayment recorded in all project cities combined during 1979.4 was caused either by the failure of claimants to conduct active job searches or by claimants' unavailability for work. Well over half this overpayment (due to either inactive job searches or inability to work) was in fact due to failures to conduct active job searches, even though only five of the six cities analyzed have an active job search requirement. Voluntary quits and discharges for misconduct together accounted for about one-ninth of all measure 3 overpayment recorded in all project cities during 1979.4.

6. Although in two of the project cities all study group claimants who were required to register for work actually were registered with the Job Service or a union hiring hall, this work registration requirement was often ignored in the remaining cities. In particular, over one-fourth of those required to register with the Job Service were not so registered in three cities; also, about one-fifth of those required to register with a union hiring hall in two of these same three cities were not so registered.

Survey of Project Personnel

The primary purpose of this study was to develop estimates of various measures of detectable overpayment rates in the project cities. As evidence began to mount that the estimated overpayment rates for 1979.4 were likely to be high for some project cities, it became apparent that an additional dimension of potential importance would be to provide some insights, at least from the perspective of the personnel assigned to this project, on reasons for the relatively high rates of overpayment detected. Onsite visits by one or both of the project directors to each of the participating States, together with the two meetings held for all project supervisors, afforded opportunities for in-depth discussions about UI agency activities related to benefit payment control. This interaction of the project directors and project staffs in these cities during the project suggested that the views of the project staffs might be extremely useful in attempting to identify ways to improve agency efforts to prevent (and, to a lesser extent, detect) overpayment.

To document the views of the project staffs in the participating cities about various issues related to the prevention and detection of overpayment, a questionnaire on benefit payment control was developed and distributed to both project supervisors and field investigators in all seven participating cities. Many of the field investigators for this project had been assigned to local offices just before their involvement in this study, whereas other field investigators had worked closely with local office personnel, even though they had been employed by the benefit payment control units in their States. All these individuals were experienced UI personnel. Hence, after appropriate consultation with the staff of the NCUC, it was the opinion of the authors that the persons assigned to this study could provide useful information about local office procedures and problems related to the prevention and detection of overpayment; however, this questionnaire was not distributed to UI administrators, regional or district supervisors, local office managers, or persons currently assigned to UI local offices.[33] The *Interim Report* deadline prevented a survey of this dimension.

As a result, the findings of this survey reflect only the perceptions of the personnel assigned to this project. The perceptions of local office managers or other UI personnel about issues in the questionnaire could be markedly different from the perceptions of the persons assigned to this study. No claim can be made that the opinions of the project staff represent a completely accurate picture of the actual situation in the local offices in the participating cities and States. A different approach would be required to obtain such an understanding. The purpose was not to identify specific problems in cities with relatively high overpayment rates. Rather, the purpose was to determine whether any general consensus on potential problems related to overpayment prevention and detection would emerge for all cities, considering the diversity in overpayment rates, laws, policies or administrative structures, and city characteristics. Any strong consensus that emerged on particular items might be indicative of general problems that should be considered by the UI system as a whole. Consistent with this approach, most questions on the survey were broadly phrased to encompass the State system in which each person worked, even though the perceptions of respondents obviously depended on their specific experience and knowledge.

The questionnaire was distributed to project personnel in one of the study's benefit payments control bulletins. The questionnaire consisted of two parts. Part I, with 28 rating scale questions, focused on 5 basic aspects of local office involvement in benefit payment control activities, and Part II consisted of essay questions related to these topics. The responses to these essay questions should be particularly useful in providing insights into these issues, because respondents were asked to provide detailed examples of the problems and potential solutions. Unfortunately, the responses to the essay questions could not be collated and summarized for inclusion in the *Interim Report*. Only responses to the rating scale questions are discussed in this section.

The following rating scale for part I of the questionnaire was used by respondents to record the extent of their agreement or disagreement with statements about which they could make an *informed judgment*: (1) strongly agree, (2) agree, (3) neither agree nor disagree, (4) disagree, and (5) strongly disagree. An additional category (don't know) was provided for respondents when they could not make an informed judgment about a particular question; therefore a response of "neither agree nor disagree" does not imply a lack of knowledge on the part of the respondent, but indicates that respondents believed there were equally strong reasons for disagreeing and for agreeing with the statement.

Federal timeliness requirements

The Employment and Training Administration has specified certain performance standards that must be met in administering the UI program. The timeliness requirements for making first payments include the following provisions: 87 percent of all intrastate first payments and 70 percent of all interstate first payments must be made within 21 days following the week-ending date of the first week of unemployment claimed (whether or not the State has a noncompensable waiting week). From information obtained from each participating city, the average percentage found for the local offices included in this study during November 1979 was 87.8 percent—just above the Federal requirements for first payments during that month. For the period of this study the Federal timeliness requirements for nonmonetary determinations included the following provisions: the standard for "acceptable" performance for issues arising in connection with an initial claim was that the determinations for 75 percent of separation issues and 80 percent of nonseparation issues must be made within 14 days following the week-ending date of the first week of unemployment claimed; and the standard for "acceptable" performance for issues arising during a claim series was that the determinations for 75 percent of the separation issues and 80 percent of the nonseparation issues must be made within 7 days following the week-ending date of the week in which the issue was detected.

Responses to the six statements related to the effect of Federal timeliness requirements on benefit payment

TABLE 16. Percentage distribution of responses to rating-scale questions related to timeliness requirements [1]

Statement	Don't know or blank	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. Federal timeliness requirements for first pays have had *little or no* effect on efforts to *prevent* overpayments in local offices.	0	12	12	0	36	40
2. Federal timeliness requirements for first pays have *greatly reduced* efforts to *prevent* overpayments in local offices.	0	36	32	4	20	8
3. The Federal timeliness criteria for first pays are commonly understood by local office personnel to include a *quality* as well as a *quantity* standard.	4	0	16	4	48	28
4. Federal timeliness requirements for nonmonetary determinations have had *little or no* effect on efforts to *prevent* overpayments in local offices.	4	12	24	0	36	24
5. Federal timeliness requirements for nonmonetary determinations have *greatly reduced* efforts to *prevent* overpayments in local offices.	4	24	40	8	20	4
6. The Federal timeliness criteria for nonmonetary determinations are commonly understood by local office personnel to include a *quality* as well as a *quantity* standard.	4	0	16	0	56	24

[1] Survey of project supervisors and field investigators associated with the NCUC Benefit Payments Control Study; tabulations based on a 96 percent response rate.

control activities in local offices are summarized in Table 16. Just over two-thirds (68 percent) of the respondents believed (agreed or strongly agreed) that Federal timeliness requirements for first payments greatly reduced efforts to prevent overpayment in local offices. In contrast, nearly three-tenths (28 percent) of the respondents did not believe (disagreed or strongly disagreed) that the first-payment timeliness requirements greatly reduced efforts by local office personnel to prevent overpayment. In summary, the majority believed that these timeliness requirements greatly reduced the efforts of local office personnel to prevent overpayment. Moreover, more than three-fourths of these respondents (76 percent) believed that Federal timeliness requirements for first payments are not commonly understood by local office personnel in their States to include a quality as well as a quantity standard of performance. Such lack of understanding could place the main emphasis on rapidly rather than accurately processing first payments. A similar response pattern emerged for the effects of Federal timeliness requirements for nonmonetary determinations (see Table 16). For example, nearly two-thirds (64 percent) of the respondents believed that the existence of Federal timeliness requirements for nonmonetary determinations greatly reduced efforts to prevent overpayments by local office personnel. In contrast, about one-fourth (24 percent) of the respondents did not believe that the timeliness requirements for nonmonetary determinations had greatly reduced the efforts of local office personnel to prevent overpayments. However, 80 percent of the respondents believed that the Federal timeliness requirements for nonmonetary determinations were not commonly understood by local office personnel to include a quality as well as a quantity standard. These results strongly suggest that, in the opinion of project personnel, the timeliness requirements for nonmonetary determinations have eroded efforts to prevent overpayment in local offices.

Quality of local-office work

Eight statements related to the quality of work performed by local office personnel were included in the questionnaire, and the responses to these statements are reported in Table 17. Nearly nine-tenths (88 percent) of the respondents believed that the quality of the work performed by local office personnel in making nonmonetary determinations does not receive enough evaluation. Further, nearly two-thirds of the respondents (64 percent) believed that the actual quality of processing continued claims does *not* receive enough emphasis in personnel performance evaluations.

The perception that little emphasis is given to quality of work in evaluating local office personnel could be due partially to the absence of an effective program to assess the actual performance of local office personnel. Indeed, less than one-fourth (24 percent) of the respondents agreed that effective programs operated in their States to regularly assess the quality of the performance of local office personnel in issuing nonmonetary determinations and processing continued claims. If effective quality-appraisal programs do not exist in these local offices, it is doubtful that performance quality could be effectively included in the evaluation of local office personnel.

The survey results also show that, in the opinion

TABLE 17. Percentage distribution of responses to rating-scale questions related to quality of local office work [1]

Statement	Don't know or blank	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. The actual quality of the nonmonetary determinations made by local office personnel does not receive enough emphasis in the evaluation of their work.	0	44	44	8	4	0
2. The actual quality of the work done in the processing of continued claims does not receive enough emphasis in personnel performance evaluations.	16	24	40	0	16	4
3. An effective program exists within your State to regularly assess the *quality* of nonmonetary determinations made by local office personnel.	0	0	24	0	40	36
4. An effective program exists within your State to regularly assess the *quality* of work done in processing continued claims.	12	0	24	0	40	24
5. Local office personnel are encouraged to undertake sufficient investigation of unusual or difficult cases before a nonmonetary determination is issued.	4	4	36	0	44	12
6. Local office personnel are encouraged to undertake sufficient investigation of unusual or difficult cases before a continued claim is paid.	4	0	20	8	56	12
7. In your State most overpayments established are called to the attention of the local office personnel who processed the claim.	4	4	8	8	52	24
8. The results of quality appraisals of local office operations in your State are effectively utilized to improve efforts by local offices to *prevent* overpayments.	8	0	8	8	48	28

[1] Survey of project supervisors and field investigators associated with the NCUC Benefit Payments Control Study; tabulations based on a 96 percent response rate.

of the majority of the respondents, local office procedures and policies are not designed to encourage local office personnel to undertake sufficient investigation of unusual or difficult cases before nonmonetary determinations are made or before continued claims are paid. Over half of the respondents (56 percent) did not believe that such encouragement exists for nonmonetary determinations, and over two-thirds (68 percent) did not believe that such encouragement exists for the payment of continued claims. The survey results presented in Table 17 also show that over three-fourths (76 percent) of the respondents felt that overpayments established were not called to the attention of local office personnel who processed the claim.

Further insight into the emphasis on quality of work by local personnel is provided by responses to the statement "The results of quality appraisals of local office operations in your State are effectively utilized to improve efforts by local offices to *prevent* overpayments." Although quality appraisals are mandated by the Employment and Training Administration on a periodic basis, only 8 percent of the respondents believed that the results of local office quality appraisals actually were *effectively* used to improve local office efforts to prevent overpayments. In fact, more than three-fourths (76 percent) of the respondents disagreed or strongly disagreed with the statement.

Intrastate versus interstate-agent claimants

The questionnaire included four statements to determine perceptions of project personnel on the emphasis given to preventing (or detecting) overpayment to intrastate versus interstate-agent claimants (see Table 18). Just over one-half (52 percent) of the respondents believed that little or no emphasis was placed on the prevention of overpayment to intrastate claimants, whereas nearly nine-tenths (88 percent) believed that little or no emphasis was given to the prevention of overpayment to interstate-agent claimants. In contrast, about four-fifths (84 percent) of the respondents believed that little or no emphasis was placed on the detection of overpayment to either intrastate or interstate-agent claimants. Overall, these findings suggest that the respondents believed that very little emphasis was placed on controlling benefit payments to interstate-agent claimants.

Adequacy of training

The questionnaire included six questions about current training and the need for additional training of local office personnel in benefit payment control procedures. The responses to these questions are presented in Table 19. A little more than four-fifths (84 percent) of the

TABLE 18. Percentage distribution of responses to rating-scale questions on benefit payment control activities for intrastate and interstate claimants [1]

Statement	Don't know or blank	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. Little or no emphasis is placed on the *prevention* of overpayments to *intrastate* claimants by local office personnel.	0	20	32	12	36	0
2. Little or no emphasis is placed on the *detection* of overpayments to *intrastate* claimants by local office personnel.	0	16	64	4	16	0
3. Little or no emphasis is placed on the *prevention* of overpayments to *interstate-agent* claimants by local office personnel.	0	56	32	4	8	0
4. Little or no emphasis is placed on the *detection* of overpayments to *interstate-agent* claimants by local office personnel.	4	48	36	4	8	0

[1] Survey of project supervisors and field investigators associated with the NCUC Benefit Payments Control Study; tabulations based on a 96 percent response rate.

TABLE 19. Percentage distribution of responses to rating-scale questions on the adequacy of training [1]

Statement	Don't know or blank	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. In your State, adequate training in overpayments *prevention* is provided to local office personnel who are hired as "permanent" employees.	0	0	4	12	48	36
2. In your State, adequate training in overpayments *detection* is provided to local office personnel who are hired as "permanent" employees.	0	0	4	12	40	44
3. In your State, adequate training in overpayments *prevention* is provided to local office personnel who are hired as "temporary" or "seasonal" employees.	0	0	0	0	48	52
4. In your State, adequate training in overpayments *detection* is provided to local office personnel who are hired as "temporary" or "seasonal" employees.	0	0	4	0	40	56
5. Given local office operations as they exist in your State, additional training in the *prevention* of overpayments would serve as an effective device for reducing overpayments on a continuing basis.	0	28	52	12	0	8
6. Given local office operations as they exist in your State, additional training in the *detection* of overpayments would serve as an effective device in reducing overpayments on a continuing basis.	0	28	52	8	4	8

[1] Survey of project supervisors and field investigators associated with the NCUC Benefit Payments Control Study; tabulations based on a 96 percent response rate.

respondents did not believe that permanent local office employees received sufficient training in either the prevention or the detection of overpayments. Even a larger proportion of respondents believed that temporary employees lacked adequate training. In fact, virtually all respondents did not believe that adequate training in the prevention (100 percent) and the detection of overpayments (96 percent) was provided to temporary or seasonal employees. These findings suggest that additional training is one requirement for improving local office efforts to prevent and detect overpayments. In fact, four-fifths (80 percent) of the respondents believed that additional training in the prevention and detection of overpayments would serve as an effective device for reducing overpayments on a continuing basis.

Impact of increased resource availability

Staffing levels for local UI offices are based on weekly claim loads and on estimates of the time required to process claims. The questionnaire included four questions to assess the expected effect on efforts to prevent and detect overpayments of increasing the time allotted for taking continued claims and making nonmonetary determinations. The responses to these questions are reported in Table 20. A clear majority of the respondents believed that an increase in the time (measured in minutes per unit, or MPU) allotted for taking continued claims (68 percent) and for making nonmonetary determinations (72 percent) clearly would increase efforts to prevent overpayment in local offices. In contrast, a minority of the respondents thought that an increase in the time allotted to continued claims (20 percent) and nonmonetary determinations (12 percent) would have little or no effect on efforts to prevent overpayment in local offices.

Summary of findings from survey

The findings of this survey of project personnel may provide some important insights into difficulties confronted by local UI offices in attempting to prevent and detect overpayments. As noted, respondents to this survey included only the personnel assigned to this study; the consensus perceptions of this particular group are summarized as follows:

1. Most respondents believed that Federal timeliness requirements, both for first payments and for the issuing of nonmonetary determinations, have greatly reduced efforts to prevent overpayments.

2. Even though Federal timeliness requirements for first payments and for nonmonetary determinations are accompanied by either implicit or explicit quality standards, many respondents believe that local office personnel do not realize that a quality standard is included.

3. According to a large proportion of the respondents, the actual quality of the work done by local office personnel in processing continued claims, and especially in making nonmonetary determinations, does not receive sufficient emphasis in the evaluation of local office personnel. In addition, most respondents believed that effective programs do not exist in their States for regularly assessing the quality of work done in processing continued claims and issuing nonmonetary determinations. Furthermore, these respondents did not believe that the results of federally mandated quality appraisals of local office performance are effectively used to improve efforts to prevent or detect overpayment in local offices.

4. Although the majority of the respondents believed that little or no emphasis is placed on the prevention and detection of overpayment to intrastate claimants by local office personnel, the perceived problem is even more severe with respect to monitoring the benefits paid to interstate-agent claimants.

5. Most respondents believed that local office personnel (especially temporary or seasonal workers) lacked adequate training in the prevention and detection of overpayments. Most respondents also believed that additional training in overpayment prevention and detection would be an effective device for reducing overpayment on a continuing basis.

6. A substantial majority (but not all respondents) believed that an increase in the time allotted to local offices for processing continued claims and making nonmonetary determinations clearly would increase efforts to prevent overpayment by local office personnel.

TABLE 20. Percentage distribution of responses to rating-scale questions on the impact of increased resource availability [1]

Statement	Don't know or blank	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. An increase in the time (MPU's)[2] allotted for the taking of continued claims would have *little or no effect* on efforts to *prevent* overpayments in local offices.	4	4	16	4	52	20
2. An increase in the time (MPU's) allotted for the taking of continued claims *clearly would increase* efforts to *prevent* overpayments in local offices.	4	28	40	8	20	0
3. An increase in the time (MPU's) allotted for making nonmonetary determinations would have *little or no effect* on efforts to *prevent* overpayments in local offices.	4	0	12	8	48	28
4. An increase in the time (MPU's) allotted for making nonmonetary determinations *clearly would increase* efforts to *prevent* overpayments in local offices.	8	40	32	4	16	0

[1] Survey of project supervisors and field investigators associated with the NCUC Benefit Payments Control Study; tabulations based on a 96 percent response rate.
[2] Minutes per unit.

Recommendations

The major purpose of this report and, indeed, of the overall study is to provide reliable estimates of the detectable overpayment rates for the populations of timely and compensated weeks of unemployment claimed in the participating local offices in each city. Thus, the emphasis of the study design was almost exclusively on estimating overpayment rates, not on formulating recommendations to alter current procedures or policies. However, the large overpayment rates estimated for some project cities (which are based only on the results of phase I investigations) suggested that the focus of the study should be expanded to include recommendations for law, policy, or procedure changes that might reduce the overpayment rate. These recommendations are based solely on the evidence gathered in this study for the participating UI jurisdictions. Further examination of the recommendations would be necessary before extending them to other UI jurisdictions or to the UI system as a whole.

Replication of the study

Because the overpayment rates currently reported by the UI system clearly underestimate the rates of detectable overpayment, the authors believe the only reliable estimates of detectable overpayment rates that will be available in the immediate future are those that have been or will be prepared for the cities participating in this study. If policymakers wish to obtain estimates of the detectable rates of overpayment for other UI jurisdictions or for the system as a whole, a large-scale replication of the essential features of this study is recommended.

The following suggestions are offered for replicating the present methodology in any future studies designed to estimate overpayment rates:

1. A small, carefully selected random sample of weeks of compensated unemployment provides an adequate basis for estimating total overpayment rates. Because a random (or systematic) sample is required to obtain results that can be appropriately generalized to a larger (relevant) population, the sampling procedures used in any replication must be very carefully documented and controlled.

2. The concept of focusing on compensated and timely weeks of unemployment (rather than claimants or entire spells of unemployment) in determining whether UI benefits had been properly paid has proved an extremely effective approach. This concept would provide an effective basis for any additional study.

3. The basic methodology used for the phase I investigations conducted relied primarily on third-party verification of each claimant's eligibility for benefits during the key week. This approach has proved an effective one, and it would provide a workable basis for future studies. One modification that should be considered in designing any future studies, however, would be a reduction in the average hours devoted to each case; this suggestion is offered strictly as a means of reducing costs. Presumably, these cost savings could be achieved at the expense of only a modest reduction in the overpayment rate detected.

4. More features of the Canadian approach to estimating overpayment and error in the processing of UI claims could be included in future studies. The most important goal of any such additions would be to carefully determine the extent to which specific features of UI law or policy are properly applied in each case selected for investigation (whether or not any observed deviations directly resulted in overpayments). The potential importance of additions in this area depends on the perceived importance of uniform adherence to the specific provisions of UI law or policy.

5. The results of this study indicate that experienced local office personnel (rather than experienced UI investigators) can effectively conduct the required benefit eligibility verifications. This is an important finding in considering any large-scale replication of the present study, because it probably would not be possible for some UI jurisdictions to staff any such replication with persons already trained as UI investigators. Yet UI employees who return to work for the same UI jurisdiction after serving as overpayment investigators in that jurisdiction present some potential problems. Such assignments on the present study, for example, sometimes placed field investigators (and their project supervisors) in difficult positions. However, the authors know of no effective remedy for this problem except to adopt the Canadian approach of complete independence or to use personnel from one jurisdiction as investigators for another jurisdiction; the feasibility of either of these approaches (and particularly the former one) may be questionable within the context of the U.S. system.

6. The project directors for this study have no formal association with any UI jurisdiction or with the Unemployment Insurance Service. Similarly, the Canadian studies of UI overpayment have been directed by persons not employed by the Canadian UI program. On the basis of the specific experience gained from this study, as well as the Canadian experience, the authors believe some independence from the UI system in directing future studies would be essential in obtaining reliable estimates. Although exceptions obviously exist to this general principle (as illustrated within the present study, for example), there is little doubt that the direction of a study such as this by UI personnel could place them in a very difficult position.

7. Given the large differences recorded in two of the six project cities for the different overpayment measures developed for this study, an important feature of any future study would be to analyze more than one overpayment measure. In particular, the results of this study suggest that the actual situation in particular cities may not be well reflected by a single measure—one that encompasses only overpayments formally established by the UI agency for a specific week of compensated unemployment. This is the case because disqualifying circumstances found for weeks investigated in this or any other study may not be used by the UI agency in all cases to disqualify the weeks found to have been improperly paid. An important implication of the differences found between two overpayment measures estimated for at least one project city is that any future study should include a procedure for reconciling project views and UI agency personnel views about whether overpayment actually occurred in disputed cases.

Recommendations based on study design and results

The following recommendations are based on evidence currently available from this study and the authors' review of the Canadian overpayment studies:

1. The findings of this study indicate that at least some of the overpayment detected probably could have been prevented if a greater emphasis had been placed on the quality of work performed in local offices (or mail claims centers) in the participating project cities. If additional emphasis is to be placed on the quality of work performed, however, an effective program must be developed for regularly assessing the quality of such work. The authors recommend that a random audit methodology similar to that used in this study be included as one feature of an effective quality appraisal program. The results of periodic audits could serve as an effective management tool for gauging the quality of work performed, for training local office personnel, and for monitoring the overall effectiveness of routine benefit payment control procedures in preventing and detecting overpayment.

2. If the requirement that claimants register for work with the Job Service or a union hiring hall is considered a basic feature of UI law and policy, additional procedures for monitoring compliance with this provision apparently are needed in some UI jurisdictions. The study results strongly suggest that these requirements are poorly enforced in some of the participating UI jurisdictions.

3. Many overpayments detected in this study were due to the failure of claimants to conduct active work searches. If this requirement is considered to be an important feature of UI law and policy in those jurisdictions with work-search requirements, it appears that a much greater emphasis should be placed on defining an operational concept of active work search, communicating this concept of UI claimants, and developing an effective system for monitoring compliance with this provision of UI law and policy.

4. The experience of designing and conducting this study, combined with information provided by representatives of the Canadian Auditor General's Office, convinces the authors that one of the Federal guidelines suggested for the administration of State benefit payment control units is inappropriate. Currently, Federal guidelines suggest that the supervisor of a State's benefit payment control unit report directly to the supervisor in charge of benefit payments. Unfortunately, this suggested administrative framework results in a potential conflict of interest at the administrative level to which the benefit payment control unit reports. The same administrator is directly responsible for paying benefits in a timely manner and for detecting error (overpayment) in those same benefit payments. Although such a structure clearly could work in some cases, it certainly does not appear appropriate as a general model for effectively controlling benefit payments.

First, such a structure could place administrators of both units in an untenable position if they were to strongly emphasize benefit payment control functions.

This is the case because explicit performance criteria (e.g., timeliness requirements) exist for measuring the effectiveness with which States pay benefits, but the authors have not been able to find comparable criteria for measuring either the quality of the work done in paying those benefits or the extent to which those payments lead to overpayments. It seems reasonable to assume that most administrators would be more concerned about meeting explicit timeliness standards for benefit payments than about meeting nonexistent (or at least ill-defined) standards for (presumably minimizing) overpayment.

A second reason for taking issue with the suggested Federal guideline is that some independence in the operation of the benetfit payment control unit probably is required, at least as a general principle, to create a work environment consistent with detecting all suspected overpayment and establishing all overpayment actually found.

The third reason for taking issue with the suggested guideline is that one of the most fundamental principles of financial accountability and auditing is violated by a structure in which one administrator is asked both to operate and to audit the same payments system. This self-evident auditing principle probably requires no further elaboration, but its importance was evident in the Canadian approach to estimating overpayment. The authors believe the head of a State's benefit payment control unit should report directly to the administrator responsible for the State's UI program, as a minimum. Where appropriate State agency structures exist or could be created, a strong case (solely in terms of auditing principles) could be made for having the head of a State's benefit payment control unit and the administrator of the State's UI program report directly to the same administrative level.

Recommendations for improving efforts to prevent or detect overpayments

The recommendations in this section for improving efforts to prevent or detect overpayment deal directly with the underlying causes for the high rates of overpayment found in some project cities. The suggestions expressed in this section are based solely on the perceptions of the personnel assigned to this project in the participating cities, as reflected in their responses to the survey of project personnel; the information obtained during various meetings of project personnel and during the site visits conducted; and the authors' own perceptions and evaluation of the information obtained through these two channels.

Thus, the suggestions offered do not reflect the full spectrum of opinion or thought on these issues. Since the authors have no evidence of the opinions of others in these UI jurisdictions, they suggest that serious consideration be given to independently obtaining the views of other UI personnel in these jurisdictions (or perhaps the UI system as a whole). Any such survey would have to treat responses anonymously and be administered under carefully specified conditions to obtain meaningful responses, especially from local office personnel.

In evaluating the applicability of the recommendations, the authors provide opinions only in cases in which the project personnel from all seven cities expressed a strong consensus on a particular issue in spite of four factors that should cause differences: (1) the overpayment rates found for these cities to date range from fairly low to very high; UI laws or policies and administrative structures vary considerably among these jurisdictions; administrative enforcement of existing UI laws or policies varies substantially across these jurisdictions; and economic, demographic, and social conditions vary considerably among these seven cities. Given all these qualifications, the authors believe that the following issues should be given serious policy consideration:

1. Additional training for local office (and mail claims center) personnel in the prevention of overpayment would be an effective means of reducing overpayments on a continuing basis.

2. An unintended impact of Federal timeliness standards for first payments and nonmonetary determinations has been a decrease in the emphasis placed on the quality of work performed in processing UI claims. Hence, serious consideration should be given to the development of operationally meaningful quality standards for the processing of UI claims; and these quality standards should be given appropriate emphasis in addition to the emphasis currently placed on quantity standards. One approach might include a restructuring of standards to provide penalties for timely payments or determinations that result in overpayment. The authors realize that quality cannot be measured easily by objective criteria and that the development and implementation of a set of quality standards would be a major undertaking. To effectively monitor compliance with such quality standards, it would probably be necessary for the Unemployment Insurance Service to conduct periodic random audits of the local offices in each UI jurisdiction.

3. The authors believe that inadequate emphasis is placed on the prevention and detection of overpayment to interstate-agent claimants. If benefit payment controls are considered to be important for such claimants, this entire issue should be reviewed. The purpose of such a review would be to determine how to fundamentally restructure the essential features of controlling benefit payments to interstate-agent claimants. The development and implementation of an effective benefit payment control system for interstate claimants would be a major undertaking.

4. The verifications of benefit eligibility conducted for this study were so costly per case that it would be prohibitively expensive to implement even a reduced version of these eligibility verifications for all UI claimants. However, the authors recommended that the concept of comprehensive audits for selected cases be introduced as an operational feature of the UI system. The cost of a small number of very comprehensive audits (and perhaps a somewhat larger number of less comprehensive audits) could be easily justified by the benefits of such a system in preventing overpayment. The U.S. tax system certainly represents an example of a complicated system that depends primarily on inducing self-enforcement by the small (but well-known) possibility that any given taxpayer might be selected for audit in any given year. A similar approach by the UI system would represent one part of an effective benefit payment control system.

5. Many of the problems discussed in these recommendations arise, at least in part, from the inherent complexity of UI law and policy. In fact, given the current resource level for administering the UI program, the authors have reservations about the feasibility of administering the program so as to pay benefits promptly and properly while maintaining very low error rates. A review of existing benefit policy rules would probably convince most persons of the inherent complexity of the UI system. Given this complexity, the task of making thousands of decisions (in the time allotted) that actually result in the equal treatment of persons in equal circumstances (in terms of UI law and policy) seems difficult at best. Thus, it seems likely that horizontal equity—a fundamental principle on which any social program should be based—often may be compromised in the UI system.

reported higher earnings during the quarter than did employers.[12] This overreporting of earnings by claimants is not analyzed in this report, nor is the effect of the overreporting of earnings on the payment of UI benefits analyzed.

Although 23 percent of the study group reported smaller earnings than were reported for them by employers, these conflicts were computed for only 15.4 percent of the study group, once the earnings disregard of $15 was included in the computation (see Table 1). Not all unreported-earnings conflicts for these claimants would result in overpayments because computed overpayments of less than $15 for unreported earnings normally are not established as overpayments by the Arizona agency,[13] some weeks with underreported earnings might be offset against other weeks with overreported earnings, and some claimants might successfully protest the establishment of some potential overpayments by providing substantiation of their original wage reports. Analysis of these unreported-earnings conflicts, apart from whether they actually result in overpayments, is consistent with the development of a prediction profile for identifying wage-reporting conflicts that might result in overpayments.

TABLE 1. Reported-earnings conflicts between employers and claimants for the fourth quarter of 1978

Category	Percentage of study group [1]
Employer-reported earnings less claimant-reported earnings [2]	
$-999 to $-100	5.0
$-99 to $-1	9.9
No difference	62.1
$1 to $99	13.1
$100 to $999	9.1
$1,000 or more	0.8
Total	100.0
(Mean earnings difference = $31)	
Total weeks per claimant of unreported-earnings conflicts due to underreporting of earnings by claimants [3]	
0	84.6
1	10.0
2	2.1
3	1.0
4–5	1.1
6–12	1.2
Total	100.0
(Mean weeks unreported = 0.31)	
Total amount per claimant of unreported-earnings conflicts due to underreporting of earnings by claimants [3]	
$0	84.6
$1–14	2.3
$14–85	9.1
$86–200	2.1
$201–300	0.6
Over $300	1.2
Total	100.0
(Mean amount unreported = $17)	

[1] Total study group equals 1,542 claimants. Sum of categories may not equal 100 percent because of rounding.

[2] The earnings differences reported for this item are gross differences that do not include the weekly earnings disregard of $15.

[3] For this study unreported-earnings conflicts are calculated strictly on the basis of comparing employer-reported and claimant-reported earnings for UI-compensated weeks of unemployment. Because of the administrative costs involved in establishing overpayments, normal Arizona policy is *not* to establish overpayments for amounts less than $15. In addition, normal policy requires that claimants be notified of any computed overpayment and given the opportunity to contest employer-reported earnings. As earlier noted, these procedures were not followed in this study because the interest was not in establishing the existence of overpayments. Rather, the main focus was determining whether an effective profile could be developed for identifying the probability for each claimant that a conflict exists between employer- and claimant-reported earnings.

The typical conflict found was for just 1 week. Only 5.4 percent of the sample had a conflict for 2 or more weeks (see Table 1). As would be expected, the dollar amounts of these conflicts were typically very small. In fact, conflicts of $86 or more were founded for only 3.9 percent of the study group.

The rates of conflict estimated for the study population of 9,795 claimants, based on the sample data for 1,542 claimants, are reported in Table 2. These rates cannot be used to develop reliable estimates of the rates of overpayments due to unreported earnings for all Arizona claimants during the fourth quarter of 1978, for the following reasons:

- Only claimants with both UI-compensated weeks and some employer-reported earnings were included in the study population, and this group typically includes only about one-half of all claimants.
- As noted above, not all these unreported-earnings conflicts would result in actual overpayments.

TABLE 2. Estimated rates of unreported-earnings conflicts due to the underreporting of earnings by claimants who received benefits and had earnings reported by employers for the fourth quarter of 1978

Item for which rate was determined	Point estimate	Upper limit (pct) (95-pct confidence interval [1])	Lower limit (pct) (95-pct confidence interval [1])
Claimants [2]	15.4	17.0	13.7
Weeks compensated [3]	6.7	7.0	5.1
Dollars of benefits paid [4]	5.7	7.1	4.8

[1] The confidence limits for weeks compensated and dollars of benefits paid were constructed by finding the confidence limits for total weeks with unreported-earnings conflicts and total benefits paid in weeks with unreported-earnings conflicts and then dividing by known values for total weeks compensated and total dollars of benefits paid. This yielded narrower confidence bands than would have been obtained by a ratio estimation approach. It also yielded intervals that are asymmetrical with respect to the point estimate.

[2] Estimate for the study population of 9,795 claimants who had UI-compensated weeks of unemployment and employer-reported earnings for the fourth quarter of 1978.

[3] Weeks compensated include waiting weeks and weeks in which benefits were offset in addition to weeks in which benefits were paid to the 9,795 claimants in the study population.

[4] Dollars of benefits paid are the total benefits paid or offset for the 9,795 claimants in the study population during the fourth quarter of 1978.

- Some employers probably misreported the earnings figures used in these computations.
- Unreported earnings from the cash economy cannot be detected by the postaudit. On any case, given these qualifications, conflicts were estimated for 15.4 percent of the study population but for only 6.7 percent of the weeks compensated for this population and for only 5.7 percent of the total benefits paid to the study population. As shown in Table 2, the 95 percent confidence intervals for these three-point estimates are relatively narrow.

For those interested in the relationship between the unreported-earnings conflicts found for the study group and each of several UI and personal characteristics, a group of cross-tabulations have been included as Appendix C. These cross-tabulations were also used to choose some of the variables included in the model crossmatch PINDEX.

Selecting Claimants With Earnings-Report Conflicts

Before comparing the selection effectiveness of the model crossmatch and discriminant analysis, a sketch of the basic features of each approach will be useful. A more technical and complete description of each approach is provided in Appendix D.

The model crossmatch PINDEX generates a score for each claimant. These scores are then used to select claimants to be audited for a potential unreported-earnings conflict. The PINDEX score for any given claimant increases as the sum of the number of weeks of benefits plus the estimated number of weeks of work in covered employment for that claimant. This score can be further adjusted by accounting for personal/labor market characteristics and particular local offices that have been associated with unreported earnings in a particular State. Scores adjusted in this way were estimated for this study. The main feature of the model crossmatch is that it relies primarily on weeks of benefits plus an estimate of weeks of work in selecting claimants for audits of unreported earnings.

MLDA is a considerably more sophisticated technique for selecting which claimants to audit for unreported earnings. The details of this technique are discussed in Appendix D. In addition to using information on the two main variables for the model crossmatch—weeks of benefits and estimated weeks of work during the audit quarter—any other variable can be used in estimating a discriminant profile for any claimant. The purpose of this estimation is to obtain probability coefficients for a given claimant that indicate the likelihood of an unreported-earnings conflict. These probability coefficients can be used to rank claimants from the most to the least likely to have such conflicts.

TABLE 3. Comparative predictive qualities for some unreported-earnings conflict versus no conflict (APINDEX versus discriminant analysis [1])

Parameter	Conflict probability of 0.5 or more		Conflict probability of 0.25 or more		Conflict probability of 0.1 or more	
	APINDEX	Discriminant analysis	APINDEX	Discriminant analysis	APINDEX	Discriminant analysis
Total number available for postaudit	1,542	1,542	1,542	1,542	1,542	1,542
Number selected with potential conflict	65	65	232	232	718	718
Percentage selected of total available	4.2	4.2	15.0	15.0	46.6	46.6
Number selected with actual unreported-earnings conflict	22	25	48	81	130	159
Of selected group, percentage with actual unreported-earnings conflict	33.6	36.8 [2]	20.7	34.6 [3]	18.1	22.0 [3]

[1] See Appendices E, F, and G for further detail on the estimation results. See Appendix D for a discussion of each technique.
[2] At the 5 percent level, the predictive capability of the discriminant functions does not differ significantly from the predictive capability of the APINDEX.
[3] At the 5 percent level, the predictive capability of the discriminant function is significantly greater than the APINDEX's capabilities.

The main issue addressed in this study is which of these two techniques is more effective. The results of using the techniques are compared in Table 3, which provides three levels of comparisons.[14] Although many comparisons could be made, these three comparisons provide a reasonable basis for evaluating the two techniques. They range from one that selects only the top 4.2 percent of the scores for the study group under each approach to one that selects the top 46.6 percent of the scores. A purely random selection from the study group would be expected to result in earnings-report conflicts in 15.4 percent of the cases since this is the rate of unreported-earnings conflict for the study group.

The comparisons in Table 3 show that for situations where it is very likely that a claimant has a conflict (i.e., a probability of 0.5 or more), the APINDEX (the PINDEX adjusted by State and local office options) is just as effective as the discriminant score for identifying claimants with conflicts. However, for situations where claimants are less likely to have conflicts (i.e., a probability of 0.25 or 0.1), the APINDEX is not as effective as the discriminant score.

A potential problem with the data underlying Table 3 is that the conflicts are not weighted or analyzed by magnitude. A claimant who mistakenly underreports earnings by $10 one week and overreports earnings by $10 the next week is treated on the same basis as one who fails to report $1,000 in earnings. To account for the potential problem of including very small overpayments in the data for Table 3, a second classification test was performed for the two techniques. Under this second approach a claimant was counted as having a conflict only if the difference between employer-reported earnings and claimant-reported earnings was positive and at least equal to the claimant's maximum WBA.

Table 4 summarizes the results for claimants with large unreported-earnings conflicts versus claimants with small or no conflicts.[15] In no case is the discriminant function significantly better at the 5 percent level of significance than the APINDEX.

Conclusions

For claimants who have a probability of 0.5 or more of having unreported-earnings conflicts, and for claimants with conflicts greater than or equal to their WBA's, APINDEX scores are almost as effective as discriminant scores for selecting claimants to audit. This is a plausible finding, given that weeks of benefits paid and amount of employer-reported earnings (relative to prior weekly earnings) are the key variables for detecting large unreported-earnings conflicts under either approach. In contrast, discriminant scores are more effective than APINDEX scores for selecting the claimants to be audited if all conflicts (including amounts smaller than each claimant's maximum WBA) are to be found. Since the discriminant program is a considerably more complicated program to implement, the model crossmatch probably represents the more realistic approach for most State agencies, particularly if the primary interest is in identifying for audit a relatively small number of claimants who are highly likely to have relatively large unreported-earnings conflicts.

TABLE 4. Comparative predictive qualities for large unreported-earnings-report conflict versus small or no conflict (APINDEX versus discriminant analysis [1])

Parameter	Conflict probability of 0.5 or more: APINDEX	Conflict probability of 0.5 or more: Discriminant analysis	Conflict probability of 0.25 or more: APINDEX	Conflict probability of 0.25 or more: Discriminant analysis	Conflict probability of 0.1 or more: APINDEX	Conflict probability of 0.1 or more: Discriminant analysis
Total number available for postaudit	1,542	1,542	1,542	1,542	1,542	1,542
Number selected with potential conflict	29	29	104	104	376	376
Percentage selected of total available	1.9	1.9	6.7	6.7	24.4	24.4
Number selected with actual unreported-earnings conflict	8	5	25	22	55	66
Of selected group, percentage with actual unreported-earnings conflict	20.5	23.2 [2]	26.1	23.7 [2]	14.7	17.8 [2]

[1] See Appendices E, F, and G for further detail on the estimation results. See Appendix D for a discussion of each technique.
[2] At the 5 percent level the predictive capability of the discriminant functions does not differ significantly from the predictive capability of the APINDEX.

The advantages and disadvantages of the APINDEX and discriminant analysis procedures are as follows:

APINDEX

Advantages	*Disadvantages*
Simple—Only three variables are involved, and no computers or computer programs are required.	Provides no measure of the likelihood of conflict—the APINDEX will rank-order claimants but will not give a probability of conflict.
	Personal characteristics must be given equal weight—the State option index applies either a 0 or a 1 for the presence or absence of characteristics such as occupation, age, number of employers.

Discriminant analysis

Advantages	*Disadvantages*
Provides a probability of group membership—the probability that each individual will have a conflict is routinely reported.	Requires an initial study—the State must perform a 100 percent audit of a sample of claimants in order to form the discriminant function.
Flexible—as many personal characteristics as desired can be included, and they can be given different weights.	Requires a computer program—the State must have a computer software program to estimate the discriminant function.

The advantages of discriminant analysis are lessened by the facts that (1) the assumptions of the model are not satisfied, and hence the probabilities of group membership are not entirely accurate;[16] and (2) most of the relevant information for determining whether a large conflict exists is contained in the three variables used in the APINDEX. Moreover, the disadvantages of the APINDEX are balanced by the facts that (1) by observing results over time, a reasonably accurate probability of conflict can probably be associated with each PINDEX value [17] and (2) personal characteristics other than weeks compensated, employer-reported wages paid, and average WBA are not very important for identifying large conflicts. It appears, therefore, that the advantages of discriminant analysis do not outweigh its disadvantages unless an agency is willing to audit a relatively large number of claimants to detect both small and large earnings-report conflicts.

Notes

1. Wage-report States are States that require covered employers to report periodically the earnings paid to all workers. In contrast, some States are wage-request States, which are States where employers provide information on the wages earned by UI claimants only on request at the time workers file for UI benefits.

2. Appendix A describes the procedures used in Arizona to select the claimants whose earnings are to be verified.

3. It may be useful to consider the other techniques used to uncover overpayments in Arizona. They include (1) audits of local office records, (2) verification of return-to-work dates following a period of unemployment, (3) verification of base-period earnings statements, (4) random selection of claimants for review, (5) investigation of leads provided by local UI office personnel, (7) employer protests of benefit charge notices, (8) border checks for place of residence, (9) industry audits of claimants' earnings during periods of unemployment, and (10) regular claims control.

4. During calendar year 1979, 34 percent of the overpayments detected in Arizona were detected by means of a postaudit of earnings.

5. During calendar year 1979, 56 percent of the fraud overpayments detected in Arizona were detected by means of a postaudit of earnings.

6. The model crossmatch system is the most widely used formalized technique for determining which claimants should receive a full postaudit of employer-reported earnings. The model crossmatch system currently is used in 13 jurisdictions, and two additional jurisdictions are scheduled to implement this system during 1980.

7. Because a computer program was used to select the sample, it was possible to assign a random number between 0 and 1 to each claimant in the population. If the random number for a given claimant was less than or equal to the proportion of the population that was to be sampled (approximately 0.184), that claimant was included in the sample.

8. The need for a special postaudit to determine whether conflicts in reported earnings actually occur should be further explained. To reduce the burden of wage reporting in Arizona, employers are asked to report, for each covered worker, the wages paid for an entire calendar quarter. It cannot be determined from these quarterly wage reports whether a particular employee either earned or was paid wages during a particular week. Moreover, an employee might well have earnings reported during a calendar quarter, even though he earned nothing during that calendar quarter. This possibility arises because, for simplicity's sake, employers are asked to report earnings on the basis of when they were paid, not earned. In contrast, claimants legally are required to report wages by weeks when they were earned, not paid. Thus, a special form is used to determine from employers whether each claimant who had been on the payroll earned any wages during any of the weeks for which the claimant also received benefits. The data provided on these Report of Earnings Forms then can be compared with claimant-reported earnings during the same weeks to identify any earnings conflicts indicated by this comparison.

9. Although those for whom full and partial employer responses were received are not separately analyzed, it is interesting to note that the frequency of unreported-earnings conflicts was greater among those for whom partial responses were received. The results stemmed primarily from the fact that a claimant had to have more than one employer in the quarter for a partial response to occur. These results strongly suggested that those with partial responses be included for analysis. Overall, there were 1.29 employers per claimant for the full responses, 2.61 employers per claimant for the partial responses, and 1.12 employers per claimant for the nonresponses.

10. Weeks of UI-compensated unemployment include weeks in which (1) benefits were paid, (2) benefits were offset, or (3) a waiting week was served.

11. For these 1,542 persons a total of 2,247 wage inquiry forms were sent to employers, and 2,021 of these forms were returned by employers.

12. Part of this difference may be due, of course, to the fact that not all employers responded to the wage inquiry forms on which employers reported the weekly earnings of the study group.

13. Because of the administrative cost of establishing the existence of overpayments, the policy of the Arizona agency is that overpayments due to unreported earnings of less than $15 normally are not established.

14. The derivation of Table 3 must be explained. Forming and testing a discriminant function on the same data do not provide an accurate picture of the predictive capability of the function. Thus, researchers

typically estimate the function from one set of data and test it on another. Because the data for this study were relatively expensive to gather, a technique referred to as jackknifing was used to form and test the discriminant functions. Under this technique a number of mutually exclusive sets of data were selected from the available data. A discriminant function then was estimated on the basis of all of the data except for that contained in one set, and tested on the data in the set. This process was repeated for each of the mutually exclusive sets of data.

Specifically, the study group of 1,542 claimants was divided into those with unreported-earnings conflicts (237 claimants) and those without such conflicts (1,305 claimants). Each of these groups then was randomly divided into five groups, and each subgroup of those with conflicts was randomly combined with a group without conflicts. In this manner five mutually exclusive and exhaustive subgroups were formed, each of which contained about 308 claimants and each of which had about 47 claimants with conflicts.

Five discriminant functions then were estimated. Each function was estimated on the data exclusive of the data for one of the subgroups, then tested on that subgroup. The functions, classification matrices, and APINDEX comparisons for each function are shown in Appendices E, F, and G. Table 3 summarizes the information for all five groups and was derived from the information in Appendix G. The first four rows in Table 3 were obtained by summing the results in Appendix G, and the last row was obtained by averaging the results in Appendix G.

15. Table 14 was derived in exactly the same manner as Table 3. The data used to construct Table 4 are included in Appendix G. Additional information for conflicts versus small or no conflicts is included in Appendices E and F.

16. For an explanation of the assumptions and how they are used for discriminant analysis, see T. W. Anderson, *An Introduction to Multivariate Statistical Analysis* (New York, John Wiley & Sons, 1958), pp. 126–37.

17. By observing what happens over time, one could probably obtain a reasonably good estimate of the percentage of conflicts likely to arise if only persons with scores of 20 or more, 15 or more, 10 or more, etc., were audited.

Appendix A: Selection Procedures for the Arizona Postaudit of Earnings

The procedure used in Arizona to select a claimant for a postaudit of earnings involves checks for the amount of wages paid to the claimant, the amount of benefits received by the claimant, and the number of employers for whom the claimant worked. The following procedure was in use throughout 1978 to select the claimants routinely audited for unreported earnings:

1. An individual was considered for audit in a given quarter only if information in the base-period wage file for that quarter showed that either the claimant had been paid $300 or more in wages during the quarter or the claimant had two or more employers during the quarter.

2. For claimants who met either of the criteria in item 1 above:

a. 100 percent of all persons who filed 10 or more continued claims during the given quarter were audited.

b. The selection for audit was made on the basis of the last digit of each claimant's social security number for claimants who filed fewer than 10 continued claims during the given quarter. In the fourth quarter of 1978, 30 percent of this group was selected for audit.

As soon as possible after the base-period wage file is updated (but no later than the 15th of the 4th month following the close of each calendar quarter), a UB–259, Report of Earnings Form, is mailed to all employers who paid wages to the claimants selected for audit for that quarter.

Appendix B: Sample Selection Criteria and Study Group Characteristics

During the fourth quarter of 1978 a total of 16,861 claimants received some benefits (or served a waiting week) in Arizona. The relevant population for this study, however, includes only regular UI claimants who

1. Established their entire eligibility for benefits on the basis of employment in Arizona. (This restriction was applied in selecting the sample because it was desirable to have complete base-period wage information for constructing the discriminant profile.)

2. Filed for benefits within the State of Arizona (i.e., interstate-liable claimants were excluded). (This restriction was applied in selecting the sample because an audit of unreported earnings was possible only for wages received from Arizona covered employers during the fourth quarter of 1978.)

3. Filed at least one valid claim for benefits or served a valid waiting week during the fourth quarter of 1978 and had earnings of at least $1 reported paid during the quarter by one or more Arizona employers. (This restriction was applied in selecting the sample because the postaudit is conducted only on claimants who have both earnings paid and compensable weeks in the same quarter.)

The claimants who met the above criteria were included in the population for this study. This population totaled 9,795 claimants, or approximately 58 percent of the total active claimants during the same calendar quarter. From this population of 9,795 claimants, a sample of 1,806 claimants was randomly selected.[1] This sample amounted to approximately 18.4 percent of the total population. The sample size was determined on the basis of the following:

1. The discriminant function is

$$X'_i \Sigma^{-1}(M^1-M^2) - \tfrac{1}{2}(M^1+M^2)' \Sigma^{-1}(M^1-M^2)$$

where

X_i = a vector of observed measurements for the ith individual.

Σ^{-1} = the inverse of the pooled variance-covariance matrix for the observed measurements on the individuals in both populations.

M^1 = a vector of means for the observed measurements on the individuals in the first population.

M^2 = a vector of means for the observed measurements on the individuals in the second population.

For the discriminant function to be reliably estimated, there must be enough individuals in the smaller of the two populations to provide for a reliable estimate of M.

2. In Arizona approximately 13.4 percent of the audited claimants have been found to have received overpayments due to unreported earnings. But under the current procedures only the claimants most likely to have unreported earnings are audited (about 60 percent of the claimants who have both earnings and benefits in the same quarter). If the currently audited claimants are 1½ times as likely to have unreported earnings as are the claimants who are not currently audited, then approximately 11.6 percent = [0.6 × 13.4 percent) + (0.4 × 0.67 × 13.4 percent)] of the claimants should have unreported-earnings overpayments in a random sample of claimants who have both earnings and benefits in the same quarter.

3. Because a number of measurements are observed on each individual, and because the means of the measurements differ widely (e.g., $8,758 for base-period wages, 37 years for age), it is not feasible to specify a single bound to be attained on the absolute error of estimate for each variable. It is feasible, however, to specify a single bound to be attained on the relative error of estimate for each variable. The sample size required to attain a given upper bound on the relative error of estimate for any variable can be determined as follows:[2]

$$n = \frac{N}{\dfrac{R^2(N-1)}{Z^2(CV)^2} + 1}$$

where

n = the required sample size

N = the size of the target population

Z = a standard normal random variable

CV = the coefficient of variation

R = 0.01 times the relative error expressed as a percentage

Previous studies have shown that for the variables to be included in the discriminant function, the maximum value of the coefficient of variation is about 1.[3] Hence, at the 95 percent confidence level, and with an upper bound on the relative error of estimate of 15 percent of the value of the parameter, the required sample size is 168 persons.

4. To get 168 claimants with unreported earnings overpayments, 1,448 = (168/0.116) claimants must be sampled if the response rate is 100 percent. We estimated an 80 percent response rate and hence needed to sample 1,810 claimants. Because the computer program that selected the sample generated a separate random number between 0 and 1 for each claimant in the population and included a claimant in the sample only if the claimant's random number was between 0 and 0.184, there was no way to guarantee that the sample would include exactly 1,810 claimants. In fact, 1,806 claimants were selected.

A comparison of the characteristics of the sample and the population from which it was drawn is reported in Table B-1.

TABLE B-1. Characteristics of study group and population

Characteristic	Study group (pct)[1]	Population (pct)[2]	Probability coefficient (pct)[3]
Sex			
Male	70.9	67.3	0.0110
Female	29.1	32.7	0.0110
Age			
Less than 25 years	19.5	19.7	0.8650
25–34 years	31.3	31.9	0.6672
35–44 years	21.3	20.7	0.6242
45–54 years	16.9	16.3	0.5892
55 years and over	11.0	11.4	0.6744
Ethnic group			
White	68.5	69.5	0.4716
Hispanic	22.3	21.4	0.4654
Other	9.2	9.1	0.9044
Occupation			
Professional, technical, & managerial	30.9	31.4	0.7188
Clerical & sales	19.4	19.6	0.8650
Service	6.6	7.7	0.1706

TABLE B-1 (*continued*)

Characteristic	Study group (pct)[1]	Population (pct)[2]	Probability coefficient (pct)[3]
Agriculture, fisheries, forestry, & related	1.4	1.7	0.4412
Processing	1.4	1.3	0.7718
Machine trades	3.6	4.2	0.3222
Benchwork	3.2	3.5	0.5892
Structural work	21.9	20.2	0.1616
Miscellaneous	11.6	10.4	0.1936
Industry			
Agriculture	1.6	1.6	1.0000
Mining	2.0	1.5	0.1738
Construction	34.3	30.8	0.0120
Manufacturing	15.6	15.6	1.0000
Transportation, communications, & public utilities	3.2	3.4	0.7114
Wholesale & retail trade	19.7	21.9	0.0784
Finance, insurance, & real estate	3.4	3.3	0.8494
Services	16.4	18.0	0.1676
Government	3.8	3.9	0.8650
Last base-period quarter			
77.2	0.9	0.6	0.2938
77.3	8.6	7.7	0.2628
77.4	12.3	12.5	0.8414
78.1	23.9	22.6	0.3030
78.2	54.3	56.6	0.1236
High-quarter wages			
$1,000 or less	4.6	4.8	0.6672
$1,001–$1,500	11.0	12.5	0.1336
$1,501–$2,000	18.2	18.8	0.6100
$2,001–$2,500	13.9	15.2	0.2302
$2,501–$3,000	10.0	9.8	0.8258
$3,001–$3,500	8.8	7.4	0.0768
$3,501–$4,000	6.7	6.7	1.0000
$4,001–$4,500	6.9	6.1	0.2670
$4,501–$5,000	5.6	4.6	0.1142
$5,001–$7,500	10.2	10.6	0.6672
Greater than $7,500	4.1	3.5	0.2802
Base-period earnings			
Less than $2,000	4.2	4.0	0.7338
$2,000–$2,999	5.9	7.1	0.1212
$3,000–$3,999	9.0	9.4	0.6528
$4,000–$4,999	9.7	10.5	0.3898
$5,000–$7,499	23.1	24.2	0.3954
$7,500–$9,999	17.1	15.4	0.1188
$10,000–$14,999	17.9	16.6	0.2460

TABLE B-1 (*continued*)

Characteristic	Study group (pct)[1]	Population (pct)[2]	Probability coefficient (pct)[3]
$15,000–$19,999	7.4	7.6	0.8026
$20,000 or more	5.7	5.2	0.4532
Weekly benefit amount			
$25 or less	1.1	0.9	0.4840
$26–$35	2.3	2.3	1.0000
$36–$45	3.2	3.6	0.4778
$46–$55	5.5	6.7	0.1118
$56–$65	7.1	8.5	0.0970
$66–$75	9.2	9.9	0.4354
$76–$84	9.6	8.2	0.0910
$85	62.0	59.8	0.1386
Maximum benefit award			
$500 or less	1.8	1.7	0.7948
$501–$1,000	8.4	9.5	0.2150
$1,001–$1,500	14.7	15.8	0.3174
$1,501–$2,000	16.0	17.6	0.1646
$2,001–$2,209	7.4	6.5	0.2262
$2,210	51.7	48.8	0.0548

[1] The study group includes 1,542 claimants. Included in the total are 1,348 claimants receiving full responses from their employers' wage inquiries and 194 claimants receiving partial responses from their employers' wage inquiries.

[2] The population contains 9,795 claimants who both received benefits and were paid wages during the 4th quarter of 1978.

[3] These values indicate the probability of obtaining a difference between the two group proportions as large or larger than the one actually observed, due to chance alone, if the two groups had been drawn from the same population. The probability is at least 0.05 that one or more of the 57 independent probability values would be less than 0.0009 (or 0.05/57) due to chance alone. Hence, only those probability coefficients of 0.0009 or smaller are identified with an asterisk in the table to indicate statistically significant differences.

Notes to Appendix B

1. Because a computer program was used to select the sample, it was possible to assign a random number between 0 and 1 to each claimant in the population. If the random number for a given claimant was less than or equal to the proportion of the population that was to be sampled (approximately 0.184), that claimant was included in the sample.

2. This formula applies to both means and proportions.

3. This is based on the results of an earlier study conducted for the Arizona Department of Economic Security. See P. L. Burgess, J. L. Kingston, and R. D. St. Louis, *Fraudulent Receipt of Unemployment Insurance Benefits: Characteristics of Those Who Commit Fraud and a Prediction Profile* (Phoenix, Arizona Department of Economic Security, 1978), pp. 1–27.

Appendix C: Cross-Tabulations of Unreported-Earnings Conflicts by Selected Characteristics

TABLE C-1. Cross-tabulations of industry by number of computed conflicts [1]

Claimant's industry	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
Agriculture	24 (1.6) [4]	19 (1.5)	5 (2.1)	20.8
Mining	31 (2.0)	22 (1.7)	9 (3.8)	29.0
Construction	529 (34.3)	481 (36.9)	48 (20.3)	9.1
Manufacturing	240 (15.6)	215 (16.5)	25 (10.5)	10.4
Transportation, communication, public utility	49 (3.2)	37 (2.8)	12 (5.1)	24.5
Wholesale trade	122 (7.9)	104 (8.0)	18 (7.6)	14.8
Retail trade	182 (11.8)	137 (10.5)	45 (19.0)	24.7
Finance, insurance, real estate	53 (3.4)	42 (3.2)	11 (4.6)	20.8
Services	253 (16.4)	202 (15.5)	51 (21.5)	20.2
Government	58 (3.8)	45 (3.5)	13 (5.5)	22.4
Total	1,541	1,304	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.

[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.

[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.

[4] Numbers in parentheses are percentages.

NOTES: $\chi^2 = 48.9$; significance = 0.0000; missing observations = 1. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-2. Cross-tabulations of number of employers by number of computed conflicts [1]

Number of employers	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
1	1038 (67.3) [4]	902 (69.1)	136 (57.4)	13.1
2	362 (23.5)	294 (22.5)	68 (28.7)	18.8
3	101 (6.5)	76 (5.8)	25 (10.5)	24.8
4 or more	41 (2.7)	33 (2.5)	8 (3.4)	19.5
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.

[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.

[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.

[4] Numbers in parentheses are percentages.

NOTES: $\chi^2 = 14.7$; significance = 0.0021. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-3. Cross-tabulations of occupation by number of computed conflicts [1]

Occupation	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
Professional, technical, managerial	476	425	51	10.7
	(30.9) [4]	(32.6)	(21.5)	
Clerical, sales	299	236	63	21.1
	(19.4)	(18.1)	(26.6)	
Service	102	77	25	24.5
	(6.6)	(5.9)	(10.5)	
Fishing, farming, forest	22	17	5	22.7
	(1.4)	(1.3)	(2.1)	
Processing	21	17	4	19.0
	(1.4)	(1.3)	(1.7)	
Machine	56	47	9	16.1
	(3.6)	(3.6)	(3.8)	
Bench	50	42	8	16.0
	(3.2)	(3.2)	(3.4)	
Structural	338	299	39	11.5
	(21.9)	(22.9)	(16.5)	
Miscellaneous	178	145	33	18.5
	(11.5)	(11.1)	(13.9)	
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.
[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.
[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.
[4] Numbers in parentheses are percentages.
NOTES: $\chi^2 = 28.3$; significance = 0.0004. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-4. Cross-tabulations of sex by number of computed conflicts [1]

Sex	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
Male	1,094	940	154	14.1
	(70.9) [4]	(72.0)	(65.0)	
Female	448	365	83	18.5
	(29.1)	(28.0)	(35.0)	
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.
[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.
[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.
[4] Numbers in parentheses are percentages.
NOTES: $\chi^2 = 4.5$; significance = 0.0338. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-5. Cross-tabulations of age by number of computed conflicts [1]

Age	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
Under 25	300	254	46	15.3
	(19.5) [4]	(19.5)	(19.5)	
25–34	481	396	85	17.7
	(31.2)	(30.4)	(36.0)	
35–44	329	282	47	14.3
	(21.4)	(21.6)	(19.9)	
45–54	261	226	35	13.4
	(16.9)	(17.3)	(14.8)	
55 or older	169	146	23	13.6
	(11.0)	(11.2)	(9.7)	
Total	1,540	1,304	236	15.3

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.
[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.
[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.
[4] Numbers in parentheses are percentages.
NOTES: $\chi^2 = 3.4$; significance = 0.4877; missing observations = 2. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

Table C-6. Cross-tabulations of ethnic group by number of computed conflicts [1]

Ethnic group	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
White	1,056	882	174	16.5
	(68.5) [4]	(67.6)	(73.4)	
Black	63	46	17	27.0
	(4.1)	(3.5)	(7.2)	
Hispanic	344	305	39	11.3
	(22.3)	(23.4)	(16.5)	
American Indian	62	57	5	8.1
	(4.0)	(4.4)	(2.1)	
Unavailable	17	15	2	11.8
	(1.1)	(1.1)	(0.8)	
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.

[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.

[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.

[4] Numbers in parentheses are percentages.

NOTES: $\chi^2 = 14.5$; significance $= 0.0057$. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

Table C-7. Cross-tabulations of high-quarter earnings by number of computed conflicts [1]

Earnings	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct)[3]
$1,000 or less	71	59	12	16.9
	(4.6) [4]	(4.5)	(5.1)	
$1,001–$1,500	169	141	28	16.6
	(11.0)	(10.8)	(11.8)	
$1,501–$2,000	280	228	52	18.6
	(18.2)	(17.5)	(21.9)	
$2,001–$2,500	215	175	40	18.6
	(13.9)	(13.4)	(16.9)	
$2,501–$3,000	154	119	35	22.7
	(10.0)	(9.1)	(14.8)	
$3,001–$3,500	136	121	15	11.0
	(8.8)	(9.3)	(6.3)	
$3,501–$4,000	103	91	12	11.7
	(6.7)	(7.0)	(5.1)	
$4,001–$4,500	106	92	14	13.2
	(6.9)	(7.0)	(5.9)	
$4,501–$5,000	86	77	9	10.5
	(5.6)	(5.9)	(3.8)	
$5,001–$7,500	159	142	17	10.7
	(10.3)	(10.9)	(7.2)	
$7,501 or more	63	60	3	4.8
	(4.1)	(4.6)	(1.3)	
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.

[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.

[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.

[4] Numbers in parentheses are percentages.

NOTES: $\chi^2 = 23.8$; significance $= 0.0081$. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-8. Cross-tabulations of base-period earnings by number of computed conflicts [1]

Earnings	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct) [3]
Less than $2,000	64	53	11	17.2
	(4.2) [4]	(4.1)	(4.6)	
$2,000–$2,999	91	76	15	16.5
	(5.9)	(5.8)	(6.3)	
$3,000–$3,999	140	120	20	14.3
	(9.1)	(9.2)	(8.4)	
$4,000–$4,999	149	115	34	22.8
	(9.7)	(8.8)	(14.3)	
$5,000–$7,499	356	291	65	18.3
	(23.1)	(22.3)	(27.4)	
$7,500–$9,999	264	222	42	15.9
	(17.1)	(17.0)	(17.7)	
$10,000–$14,999	276	245	31	11.2
	(17.9)	(18.8)	(13.1)	
$15,000–$19,999	114	102	12	10.5
	(7.4)	(7.8)	(5.1)	
$20,000 or more	88	81	7	8.0
	(5.7)	(6.2)	(3.0)	
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.

[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.

[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.

[4] Numbers in parentheses are percentages.

NOTES: $\chi^2 = 18.5$; significance $= 0.0179$. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-9. Cross-tabulations of maximum benefit amount by number of computed conflicts [1]

MBA	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct) [3]
$500 or less	27	19	8	29.6
	(1.8) [4]	(1.5)	(3.4)	
$501–$1,000	130	112	18	13.8
	(8.4)	(8.6)	(7.6)	
$1,001–$1,500	227	185	42	18.5
	(14.7)	(14.2)	(17.7)	
$1,501–$2,000	247	205	42	17.0
	(16.0)	(15.7)	(17.7)	
$2,001–$2,209	114	93	21	18.4
	(7.4)	(7.1)	(8.9)	
$2,210	797	691	106	13.3
	(51.7)	(53.0)	(44.7)	
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.

[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.

[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.

[4] Numbers in parentheses are percentages.

NOTES: $\chi^2 = 10.1$; significance $= 0.0721$. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-10. Cross-tabulations of weekly benefit amount by number of computed conflicts [1]

WBA	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct) [3]
$25 or less	17 (1.1) [4]	13 (1.0)	4 (1.7)	23.5
$26–$35	35 (2.3)	30 (2.3)	5 (2.1)	14.3
$36–$45	50 (3.2)	42 (3.2)	8 (3.4)	16.0
$46–$55	85 (5.5)	69 (5.3)	16 (6.8)	18.8
$56–$65	109 (7.1)	91 (7.0)	18 (7.6)	16.5
$66–$75	142 (9.2)	119 (9.1)	23 (9.7)	16.2
$76–$84	148 (9.6)	116 (8.9)	32 (13.5)	21.6
$85	956 (62.0)	825 (63.2)	131 (55.3)	13.7
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.
[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.
[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.
[4] Numbers in parentheses are percentages.
NOTES: $\chi^2 = 8.4$; significance = 0.3011. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

TABLE C-11. Cross-tabulations of the ratio of base-period earnings to high quarter by number of computed conflicts [1]

Ratio	Total claimants [2]	Claimants with no conflict	Claimants with one or more conflicts	Conflict rate (pct) [3]
2 or less	333 (21.6) [4]	281 (21.5)	52 (21.9)	15.6
2.1–2.5	283 (18.4)	239 (18.3)	44 (18.6)	15.5
2.6–3.0	307 (19.9)	260 (19.9)	47 (19.8)	15.3
Greater than 3.0	619 (40.1)	525 (40.2)	94 (39.7)	15.2
Total	1,542	1,305	237	15.4

[1] Based on claimants who established benefit years as regular Arizona UI claimants. Transitional claims from prior benefit years were included, but interstate liable claims were excluded. Included are only claimants who received one or more benefit payments (including partial payments, offsets, and waiting weeks) and who also had earnings of $1 or more (as reported by the employers) for weeks in the same quarter.
[2] Each cell of the cross-tabulation contains two numbers. The upper number represents the cases that fell in that cell. The lower is the percentage of all cases in the entire column that are accounted for by the cases in the cell.
[3] The conflict rate is defined as 100 times the number of claimants in that cell that had one or more conflicts divided by the total number of claimants in that cell.
[4] Numbers in parentheses are percentages.
NOTES: $\chi^2 = 0.04$; significance = 0.9979. The χ^2 statistic indicates whether the two classification variables in the cross-tabulation are related. The larger the value of the chi-square statistic (other things equal), the more confident one can be that the two variables are related. The significance statistic indicates how confident one can be that the two variables are related to each other. A statistical significance of 0.05, for example, indicates 95 percent confidence that the two variables are related. In general, the level of confidence is 100 (1 significance) percent.

Appendix D: A Comparison of the Basic Features of the Model Crossmatch and the MLDA

The main question to be addressed in developing a postaudit system for earnings in covered employment is to determine which claimants should be audited for unreported earnings. The only information routinely available in the reporting system is the amount of wages paid by covered employers to claimants who had weeks of UI-compensated unemployment during a given calendar quarter. There are a number of approaches to identifying cases in which an effort should be made to determine whether a particular claimant received earnings during a week when UI benefits actually were paid. For example, claimants who (1) drew 13 weeks of full benefits during a quarter and (2) had employer-reported earnings greater than 13 times the earnings disregard during the same quarter probably failed to report some earnings that they were legally required to report.[1]

However, many claimants receive both benefits and earnings during a given quarter because they are employed during part of the quarter and unemployed during the remainder of the quarter. Unless all claimants with both employer-reported earnings and compensated weeks during a quarter are audited, some technique must be used to identify claimants who should be audited. Because a full audit to determine unreported earnings entails costs, it may not be cost effective to perform a full audit for all claimants who have both compensated unemployment and employer-reported earnings during the same quarter. Thus, it would be extremely useful to rank claimants by the likelihood that conducting a postaudit would uncover an unreported-earnings conflict.

The ability thus to rank claimants is made even more desirable by the fact that, at least in Arizona, recovered overpayments must go directly into the UI trust fund. Because recovered overpayments cannot be used to pay the salaries of investigators or other UI personnel, an additional investigator might not be hired because of a lack of administrative funds, even if it were known that the investigation would recover many times the investigator's salary in overpayments.

The model crossmatch PINDEX

The model crossmatch system uses a probability index (PINDEX) developed by A. I. Shiigi and Associates to identify claimants who may have been overpaid because of unreported earnings. A formal statement of the PINDEX, as used in the model crossmatch system, is as follows:

$$\mathrm{PINDEX}_a = \mathrm{NWK}_a + \mathrm{ENWW}_a \qquad (1)$$

where

PINDEX_a = probability index for claimant a.

NWK_a = number of weeks compensated in the audit quarter for claimant a. It includes weeks where the benefit amount was reduced because of part-total earnings, partial claims, weeks used as offsets, and the waiting week.

ENWW_a = estimated number of weeks of work for claimant a.

$$\mathrm{ENWW}_a = C\sqrt{\frac{\mathrm{WG}_a}{\mathrm{WBA}_a}} \qquad (2)$$

where

C = a mathematical constant, an adjustment factor for which the method of computation is explained in (3).[2]

WG_a = employer-reported wages of claimant a in the audit quarter.

WBA_a = the maximum weekly benefit amount for claimant a.

$$C = \frac{13 - \dfrac{\sum^{a} \mathrm{NWK}_a}{a}}{\dfrac{\sum^{a}\sqrt{\dfrac{\mathrm{WG}_a}{\mathrm{WBA}_a}}}{a}} \qquad (3)$$

where

13 = the number of weeks in the audit quarter.

$\dfrac{\sum^{a} \mathrm{NWK}_a}{a}$ = the average number of weeks compensated during the audit quarter for *all* claimants who had benefits and wages in the audit quarter.

$\dfrac{\sum^{a}\sqrt{\dfrac{\mathrm{WG}_a}{\mathrm{WBA}_a}}}{a}$ = the average of the square roots of the quotients of wages divided by the maximum weekly benefit amount for *all* claimants who had benefits and wages in the audit quarter.

Thus, the PINDEX computed for each claimant is simply a sum of the number of weeks of benefit payments for the claimant during the audit quarter and an estimate of the number of weeks of work the claimant had during the audit quarter. The weeks of benefit payments include weeks of full and partial benefits and the waiting week (if served during the quarter).

The model crossmatch system then adjusts the PINDEX on the basis of the local office at which the claimant filed during the audit quarter. The local office adjustment (LO) reflects the incidence of employer-reported wages for claimants at a given local office. Before the LO can be determined it is necessary to determine the so-called quality index (QL) for each local office. A formal statement of the QL, as used by the model crossmatch system, follows:

$$\mathrm{QL}_j = 1 - \frac{\mathrm{XN}_j}{\mathrm{TN}_j} \qquad (4)$$

where

XN_j = The total number of claimants in local office j that had benefits and earnings during the audit quarter.

TN_j = The total number of claimants in local office j that received 1 or more benefit weeks in the audit quarter. It includes claimants with and without earnings in the audit quarter.

The QL represents nothing more than the ratio of claimants who received both benefits and wages to the total number of claimants who received benefits at that local office during the audit quarter. This ratio (or quotient) is then subtracted from 1; thus it is always a number between 0 and 1. When the QL has been determined for each local office, the local offices' scores are ranked from high to low and divided into four quartiles. The highest 25 percent of the offices are assigned LO scores of -1, the lowest 25 percent, scores of $+1$, and the offices in the other two quartiles, scores of 0. Table D-1 provides the local office adjustment computations for Arizona claimants during the audit quarter. The model crossmatch system also allows for an optional adjustment to the PINDEX to be introduced by the audit State. Some States have found that overpayments are more prevalent among

TABLE D-1. Computation of local office adjustment scores for Arizona claimants for the fourth quarter of 1978

Local office number	Quality index	Quartile	LO index
10	0.5324	1	−1
70	0.4792	1	−1
65	0.4768	1	−1
94	0.4729	1	−1
40	0.4254	1	−1
75	0.4238	1	−1
50	0.3902	2	0
92	0.3750	2	0
35	0.3716	2	0
30	0.3696	2	0
26	0.3411	2	0
20	0.3396	2	0
55	0.3351	3	0
15	0.3333	3	0
80	0.3320	3	0
81	0.3220	3	0
90	0.3218	3	0
25	0.3191	4	+1
60	0.3139	4	+1
46	0.3095	4	+1
85	0.2763	4	+1
16	0.2308	4	+1
66	0.2164	4	+1

claimants with two or more employers and among claimants employed in certain industries. The audit State may add its own claimant-selection factors to the model crossmatch system's screening criteria. One point is added to each claimant's PINDEX score for each State option (SO) variable that applies to the claimant. Under normal conditions the number of points for the SO index is not to exceed three points per claimant, according to the model crossmatch manual.

For this study the cross-tabulations of study-group claimant characteristics by unreported-earnings conflicts (Appendix C) were used to select variables for the SO adjustment. The three variables with the highest level of statistical significance were industry, occupation, and number of employers. Among the industry groups, mining, transportation/communications/public utilities, retail trade, and government had the highest rates of unreported-earnings conflicts; therefore, claimants whose last employer was in one of these industry classifications were assigned one point toward computation of the SO adjustment. Among the occupation groups, services, farming/fisheries/forestry, and clerical/sales provided the highest rates of unreported-earnings conflicts; therefore, claimants in these occupational categories were also assigned one point toward computation of the SO adjustment.

The third variable selected for the SO index was the number of employers that reported wages for each claimant during the audit quarter. Rates of earnings-report conflict increased as the number of employers increased up to three employers (only eight claimants had more than three employers); claimants with two or more employers were assigned one point toward computation of the SO adjustment.

The SO adjustment was then computed by summing each of the three addends of each claimant. The claimant could have an SO from 0 to 3, depending on the separation employer's industry, the claimant's occupation of last attachment, and the number of employers reporting that they paid wages to the claimant in the audit quarter.

The adjusted probability index (APINDEX) was then computed as the sum of a claimant's PINDEX, local office adjustment (LO), and SO adjustment score:

$$APINDEX_a = PINDEX_a + LO_a + SO_a \quad (5)$$

where

$APINDEX_a$ = The adjusted probability index of claimant *a*.

LO_a = The adjustment for the local office in which claimant *a* files.

SO_a = The State option adjustment for claimant *a*.

The model crossmatch system then selects for audit claimants with the highest adjusted probability indexes. A basic difficulty with this approach is that it provides only ordinal measurement. Because the majority of the scores range from 1 to 25, it is not a true probability and cannot be used to infer how much more likely one claimant is than another to have unreported earnings. Moreover, when a fixed number of claimants are to be selected for audit and more than one claimant has the same APINDEX score, the claimant selected depends on the order in which claimants are ranked, not on their APINDEX scores.

Multiple linear discriminant analysis

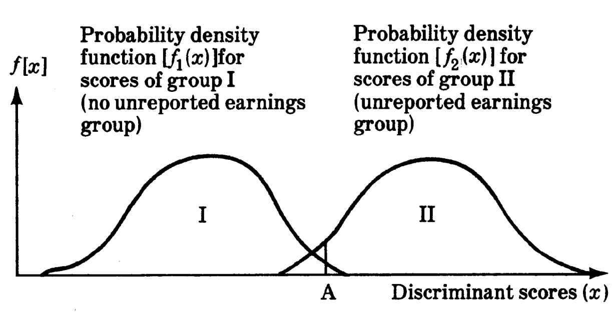
Discriminant analysis has not previously been used to determine which UI claimants should be audited by employer contacts. However, discriminant analysis was used in an earlier report to develop a profile for discriminating between those who were more and less likely to have fraudulently collected UI benefits.[3] The reason for experimenting with this technique is that, for each claimant, it would generate a coefficient of estimated probability of detecting an unreported-earnings conflict if an audit were conducted for that claimant.

A successful discriminant profile could determine how best to allocate costly resources to maximize the difference between overpayment recoveries and detection costs or to uncover the most violations due to unreported earnings for a given detection cost. Before the exact procedure used in this study is explained and the empirical results of the profile developed are presented, there is a brief discussion of discriminant analysis as a general technique.[4] The basic purpose of discriminant analysis in this context is to develop a profile to predict the probability that an unreported-earnings conflict could be found by obtaining employer wage reports and other basic data for any particular claimant. It is possible through discriminant analysis to develop a profile that places persons (with some probability) into any one of several mutually exclusive categories. For the profile of interest here, only two categories are relevant: those with and those without earnings-report conflicts. It should be noted, however, that only those in the sample group for whom unreported earnings were found in the postaudit can be included in the unreported-earnings category. The more claimants who actually had unreported earnings not detected by the postaudit, the more difficult it might be to develop an accurate profile. Although the magnitude of this problem is unknown, the problem probably reduced the effectiveness that could have been achieved if all persons with unreported earnings had been detected.[5]

Figure D-1 shows hypothetical distributions of discriminant scores for the population of claimants who had unreported-earnings conflicts and the population of claimants who did not. The score for each individual would be a linear function of the values of the personal and labor market characteristics of the individual.[6] The coefficients chosen for the variables would be those that would make the means for the two populations as far apart as possible and the variances for each population as small as possible.[7]

Ideally, there would be no overlap between the scores for the two groups (i.e., the discriminant function would put each person into the correct group). In fact, however, a decision criterion that produces classification with 100 percent accuracy generally is not possible. An example of an imperfect decision criterion is illustrated by point A in Figure D-1. The probability that a claimant belongs to group I or group II is determined from the probability density functions for the two groups. If the population sizes are equal, the probability that a claimant with a specific score belongs to group I is $f_1(x)/[f_1(x) + f_2(x)]$, and the probability that the claimant belongs to group II is $f_2(x)/[f_1(x) + f_2(x)]$. If the population sizes are unequal (as is the case in this study), weights can be applied to the probability density functions to account for differing population sizes. In this example all claimants with discriminant scores to the right of point A in group I are misclassified as having unreported earnings, and all claimants with discriminant scores to the left of point A in group II are misclassified as having no unreported earnings.

FIGURE D-1. Discriminant analysis illustration



Since some misclassification would generally be unavoidable, the selection of the decision criterion requires estimation of the "costs" of misclassification for each category. In this context, if the costs of misclassifying anyone from either group were equal, an individual claimant would be assigned to the category with the highest posterior probability (e.g., above 50 percent for the above example of two categories of equal size). In some instances, however, misclassification costs are not equal, and the decision criterion must be adjusted to account for the unequal costs. In the example shown in Figure D-1, if it were assumed that the cost of misclassifying a person with unreported earnings as having no unreported earnings were much higher than the opposite error, the appropriate adjustment of the decision criterion would require a movement of point A to the left; the result would be that fewer persons who actually had unreported earnings would be misclassified. The possibility of directly incorporating assumptions about misclassification costs into the decision criterion represents a great strength of discriminant analysis.[8]

Although it is possible to estimate the relative importance of individual influences on the classification power of discriminant functions, the emphasis in this paper is on the overall capability of the discriminant profile developed to correctly classify individual claimants into the relevant categories. One indicator of this capability is the classification matrix. A hypothetical classification matrix is provided below to illustrate how the overall classification power of a discriminant function is indicated by a classification matrix.

	Predicted status		
Actual status	*Unreported earnings*	*No unreported earnings*	*Pct correct by category*
Unreported earnings	40	60	40
No unreported earnings	10	90	90

In this example, 200 claimants (100 of whom actually belong in each category) have been classified. Of the 100 claimants who actually had unreported earnings, this hypothetical discriminant function correctly identified 40 percent and incorrectly classified the remaining 60 percent. In contrast, of the 100 persons without unreported earnings, 90 percent were correctly classified and the remaining 10 percent were classified incorrectly. Overall, 65 percent (130/200) of the total sample of 200 claimants was classified correctly. As is apparent from this example, the classification matrix provides a convenient and direct indication of the discriminatory power of any particular discriminant function for any number of categories.[9]

The remainder of this Appendix presents the method and variables used to develop the actual discriminant functions. A modified jackknifing method was used to create and test the discriminant functions. The 1,542 claimants of the study group were randomly divided into five subgroups of 309, 309, 308, 308, and 308. The Statistical Package for the Social Sciences (SPSS) computer software was used to build five discriminant functions for the remaining 80 percent of the sample after the data for the 20 percent of the sample had been removed; each of these five functions then was tested on the 20 percent of the sample that had not been used in building each of the five respective discriminant functions. In this way the discriminating power of each function was tested on data that had not been used in estimating the discriminant profile.

In estimating each discriminant function a stepwise method was used; that is, independent variables were selected for entry into the analysis on the basis of their discriminating power. The process begins by choosing the single variable with the highest value on the selection criterion.[10] This initial variable is then paired with each of the other available variables, one at a time, and the selection criterion is reapplied. The new variable that, in conjunction with the initial variable, produces the best criterion value is selected as the second variable to enter the equation. These two variables are then combined with each of the remaining variables, one at a time, to form triplets, which are evaluated on the criterion. The triplet with the best criterion value determines the third variable selected. This procedure of locating the next variable that would yield the best criterion score, given the variables already selected, continues until all variables are selected or until no additional variables provide a minimum level of improvement.[11]

As variables are selected for inclusion (see Table E-1 for the variables considered for inclusion), some variables previously selected may lose their discriminating power. This occurs because the information they provide about group differences is now available in some combination of the other included variables. Thus, at the beginning of each step, each of the previously selected variables is tested to determine whether it still makes a sufficient contribution to discrimination.[12] If any are eligible for removal, the least useful is eliminated. A variable is considered for selection only if its partial F-ratio is larger than a specified value (a value of 2 was used in this study). Similarly, a variable is considered for deletion only if its partial F-ratio is less than a specified value (a value of 1.5 was used in this study). (See Table E-2 for the partial F-ratios for the variables included in each of the five discriminant functions.) The partial F-ratio measures the discrimination introduced by the variable after taking into account the discrimination achieved by the other selected variables. The assumption is that the stepwise procedure is an efficient way of approximately locating the best set of discriminating variables. (See Table E-3 for the unstandardized discriminant function coefficients for the variables included in each of the five functions.)

These five discriminant functions were then used to compute discriminant scores for each other claimant who was not used to develop the discriminant function. Thus, claimants used in the discriminant analysis to create the discriminant functions were not used to test the results. For example, the function created from the random sample of 1,233 (1,542 — 309) claimants was tested (i.e., discriminant scores were computed) on the remaining 309 cases. The results of estimating these discriminant scores are discussed in the text of the report.

Notes to Appendix D

1. Because employers report earnings when paid, not when earned, even the situation described in the text might not involve an instance of unreported earnings.

2. The constant was calculated in accordance with the crossmatch model formula and was found to be 2.2, which was well within the range (1.5 to 2.5) of constants among States testing the model crossmatch system and which was also very near their average of 2.1.

3. See Robert D. St. Louis, Paul L. Burgess, and Jerry L. Kingston, *Fraudulent Receipt of Unemployment Insurance Benefits: Characteristics of Those Who Committed Fraud and a Prediction Profile,* a report prepared for the Arizona Unemployment Insurance Task Force (Phoenix, Ariz., Unemployment Insurance Administration, Arizona Department of Economic Security, 1978).

4. The discussion in this section draws heavily on St. Louis, Burgess, and Kingston, *Fraudulent Receipt,* and Paul L. Burgess and Jerry L. Kingston, *Applications of Multiple Linear Discriminant Analysis to the Labor Market Experience of UI Claimants* (Washington, D.C., U.S. Department of Labor, The Unemployment Insurance Service, June 1974).

5. The main problem involves persons who work in the cash economy, although it is likely that some undetected unreported earnings also existed for the covered employment of the study group because of errors, employer nonresponse, and perhaps even employer-claimant collusion.

6. Essentially, the assumptions of MLDA are as

follows: (1) the number of variables used for classification purposes must be greater than or equal to the number of populations minus 1; (2) the number of sample observations must exceed the number of variables used for classification purposes; (3) the costs of misclassifying an individual into any one of the other populations must be known or be estimated; (4) the probability that an individual selected at random belongs to a specific population must be known for each population; (5) the populations must be multivariate normal; and (6) the populations must have identical variance-covariance matrices. For a more complete yet highly intuitive discussion of discriminant techniques, see Wendy Lee Graham, "The Labor Force Decisions of Married Female Teachers: A Discriminant Analysis Approach," *Review of Economics and Statistics,* August 1973. For a more technical and detailed treatment see William F. Massey, "Discriminant Analysis of Audience Characteristics," *Journal of Advertising Research,* March 1965; Ethel S. Gilbert, "On Discrimination Using Qualitative Variables," *American Statistical Association Journal,* December 1968; and William G. Cochran, "Some Classification Problems with Multivariate Data," *Biometrics,* March 1961.

7. Actually, some conflict may exist between making the means as far apart as possible and making the variances as small as possible. Discriminant analysis selects values for the coefficients that maximize the ratio of between-group to within-group variation.

8. The example above is for a two-category situation, but the technique is applicable where the number of categories is larger. In fact, another advantage of discriminant analysis is that a large number of mutually exclusive categories (which represent either equal or unequal population sizes) can be analyzed easily.

9. Coefficients are estimated for each variable used to classify claimants into the relevant categories, and those coefficients can be tested for statistical significance. As noted in the text, however, the emphasis is on the overall power of the discriminant functions estimated; therefore, coefficients for individual variables are not emphasized in this paper.

10. The selection criterion used is known as Wilks' lambda which uses an overall multivariate F-ratio for the test of differences among the group centroids. The variable that maximizes the F-ratio also minimizes Wilks' lambda, a measure of group discrimination.

11. An additional test is performed before a variable is actually accepted. This is a test to see if the "tolerance" for this variable is sufficiently high. A tolerance check is needed to detect situations in which rounding errors during the inversion of the pooled within-group covariance matrix would have a serious effect upon the results.

12. This test is made only for variables with an inclusion level of 1.5 or less.

Appendix E: Discriminant Analysis Inputs and Outputs for Two Comparisons of Unreported-Earnings Conflicts

Definitions of variables

AGE1	Age group 24 years or less
AGE2	Age group 25 to 34 years
AGE3	Age group 35 to 44 years
AGE4	Age group 45 to 54 years
AGE5	Age group 55 years or more
CLSUM	Total amount of earnings reported by claimant in the audit quarter
DOT1	Occupations in professional, technical, and managerial skills
DOT2	Occupations in clerical and sales skills
DOT3	Occupations in services
DOT4	Occupations in farming, fishing, and forestry
DOT5	Occupations in processing trades
DOT6	Occupations in machines trades
DOT7	Occupations in benchwork
DOT8	Occupations in structural work
DOT9	Miscellaneous occupations
ERWG	Total amount of earnings reported by employers on the quarterly wage report
ETH1	Ethnic group white
ETH2	Ethnic group black
ETH3	Ethnic group Hispanic
ETH4	Ethnic group Indian
ETH5	Ethnic group other
ISS1	Determination issues: voluntary quit; discharge; compelling personal reasons; labor dispute; vacation, sick, holiday, or dismissal pay
ISS2	Determination issues: ability, availability, refusal of work, reporting requirements
ISS3	All other determination issues
PDSUM	Total amount of benefits paid in the audit quarter (including offset amounts)
PINDX	Shiigi's adjusted probability index without the State option adjustment
PNDEST1	A variable constructed by taking the sum of WKSCOMP plus the quotient of employer-reported quarterly wages divided by average weekly earnings in the high quarter [PNDEST1 = WKSCOMP + ERWG/(V12/13)].
PNDEST2	A variable constructed by taking the sum of WKSCOMP plus the quotient of employer-reported quarterly wages divided by average weekly earnings during the base period [PNDEST2 = WKSCOMP + ERWG/(V13/52)].
PNDEST3	A variable constructed by dividing the difference between 13 and WKSCOMP

	by the quotient of employer-reported quarterly wages divided by average weekly earnings in the high quarter [PNDEST3 = (13-WKSCOMP) + (ERWG/(V12/13)].
PNDEST4	A variable formed by taking the square root of PNDEST3
RFS1	Voluntarily quit last job
RFS2	Discharged from last job
RFS3	Laid off from last job
ROOTX	A variable formed by taking the square root of PINDX
ROOT1	A variable formed by taking the square root of PNDEST1
ROOT2	A variable formed by taking the square root of PNDEST2
SENT	Total number of employers sent audit wage inquiry forms
SEX1	Male claimants
SEX2	Female claimants
SIC1	Agricultural industries
SIC2	Mining industries
SIC3	Construction industries
SIC4	Manufacturing industries
SIC5	Transportation, communications, and public utility industries
SIC6	Wholesale trade industries
SIC7	Retail trade industries
SIC8	Finance, insurance, and real estate industries
SIC9	Services industries
SIC10	Government industry
V12	High-quarter wages earned in the claimant's base period in Arizona
V13	Base-period earnings
V14	Maximum benefit award of claimant
V26	Total amount of benefits paid claimant in current benefit year through audit quarter
V27	Total amount of benefits offset in current benefit year through audit quarter
V31	Total number of weeks offset in current benefit year through audit quarter
V32	Total number of weeks with earnings in current benefit year through audit quarter
V34	Total reported earnings in current benefit year through audit quarter
V35	Total number of nonmonetary determinations in current benefit year through audit quarter
V37	Total number of nonmonetary determinations resulting in disqualification (more than 1 week can be disqualified by 1 determination) in current benefit year through audit quarter
V38	Total number of statutory deductions applied in current benefit year through audit quarter
V40	Total number of level 2 appeals in current benefit year through audit quarter
V41	Total number of level 2 appeals upheld in current benefit year through audit quarter
V50	Total number of nonfraud overpayments in current benefit year through audit quarter
V51	Total number of administrative overpayments in current benefit year through audit quarter
V52	Total number of overpayments due to unreported earnings in current benefit year through audit quarter (a single established overpayment may encompass several weeks of benefit payments)
V54	Total number of overpayments due to unreported earnings with source of post-audit established against current benefit year through audit quarter.
V55	Total weeks overpaid in current benefit year through audit quarter
V57	Total weeks nonfraud overpayment in current benefit year through audit quarter
V59	Total weeks overpaid as a result of unreported earnings in current benefit year through audit quarter
V68	Total amount overpaid as a result of unreported earnings with source as post-audit established against current benefit year through audit quarter
WKSCLDD	Total number of weeks during which claimant reported deductible earnings in the audit quarter
WKSCLMD	Total number of weeks claimed in the audit quarter
WKSCOMP	Total number of weeks compensated (including offset and waiting weeks) in the audit quarter
WKSDEE	Total number of weeks disqualified for excessive earnings in the audit quarter
WKSDISQ	Total number of weeks disqualified in the audit quarter

TABLE E-1. Partial F-ratios for variables in the discriminant functions for computed conflict versus no computed conflict

Variable	Function 1	Function 2	Function 3	Function 4	Function 5
AGE2	—	—	5.1352	—	2.7544
CLSUM	—	4.6916	—	—	5.1460
DOT1	—	6.4837	3.0631	6.5932	5.9105
DOT4	—	—	—	—	2.2571
DOT6	1.9681	—	—	—	—
DOT9	2.1390	—	—	—	—
ETH1	2.4980	—	—	—	—
ETH2	9.3183	2.0324	2.5154	4.5083	—
ETH3	—	3.1529	7.4165	—	2.5396
ETH5	—	2.6590	—	—	—
ISS2	—	—	—	6.0670	—
ISS3	—	2.9333	—	—	—
PDSUM	—	—	30.173	—	36.147
PINDX	—	—	9.5411	—	—
PNDEST1	15.983	12.191	—	10.695	16.847
RFS2	5.1174	—	—	—	—
RFS3	—	—	—	2.9868	—
ROOTX	2.6220	—	—	—	—
ROOT2	—	3.8781	—	3.1700	—
SENT	13.462	6.9824	11.398	19.583	8.6559
SIC1	—	7.5433	—	—	—
SIC2	—	7.7442	9.8067	—	11.073
SIC3	19.761	—	—	—	—
SIC4	15.162	—	—	—	—
SIC5	—	—	4.8233	5.5682	4.7221
SIC6	4.9776	—	—	—	—
SIC7	—	16.784	4.5542	10.160	8.2800
SIC8	—	3.1883	—	—	—
SIC9	—	6.1501	2.4085	3.7275	6.1633
SIC10	—	9.4636	—	8.2657	—
V12	—	—	9.2576	—	1.8777
V27	—	—	—	—	3.5265
V30	—	—	—	6.2990	—
V32	—	—	17.764	—	—
V34	—	—	3.1589	—	—
V35	—	6.3854	—	—	—
V41	3.5157	2.5819	3.0963	—	4.1810
V51	—	—	—	2.2975	—
V54	—	3.8804	—	—	—
V57	3.4415	3.4898	—	6.1759	4.4341
V59	7.7078	11.760	11.276	19.190	13.606
V68	2.2668	—	4.9638	—	5.8018
WKSCLDD	20.435	34.580	—	49.967	43.700
WKSCLMD	21.747	—	—	10.732	—
WKSCOMP	—	19.282	—	—	—
WKSDEE	—	—	—	11.935	—
WKSDISQ	11.150	—	—	—	—

TABLE E-2. Unstandardized canonical discriminant function coefficients for computed conflict versus no computed conflict

Variable	Function 1	Function 2	Function 3	Function 4	Function 5
AGE2	—	—	−0.4014860	—	0.2684626
CLSUM	—	0.1466063E–02	—	—	−0.1691980E–02
DOT1	—	0.4275232	0.3266983	0.4142601	−0.4072030
DOT4	—	—	—	—	0.9978243
DOT6	0.6313942	—	—	—	—
DOT9	−0.3969512	—	—	—	—
ETH1	−0.2928286	—	—	—	—
ETH2	−1.317629	−0.5486043	−0.6354684	−0.7999795	—
ETH3	—	0.3375492	0.5496959	—	−0.2942157
ETH5	—	1.198023	—	—	—
ISS2	—	—	—	0.4266585	—
ISS3	—	−0.3804643	—	—	—
PDSUM	—	—	−0.1922419E–02	—	0.1839473E–02

Table E-2 (*continued*)

Variable	Function 1	Function 2	Function 3	Function 4	Function 5
PINDX	—	—	−0.7336877E–01	—	—
PNDEST1	−0.9502483E–01	−0.1172095	—	−0.1099274	0.5904049E–01
RFS2	−0.4975839	—	—	—	—
RFS3	—	—	—	0.3048503	—
ROOTX	0.4046026	—	—	—	—
ROOT2	—	0.3313929	—	0.2954407	—
SENT	−0.3888347	−0.2564325	−0.3666268	−0.4098636	0.2911379
SIC1	—	−1.803023	—	—	—
SIC2	—	−1.450989	−1.875149	—	1.834061
SIC3	0.8536556	—	—	—	—
SIC4	0.9789230	—	—	—	—
SIC5	—	—	−1.023019	−0.9743935	0.9022940
SIC6	0.7223366	—	—	—	—
SIC7	—	−1.008189	−0.5735906	−0.7602686	0.7002916
SIC8	—	−0.7308484	—	—	—
SIC9	—	−0.5240792	−0.3726222	−0.3952048	0.5383286
SIC10	—	−1.259153	—	−1.086108	—
V12	—	—	0.1397786E–03	—	−0.5498503E–04
V27	—	—	—	—	0.1154439E–01
V30	—	—	—	−0.3192959E–01	—
V32	—	—	−0.2415980	—	—
V34	—	—	0.8984341E–03	—	—
V35	—	−0.2368653	—	—	—
V41	−1.014228	−0.7697472	−0.8291003	—	0.9784401
V51	—	—	—	−1.014903	—
V54	—	3.398062	—	—	—
V57	0.2297874	0.2182978	—	0.2703294	−0.2323285
V59	−1.060816	−1.008789	−1.317237	−0.4933145	1.254174
V68	0.8819310E–02	—	0.1590064E–01	—	−0.1265814E–01
WKSCLDD	−0.3594748	−0.4754122	—	−0.5087122	0.5674302
WKSCLMD	−0.1355954	—	—	−0.9471960E–01	—
WKSCOMP	—	−0.1155695	—	—	—
WKSDEE	—	—	—	0.4923223	—
WKSDISQ	0.3410754	—	—	—	—
CONSTANT	0.7654138	1.784834	2.085751	1.464328	−1.932574

Table E-3. Partial F-ratios for variables in the discriminant functions for large versus small or no computed conflict

Variable	Function 1	Function 2	Function 3	Function 4	Function 5
AGE1	—	—	3.4526	—	—
AGE2	8.7069	4.9074	7.1133	7.8725	8.4131
DOT1	—	—	—	2.7436	—
DOT3	—	—	—	—	4.6540
DOT4	2.7964	—	9.8277	—	—
DOT7	—	—	—	—	2.6477
DOT9	—	2.2153	—	—	—
ERWG	—	—	5.4287	—	—
ETH1	—	4.5630	—	—	—
ETH2	2.2318	8.1709	—	—	—
ETH3	4.3105	—	3.9382	3.2592	2.3647
PINDX	—	—	17.135	—	—
PNDEST1	—	51.721	8.0867	40.501	—
RFS2	5.9791	3.7046	3.9024	3.4478	—
ROOT1	34.305	—	—	—	38.709
ROOT2	—	—	3.7755	—	—
SENT	2.1453	—	—	2.4230	—
SEX2	—	—	—	—	2.3527
SIC1	—	5.1623	—	6.0152	—
SIC2	4.4233	—	—	—	—
SIC3	—	—	—	—	20.087
SIC4	—	—	—	—	14.016
SIC5	—	4.2735	—	—	—
SIC6	—	—	—	—	8.5366

Table E-3 (*continued*)

Variable	Function 1	Function 2	Function 3	Function 4	Function 5
SIC7	10.766	2.2015	6.7349	7.3080	—
SIC9	—	—	—	—	3.0722
SIC10	6.5625	3.5261	4.8071	7.0672	—
V14	—	—	—	3.1404	1.8391
V30	—	—	—	2.2887	—
V32	—	—	—	3.4157	3.6219
V41	—	6.5030	3.9055	4.3827	3.1783
V51	—	—	—	6.0282	—
V52	—	5.0860	—	—	—
V54	—	2.4814	—	—	—
V58	—	—	—	3.2668	—
V59	—	5.9441	11.566	24.726	13.968
V68	9.3728	—	2.8665	—	5.3446
WKSCLDD	—	—	—	5.6695	6.0831
WKSCLMD	9.7514	6.2596	—	3.0547	3.4494
WKSDEE	—	2.0795	—	—	—

Table E-4. Unstandardized canonical discriminant function coefficients for large versus small or no computed conflict

Variable	Function 1	Function 2	Function 3	Function 4	Function 5
AGE1	—	—	−0.4468848	—	—
AGE2	−0.6399546	−0.4201063	−0.5327069	−0.5372483	−0.5951319
DOT1	—	—	—	0.3310102	—
DOT3	—	—	—	—	0.8608805
DOT4	−1.487174	—	−2.685575	—	—
DOT7	—	—	—	—	−0.9288885
DOT9	—	−0.4130685	—	—	—
ERWG	—	—	0.1788815E–03	—	—
ETH1	—	−0.4401506	—	—	—
ETH2	−0.7755924	−1.355809	—	—	—
ETH3	0.5235407	—	0.4184199	0.3971665	0.3579666
PINDX	—	—	−0.1588952	—	—
PNDEST1	—	−0.1236130	−0.1152889	−0.1079926	—
RFS2	−0.6617207	−0.4576091	−0.4645165	−0.4396111	—
ROOT1	−0.8139430	—	—	—	−0.8553176
ROOT2	—	—	0.3600063	—	—
SENT	−0.1894499	—	—	−0.1805880	—
SEX2	—	—	—	—	0.3684113
SIC1	—	−1.790212	—	−1.747710	—
SIC2	−1.564365	—	—	—	—
SIC3	—	—	—	—	1.200991
SIC4	—	—	—	—	1.181512
SIC5	—	−1.041895	—	—	—
SIC6	—	—	—	—	1.156278
SIC7	−1.042374	−0.4241077	−0.7285988	−0.7617127	—
SIC9	—	—	—	—	0.5300351
SIC10	−1.356919	−0.8846879	−1.001578	−1.215193	—
V14	—	—	—	−0.3245230E–03	−0.2773502E–03
V30	—	—	—	−0.2491819E–01	—
V32	—	—	—	0.1365499	0.1375915
V41	—	−1.434194	−1.112260	−1.118714	−1.007840
V51	—	—	—	−2.990335	—
V52	—	−4.374494	—	—	—
V54	—	3.444755	—	—	—
V58	—	—	—	0.2644180	—
V59	—	−0.5509064	−1.350061	−0.6750694	−1.670577
V68	−0.9478582E–02	—	0.1038731E–01	—	0.1882248E–01
WKSCLDD	—	—	—	−0.3113573	−0.3166561
WKSCLMD	−0.1007282	−0.7183890E–01	—	−0.5940431E–01	−0.5932620E–01
WKSDEE	—	−0.2304403	—	—	—
CONSTANT	3.995638	2.686095	2.540018	2.966590	2.999707

Appendix F: Classification Matrices for Five Discriminant Functions for Two Comparisons of Unreported Earnings Conflicts

TABLE F-1. Classification matrices for each of the five discriminant functions for computed conflict versus no computed conflict

Discriminant function	Actual group	No. of cases	Predicted group: No unreported earnings	Predicted group: Unreported earnings
1	No unreported earnings	261	254 (97.32)[1]	7 (2.68)
	Unreported earnings	48	39 (81.25)	9 (18.75)
	Pct of grouped cases correctly classified: 85.11			
2	No unreported earnings	261	251 (96.17)	10 (3.83)
	Unreported earnings	48	43 (89.58)	5 (10.42)
	Pct of grouped cases correctly classified: 82.85			
3	No unreported earnings	261	253 (96.93)	8 (3.07)
	Unreported earnings	47	41 (87.23)	6 (12.77)
	Pct of grouped cases correctly classified: 84.09			
4	No unreported earnings	261	252 (96.55)	9 (3.45)
	Unreported earnings	47	45 (95.74)	2 (4.26)
	Pct of grouped cases correctly classified: 82.47			
5	No unreported earnings	261	255 (97.70)	6 (2.30)
	Unreported earnings	47	44 (93.62)	3 (6.38)
	Pct of grouped cases correctly classified: 83.77			

[1] Numbers in parentheses are percentages.

TABLE F-2. Classification matrices for each of the five discriminant functions for large versus small or no computed conflict

Discriminant function	Actual group	No. of cases	Predicted group: No unreported earnings	Predicted group: Unreported earnings
1	No unreported earnings	281	278 (98.9)[1]	3 (1.1)
	Unreported earnings	28	26 (92.9)	2 (7.1)
	Pct of grouped cases correctly classified: 90.61			
2	No unreported earnings	281	272 (96.8)	9 (3.2)
	Unreported earnings	28	28 (100.0)	0 (0.0)
	Pct of grouped cases correctly classified: 88.03			
3	No unreported earnings	280	270 (96.4)	10 (3.6)
	Unreported earnings	28	27 (96.4)	1 (3.6)
	Pct of grouped cases correctly classified: 87.99			
4	No unreported earnings	280	279 (99.6)	1 (0.4)
	Unreported earnings	28	28 (100.0)	0 (0.0)
	Pct of grouped cases correctly classified: 90.58			
5	No unreported earnings	280	279 (99.6)	1 (0.4)
	Unreported earnings	28	26 (92.9)	2 (7.1)
	Pct of grouped cases correctly classified: 91.23			

[1] Numbers in parentheses are percentages.

Appendix G: Comparison of the Predictive Qualities of Discriminant Analysis and the Model Crossmatch APINDEX for Two Comparisons of Earnings-Report Conflicts

TABLE G-1. Comparison of the predictive qualities of the APINDEX and discriminant analysis for computed conflict versus no computed conflict: claimants with a conflict probability of 0.5 or more

	APIN-DEX	Discrimi-nant function 1	APIN-DEX	Discrimi-nant function 2	APIN-DEX	Discrimi-nant function 3	APIN-DEX	Discrimi-nant function 4	APIN-DEX	Discrimi-nant function 5
Total number available for post-audit	309	309	309	309	308	308	308	308	308	308
Number selected with potential of unreported earnings	16	16	15	15	14	14	11	11	9	9
Percentage selected of total available	5.18	5.18	4.85	4.85	4.55	4.55	3.57	3.57	2.92	2.92
Number found to have unreported earnings	5	9	5	5	6	6	3	2	3	3
Percentage found to have unreported earnings	31.25	56.25	33.33	33.33	42.86	42.86	27.27	18.18	33.33	33.33

TABLE G-2. Comparison of the predictive qualities of the APINDEX and discriminant analysis for computed conflict versus no computed conflict: claimants with conflict probability of 0.25 or more

	APIN-DEX	Discrimi-nant function 1	APIN-DEX	Discrimi-nant function 2	APIN-DEX	Discrimi-nant function 3	APIN-DEX	Discrimi-nant function 4	APIN-DEX	Discrimi-nant function 5
Total number available for post-audit	309	309	309	309	308	308	308	308	308	308
Number selected with potential of unreported earnings	53	53	45	45	54	54	39	39	41	41
Percentage selected of total available	17.15	17.15	14.56	14.56	17.53	17.53	12.66	12.66	13.31	13.31
Number found to have unreported earnings	10	20	13	16	10	19	5	10	10	16
Percentage found to have unreported earnings	18.87	37.74	28.89	35.56	18.52	35.19	12.82	25.64	24.39	39.02

TABLE G-3. Comparison of the predictive qualities of the APINDEX and discriminant analysis for computed conflict versus no computed conflict: claimants with a conflict probability of 0.1 or more

	APIN-DEX	Discrimi-nant function 1	APIN-DEX	Discrimi-nant function 2	APIN-DEX	Discrimi-nant function 3	APIN-DEX	Discrimi-nant function 4	APIN-DEX	Discrimi-nant function 5
Total number available for post-audit	309	309	309	309	308	308	308	308	308	308
Number selected with potential of unreported earnings	163	163	129	129	160	160	126	126	140	140
Percentage selected of total available	52.75	52.75	41.75	41.75	51.95	51.95	40.91	40.91	45.45	45.45
Number found to have unreported earnings	28	38	27	31	31	38	21	21	23	31
Percentage found to have unreported earnings	17.18	23.31	20.93	24.03	19.38	23.75	16.67	16.67	16.43	22.14

TABLE G-4. Comparison of the predictive qualities of the APINDEX and discriminant analysis for large versus small or no computed conflict: claimants with a conflict probability of 0.5 or more

	APIN-DEX	Discriminant function 1	APIN-DEX	Discriminant function 2	APIN-DEX	Discriminant function 3	APIN-DEX	Discriminant function 4	APIN-DEX	Discriminant function 5
Total number available for post-audit	309	309	309	309	308	308	308	308	308	308
Number selected with potential of unreported earnings	5	5	9	9	11	11	1	1	3	3
Percentage selected of total available	1.62	1.62	2.91	2.91	3.57	3.57	0.32	0.32	0.97	0.97
Number found to have unreported earnings	2	2	4	0	2	1	0	0	0	2
Percentage found to have unreported earnings	40.00	40.00	44.44	0.00	18.18	9.09	0.00	0.00	0.00	66.67

TABLE G-5. Comparison of the predictive qualities of the APINDEX and discriminant analysis for large versus small or no computed conflict: claimants with a conflict probability of 0.25 or more

	APIN-DEX	Discriminant function 1	APIN-DEX	Discriminant function 2	APIN-DEX	Discriminant function 3	APIN-DEX	Discriminant function 4	APIN-DEX	Discriminant function 5
Total number available for post-audit	309	309	309	309	308	308	308	308	308	308
Number selected with potential of unreported earnings	14	14	31	31	23	23	20	20	16	16
Percentage selected of total available	4.53	4.53	10.03	10.03	7.47	7.47	6.49	6.49	5.19	5.19
Number found to have unreported earnings	5	5	5	4	4	4	6	3	5	6
Percentage found to have unreported earnings	35.71	35.71	16.13	12.90	17.39	17.39	30.00	15.00	31.25	37.50

TABLE G-6. Comparison of the predictive qualities of the APINDEX and discriminant analysis for large versus small or no computed conflict: claimants with a conflict probability of 0.1 or more.

	APIN-DEX	Discriminant function 1	APIN-DEX	Discriminant function 2	APIN-DEX	Discriminant function 3	APIN-DEX	Discriminant function 4	APIN-DEX	Discriminant function 5
Total number available for post-audit	309	309	309	309	308	308	308	308	308	308
Number selected with potential of unreported earnings	89	89	82	82	75	75	59	59	71	71
Percentage selected of total available	28.80	28.80	26.54	26.54	24.35	24.35	19.16	19.16	23.05	23.05
Number found to have unreported earnings	13	13	13	16	8	10	10	12	11	15
Percentage found to have unreported earnings	14.61	14.61	15.85	19.51	10.67	13.33	16.95	20.34	15.49	21.13

Administration and Its Financing

Comparison of Wage Record Reporting and Wage Request Reporting

Management Engineers Incorporated

Management Engineers Incorporated (MEI) was contracted by the National Commission on Unemployment Compensation to study the controversial issue of the comparative efficiency and cost effectiveness of the two unemployment insurance (UI) reporting systems—wage record and wage request. The purpose of the study was to recommend one reporting system or to outline the conditions under which each reporting system would best serve a given State.

The project's first task was to search the literature for past studies on the issue. In addition, all States were asked to provide material on the pros and cons of each system and on the conversion from one system to the other. Issues were identified from these data and from discussions with knowledgeable persons in the field.

The next step was to survey a sample of large and small States operating under different conditions to obtain data for quantitative analysis and also to interview State UI agency personnel on their perceptions of the two reporting systems. The wage request States selected for the survey were New York, Ohio, Utah, and Wisconsin. Wage record States selected were California, Georgia, Missouri, Pennsylvania, and Wyoming.

In each survey State, there was also a sample of employers who were members of the Employers' National Job Service Committee. In addition, representatives of two large multistate companies were contacted to obtain the employer's perspective, along with an indication of the relative costs and time needed to respond to reporting requirements.

Quantitative analysis was based, then, on data from the survey States, from national statistics, and from the State of Washington's continuous wage and benefit history (CWBH) files. In most cases, statistical tests were applied to determine whether the group differences between the two systems were significant. An attempt was made to explain those differences in terms of the State UI procedures and other relevant State characteristics. If the sample of values was too small for a formal quantitative analysis, then the values were simply compared. If no quantitative analysis could be made, judgments were based on the interviews and observations made during the State survey. Cost analysis relied on data from the Cost Model Management System (CMMS) and the State employment security administrative Cost Account System (CAS).

After the issues were analyzed independently, their interrelationship and the special procedures of the States were reviewed to draw overall conclusions.

This report contains a complete description of how the study was conducted, a description of the UI reporting systems in the survey States, and a detailed analysis of all the relevant issues. Because of the study's length and detail, this summary report was prepared to highlight the results.

Base Period and Benefit Eligibility

The issue here is whether the determination of eligibility, the weekly benefit amount (WBA), and the duration of benefits reflect the claimant's employment history as the UI program intends. For example, a worker's benefit rights are determined on the basis of employment in covered employment over a prior period, called the base period. The shorter the time between a claimant's base period and the date of separation from employment, the more accurately the base period will reflect the most recent employment history. Since an employer in a wage request State can be asked to give detailed information on a claimant's employment up to the time of separation, benefits can be based on more recent data than are available in wage record States. In wage record States, there is at least one quarter for which data on the most recent employment do not enter the claimant's monetary determination. This delay is due to the need to obtain and computerize the large volume of wage data from all State-covered employers.

Management Engineers Incorporated is a private consultant firm in Reston, Virginia. This report was completed in April 1980. (The full report, entitled "Comparative Analysis of Wage Record Reporting and Wage Request Reporting," is available in the microfiche collection of Government Depository Libraries.)

There are various methods or formulas used to calculate a claimant's eligibility, WBA, and benefit duration. The choice of formula and base period determines how accurately a State's program reflects the claimant's work experience. To test the effect of various base periods and benefit formulas on claimant eligibility and entitlement, a computer analysis was made of a sample of 1,113 claimant wage histories from the State of Washington's CWBH. This file was used because it contained enough data to test all formulas desired. The computer analysis was performed in the following four areas: claimant eligibility, weekly benefit amount, benefit duration, and maximum benefit amount (MBA).

These four areas were tested using three distinct base periods: the most recent 52-week period prior to the claim, the most recently completed four calendar quarters, and the first four of the last five completed calendar quarters. The base periods were selected because they are characteristic of wage request and wage record systems. The results of the analysis for the four areas are presented below.

Claimant eligibility

Only one of six formulas was found to produce a significantly higher number of eligible persons: the base period comprising the first four of the last five quarters, with an eligibility requirement of 30 weeks of work at $20 per week. The number of claimants who qualify under each of the three base periods is similar, but the total number of claimants in the sample who qualify using a more current base period is consistently greater than the number who qualify using the base period of the first four of the last five quarters. More important, however, is the impact that certain eligibility requirements have on persons who can qualify. For instance, lowering the required weeks of work increases significantly the number of claimants who qualify.

Weekly benefit amount

Using the most recent 52-week base period offers definite advantages to the claimant. Average WBA's are significantly higher under this method and result in higher total entitlements. (Actual average WBA differences ranged from approximately $2 to $5.)

Benefit duration

The average duration is nearly the same under each of the base periods tested.

Maximum benefit amount

The average MBA's are greater when the 52-week base period is used than when the first four of the last five quarters are used. Since the 52-week base period is only possible under a wage request system, this system should be adopted if the desire is to maximize claimant benefits. There are alternatives, however, for making claimants' benefits in wage record States competitive with benefits in wage request States. One alternative for increasing both the number eligible and the entitlements is to adopt the "movable base year" used in Pennsylvania. This method requires using the most recently completed four quarters for wage information if a claimant does not qualify under the first four of the last five completed quarters. This process is more cumbersome to administer than a regular wage record reporting system (but not so cumbersome as a wage request system), since it involves only a small percentage of the claimants.

A second alternative is to adopt a more liberal WBA formula, one that provides benefits comparable to the most recent 52-week base period but retains the first four of the last five completed quarters. This latter alternative does not help the new entrant, however.

Fraud

The major issue is whether one reporting system detects and deters fraud better than the other. Fraud occurs when claimants say they have a better work history than they actually have. In a wage request State, the monetary determination is based on wage information from the claimant. If the information appears reasonable, given the claimants' circumstances and occupation, the UI agency will usually not verify the claimants' affidavit. Since no other wage data are available for verification, false statements by the claimant could go undetected. In a wage record State, wage and employment duration data are normally available in the UI agency when a claim is filed. Thus, all claimant statements can be compared with employers' data.

Fraud can also occur when claimants fail to identify their employers when employment ended under disqualifying conditions. This situation occurs mainly in wage request States because claimants provide the information on employers. If claimants fail to identify employers, the agency can only do so through investigating those breaks in employment history that are not accounted for on the UI claim form. This usually is a problem only in States where separations other than the most recent help determine eligibility.

Another type of fraud occurs when claimants fail to report income earned during the period they are collecting unemployment benefits. Both systems rely on tips and the alertness of local office personnel to identify this type of fraud, but wage request States are limited to those techniques which can detect fraud in enough time to realize a good collection rate. On the other hand, wage record States can use a crossmatch method. Here, wage records of covered employers are kept in the computer for a period of four to six quarters. This makes it possible to crossmatch claims filed in one quarter with wages reported in the same quarter. Frequently, earnings and benefits will occur in the same quarter and numerous "matches" will occur. A probability index enables agencies to direct their investigations to cases with the highest probability of fraud: the cases with the greatest number of weeks claimed during a quarter and the largest amount of earnings reported by employers in the same quarter. By the time the crossmatch is completed, however, most cases have run their full duration and recoveries are difficult.

Fraud by employers occurs when an employer fails to report all taxable wages. This can occur under both systems in States using the field audit to identify employers who have not paid taxes properly. It is impossible to audit all employers, and in practice only a very small percentage are audited each year. In wage record States, the agency can use an extra option to detect this type of fraud, since all wages for employees are reported and must sum to the total wages reported. This visibility deters misreporting.

Both systems have procedures to identify joint employer-claimant fraud, where employers have established fictitious accounts or claimants have falsely applied for benefits. Both systems can also screen new employers to identify collusion in claiming an excessive number of claims.

Both reporting systems were analyzed for their capability to detect the five major types of fraud, namely: fraudulent reporting of work history, fraudulent nonreporting of work history, fraudulent nonreporting of income earned, fraudulent reporting by employers, and employer/claimant collusion and fictitious accounts.

Fraudulent reporting of work history

An analysis was made to determine if wage request States have a greater potential for increased fraud as the number of claimant affidavits increases. The affidavits were measured as a percentage of new claims. The results showed, in the States surveyed, that the greater the number of affidavits, the greater the detected fraud. Although the sample size is small, affidavits appear to be a source of fraud in wage request States.

Fraudulent nonreporting of work history

All wage request States surveyed had procedures in which claims-takers probed the claimant's work history for gaps in employment. None of these States felt there was a significant problem in this area.

Fraudulent nonreporting of income earned

The difference between the two systems in the number of fraud cases detected in this area was not significant. Detected cases were measured as a percentage of weeks claimed, as a percentage of initial claims, and per 1,000 first payments.

Although States may show a given number of cases of fraud detected, the detection methods available and inherent to the reporting system may identify mostly the important cases—that is, those involving an overpayment. The difference between reporting systems in the number of overpayments—measured as a percentage of weeks claimed—is not significant.

The dollar amount of these overpayment cases could vary significantly, so the amount of overpayments as a percentage of benefits was compared for the two reporting systems. Wage record States detected a significantly higher average amount of fraud overpayments, possibly because the crossmatch system allowed the agencies to investigate cases involving large sums of money. Also, the crossmatch method does not enable detection of fraud until 4 to 6 months after its occurrence. Consequently, the fraud continues longer before detection, and the money involved is likely to be large.

The number of fraudulent overpayments depends in part on whether the State imposes penalties or disqualifications for them; an overpayment could be due to fraud but not counted as such because no official determination was issued. This undercounting could occur if the overpayment was small or if the claimant was found to have accepted it because of some mitigating circumstance. Thus, the reporting systems were compared with respect to the number of overpaid cases as a percentage of weeks claimed, even though these data could include error as a reason for overpayment. The difference in the number of overpaid cases between reporting systems is not significant.

Regardless of the detection method, one system may detect fraud better than another simply because of greater manpower. An analysis of the number of control staff per 100,000 initial claims showed no significant difference between reporting systems.

A State may show a given number of fraudulent overpayments, but this number may not represent the State's detection capabilities. In theory, a low number of detected cases could reflect an excellent prevention system. The converse of this is also true: a poor detection system would lead to a low number. An analysis of the survey States did not support either theory, however.

To determine whether wage record States detect fraud more effectively through their use of the crossmatch, data from New York were analyzed. This wage request State now uses a wage data file for crossmatching. During the third and fourth quarters of 1978, all employers were required to submit detailed wage data. Wage data were compared with claims data provided by UI claimants, as in the wage record crossmatch system. The fraudulent overpayments identified by the normal New York fraud detection methods were increased by 17 percent through the crossmatch.

To detemine if fraud is being detected by avoiding an overpayment or decreasing the amount of overpayment, the amount of overpayments as a percentage of the total benefits was compared for the two reporting systems. The results indicated that wage record States have a better capability of detecting fraud involving large sums of money but that wage request States are more capable of detecting fraud before large overpayments can accrue.

The measurement used to determine if fraud is being detected in time—before the fraudulent parties have an opportunity to move away or hide their identity and thus avoid paying back the overpayment—was the percentage of determined overpayments eventually recovered. Data analysis indicated that wage request States recover a greater percentage of detected overpayments, since their detection systems are more timely and the overpayments involved are normally smaller.

Fraudulent reporting by employers

The survey States were asked about the ability of their field audits to analyze this type of fraud. Data on current field audits are insufficient, however, to allow firm conclusions to be drawn. The wage request States felt that fraudulent reporting by employers is not unique to their system. Because accountability for all wages paid is not required, however, the opportunity for fraud is greater. Since the wage record system is a closed-loop system, it should be more effective in preventing fraudulent reporting by employers.

Employer/claimant collusion and fictitious accounts

Under both systems, there have been conspiracies by employers and claimants as well as fictitious accounts by employers or claimants. The wage request system appears at first glance to be more susceptible to this type of fraud; in either system, however, the perpetrator(s) of the fraud must make deliberate and well-planned efforts over a significant period of time. No feature of either system is sufficient in itself to deter this type of fraud, although each uses specific programs to try to do so.

Noncompliance

Noncompliance can also result when an employer fails to adhere to UI regulations through inaction. There is greater potential for employers not to comply with the UI reporting requirements in wage request States than in wage record States. In a wage request State, employers submit wage data on an intermittent or as-needed basis. Since reporting is not routine, the UI agency may request wage data from the employer during a time when the employer is very busy and consequently unable to respond readily. In a wage record State, the employer knows a detailed wage report must be submitted to the UI agency each quarter and can plan to meet the requirement. Further, because the reports are scheduled quarterly, the employer can easily automate the reporting process, which wage request employers cannot usually do. If employers do not submit their wage data on time, the monetary determination and the benefit payments are delayed.

The limited data available showed that wage request States do have a problem in obtaining a satisfactory response from employers to wage requests. Many of these States have adequate internal procedures to control the problem so that employer delinquency is not significant.

Error

There may be greater potential for error when an employer or a claimant inadvertently provides inaccurate information or when a UI staff person transfers employer/claimant data to UI records incorrectly or misinterprets information received under one of the reporting systems. The more data that must be provided or processed, the greater the potential for error. For example, employers in wage record States may report the wrong social security number or employee name in the quarterly report. In a wage request State, the form sent to employers requesting wage information already identifies the employee's name and social security number, which reduces the potential for error. The wage record States require basically only the claimant's social security number and the name of the last employer. In wage request States, however, claimants must identify their social security number, all base-period employers, and, in many instances, the base-period work history. Administratively, wage record States must process data submitted by all employers, whereas wage request States process only the wage data required for monetary determinations.

A fluctuating workload in the agency can also affect the error rate. Wage record States have a consistent amount of data from employers each quarter, so that regular staff should be able to handle the peak loads. However, in cases of massive layoffs in wage request States, a large number of employer reports will be received and the increased workload may cause staff to become careless in trying to meet deadlines.

The total error rates for eligible claimants show no significant difference between the two systems. Error rates for ineligible claimants, however, show that wage record States have significantly poorer performance. A major source of error is the inclusion of all base-period wages.

The data from a sample of States on late first payments show that wage record States are more prone to employer and administrative error—despite their prevention techniques—than wage request States. The requirements in wage record States that employers identify employees and their wage histories each quarter result in large volumes of wage records to be processed and thus greater error rates. There was no significant difference between the reporting systems in claimnat error rates.

Claimant Burden

The burden placed on an unemployed person claiming UI benefits by the UI process can be much greater in a wage request State than in a wage record State. In the former, claimants are required to supply the names and addresses of all base-period employers. Claimants must also keep a record of their period of employment and wages earned for each base-year employer for affidavits, should an employer fail to respond to the UI agency's request for employment and wage information. If claimants forget to identify one or more of their base-year employers, this omission could result in (1) claimants not being properly qualified or receiving less than the maximum possible amount and duration, since all of their wages would not be computed in benefit entitlement and/or (2) delays in payments while attempts are made to obtain the missing information. The omissions are most likely to occur when there is high labor turnover or when the employer is in a partnership or a franchise operation, making it difficult for the claimant to know exactly who the employer is.

The burden placed on claimants in wage request States is not a valid concern, since claimants are required to supply only the names and addresses of base-period employers. More than 85 percent of the claimants have only one or two base-period employers. In many States, special procedures have been established to help the few claimants with a large number of base-period employers in reporting their wage history. Claimants in wage request States can have greater difficulty if they have to provide wage and employment-duration data for affidavits, but the majority of claimants do not have to provide such data.

Employer Burden

The burden placed on employers as a result of the reporting requirements includes:

- the time involved in retrieving wage and separation data for UI reporting requirements;
- the disruption of an office's normal routine caused by submission of wage and separation information;
- the time spent in preparing reports, depending on the format required and on whether data are prepared manually or by an automated system;
- the frequency with which the employer must submit wage data to the UI agency;
- the detail required in UI reports;
- the time period within which employers must submit the required data;
- the costs of responding to UI reporting requirements—for postage, penalties (for late reports), processing (whether manual or automated), report preparation, duplicate activity, personnel, storage space, and so on.

This burden can vary by reporting system. Under a wage record system, the employer is responsible for submitting detailed wage information on each employee with the quarterly tax report. In addition, when a claim is filed the employer may be required to submit separation information on the claim. In a wage request system, employers are responsible for providing wage and separation information only on their employees who file UI claims. Wage request employers are not required to submit detailed wage records with their quarterly contribution reports.

An analysis, based on a limited employer response, shows the following:

- The time required for data retrieval is not significant unless the frequency is high.
- The disruption to routine is not critical, except under unusual conditions.
- The time required for report preparation is greater for wage record employers than for wage request employers; however, wage record States appear to be more flexible in allowing employers to submit their reports on other UI forms, which may help to reduce the time involved.
- The frequency of reporting requirements is greater for wage request employers.
- The amount of data submitted is greater for wage record employers; however, both wage record and wage request employers must maintain equal levels of data internally, and many large employers submit wage details in some form of computer output.
- The requirement to submit reports by a certain date imposes a greater burden on wage request States.

The results, therefore, are mixed. The time required for report preparation and the amount of data in wage record States cannot be judged as significant, since both types of employers must maintain these data and employers are allowed to submit the data under a variable format. The high reporting frequency and deadlines for wage request employers are also not a critical problem. Thus, it is felt that employer burden is not a significant issue. (Note: The response from the employer survey was not adequate to compare the UI reporting costs to employers in wage record and wage request States.)

Administrative Burden

One reporting system may require less administration than the other because less time is needed to generate and process UI wage data. The less time spent per claim, the more cost-effective a system is likely to be and the more prompt the payments. Although one system may require that a larger volume of data be processed, a higher degree of mechanization may actually reduce processing time. Wage record States tend to be more mechanized than wage request States, since the latter have certain procedures that cannot be automated. Further, the staff in the wage record States that have on-line monetary capability can sometimes spend less time processing claims because they can identify problems earlier and identify ineligible claimants at the time the claim is filed.

Another administrative burden is peak loads. Whenever peak loads occur, the normal flow of work is obstructed, which can affect the ability to make timely first payments. The processing and staffing adjustments for peak loads vary according to the type of reporting system. For example, in a wage record State, four peak loads occur every year, when quarterly wage reports on every covered worker are received. For both systems, peak loads occur with seasonal fluctuations or massive layoffs. These peak loads affect the operations in either system. The peak loads in wage request States may create a greater problem, however, because of reliance on manual systems.

The relative time expended in processing claims, including time to maintain the wage data base, was analyzed in minutes per unit (MPU), the volume of data, the method for monetary determinations, and the amount of data submitted by magnetic tape. The analysis indicated that wage record States spend significantly less time on claims processing than wage request States. This fact is apparently due to the higher degree of mechanization in wage record States, which allows them to process more data in less time.

The relative effect of peak loads upon the timeliness of payments was analyzed by the number of first payments by month as a percentage of total payments for the calendar year 1978—an indication of workload; the percentage of payments that were timely by month was then calculated as an indication of the effect of peak loads. The results indicated that there is no significant difference between reporting systems.

Administrative Timeliness

Once a claim for UI benefits has been filed, each State agency must determine claimants' monetary entitlement and nonmonetary eligibility before claimants can receive their first payments. To measure each State's performance, the national office of the Employment and Training Administration established a measure of first payment time lapse for both wage record and wage request States.

To meet these criteria, both systems depend on the mail service and the timely response of employers to requests for separation information for the nonmonetary determination. For the monetary determination, wage request States also depend on the timely response of employers to requests for wage data. If a response is not promptly received, a claimant affidavit must be taken, and this extra step could also affect timeliness.

Wage request States can also be less timely in their first payments because they do not have the on-line monetary capability of many of the wage record States. The latter can speed up processing and payment of problem claims, since they can identify these claims as much as a week earlier than can wage request States.

The average performance in wage record States for timely first payments in intrastate claims is higher than in wage request States; however, wage request States have demonstrated that they can meet the timeliness criteria for intrastate claims. No statistically significant difference in the percentage of timely payments was found despite potential difficulties for wage request States in obtaining the required data. In the interstate program, however, there is a significant difference between wage record and wage request States. Wage record States have a much better performance in making timely first payments: 5 out of 11 wage request States did not meet the timeliness criteria.

Comprehensiveness of Statistical Data Base

Wage request States do not have the complete wage data base available to wage record States. Thus, wage request States may not have the information needed for internal or outside agency use. If information is required, they must find another source for it or simply forgo the activity completely.

Nearly all the information for this analysis came from the onsite surveys. The analysis indicated that a wage data base has facilitated fraud detection and research activities of UI and outside agencies, consistent with economical sharing of information among government organizations. The cost of special studies was not, however, cited as a problem. Although making information available to others is an excellent management practice, this secondary use is not its major justification.

Decentralization

There have been various opinions on the feasibility and desirability of decentralizing certain UI reporting activities. Although the arguments may be outdated in light of recent improvements in computer automation, they may still be relevant in some situations. For example, because wage records must be processed centrally, decentrailization of monetary determinations in impractical unless on-line computer capability is available. Also, decentralizing UI activities may not be desirable, since the request reporting system places the greater burden on the local office, and decentralization may not facilitate certain functions. On the other hand, decentralized monetary functions may minimize wage disputes, since the local office is in a better position to deal personally with local employers. This, in turn, could minimize the number of late payments.

The sample of States was too small for a statistically reliable analysis; however, a study of the matter raises some interesting questions about internal procedures.

- Do wage record States with on-line monetaries have lower costs?
- Are wage request States that generate computer requests from the central office more efficient?
- Is processing in wage record States of separation reports in the central office less costly and more efficient than processing them in the local office?
- Is processing in wage request States of the monetary determinations in the central office more costly than processing them in the local office?
- Does making the payment in the local office of wage record States affect timeliness?

Computerization

Under the current national policy to upgrade the level of UI computerization, it is important to determine whether one reporting system is more easily computerized than the other. Proponents of wage record systems argue that the wage record data base lends itself better to computerization and on-line processing. Wage request supporters counter by pointing out that some wage request States have automated their initial claims function and operate nearly all processing via on-line terminals. Computer sophistication could also be due to success in acquiring equipment rather than the needs of the reporting system.

Of the nine States surveyed, wage record States have greater computer sophistication. This may be due to the data processing needs inherent in the wage record system. The evidence is inconclusive on whether the wage record system is more easily computerized. With equal access to equipment, wage request States can implement an equally sophisticated system.

Operating Costs

Although one system may be more efficient, it may also be more expensive. The choice of reporting system would then depend on the value placed on factors other than cost. In summary, cost analyses show the following:

- Costs are significantly lower for wage record States, in 1978 data showing personal services and benefit dollars per claim.
- Wage record States have greater nonpersonal service costs, and the minimum difference between the two reporting systems is $0.67 per claim.
- The workloads used in the analysis portray wage request States in the best light. Wage record States fare better with an increasing workload: their average costs are reduced and savings are increased.
- Expected annual savings from converting all wage request States to the wage record reporting system (based on CY 1978 workload) are $7 to $12 million, depending on whether arithmetic or weighted averages are used.
- Expected increased annual operating costs from converting all wage record States to the wage request reporting systems are $21 to $33 million, based on CY 1978 workload.

Conversion Requirements and Costs

A complete study of the two systems requires an assessment of steps needed for conversion from one system to the other. Any recommendation to change systems without this information could lead to serious problems for the agency planning the conversion.

Conversion would impose the following UI administrative requirements: changing forms and procedures, training employees to administer the new system, educating employers so they can comply with new requirements, redesigning computer systems and installing computer program changes, and carrying over costs while the two systems are operating. The direction of the conversion and the extent of computerization in the State would dictate if and how much the above requirements would apply and the costs entailed.

The analysis indicates that converting from a wage request to a wage record reporting system could be expensive for a State if computers had to be added to the system. The problem is mitigated because computer costs are decreasing and because States can now upgrade their computer processing capabilities through such programs as Employment Security Automation Project (ESAP), which helps absorb some conversion costs. The computer sophistication of States is also a consideration: those with sophisticated programs could operate either system with little or no added equipment; those with less sophisticated programs would need more computer equipment.

The administrative requirements for conversion depend on the volume of the State's claims and the complexity of its existing operations and of those operations to which it is converting. Employer and claimant acceptance of the new system depends on the advantages it offers.

Experience Rating

The issue here is the accuracy of experience rating. Experience rating is the practice of varying the tax rate employers pay to the State according to the individual firm's experience with the risk of unemployment. With the exception of four States using a payroll variation system, each experience-rating system charges employers for claims filed against them.

There are three basic methods used to identify which employer will be charged with benefits when a worker becomes unemployed and draws benefits: charging the most recent employer, charging base-period employers in reverse chronological order, and charging employers in proportion to base-period wages. Charges to the most recent employer are made by one wage request State and seven wage record States. The remaining States or jurisdictions use one of the remaining two methods, which charge all base-period employers. Puerto Rico and the Virgin Islands are exceptions, having no experience-rating system.

If a wage record State requires charging base-period employers, then any employers the claimant had during the lag period (which would include the employer responsible for the unemployment) will not be charged at all. Therefore, the experience rate of this lag-quarter employer may be understated, and, conversely, the experience rate of base-period employers who are charged may be higher than their actual experience would indicate. This problem does not occur in a wage request State, since there is no lag quarter between the claimant's base period and time of filing the UI claim.

During the project, efforts were made to obtain data in wage record States on the magnitude of noncharging of separating employers when the claimant's employment with the separating employer occurred only during the lag period. No information was available to support any conclusion, but it would seem that the effect of this factor would be minimal, since most experience-rating systems depend on payroll totals for at least 3 years, and benefit charges for each employer and any mischarging effects would be diluted to an inconsequential point.

General Conclusions

The analysis of wage record and wage request reporting systems showed each system to have distinct advantages and disadvantages. The overriding conclusion is that a wage record system serves the needs of the UI system best. This conclusion is based upon the following considerations:

1. The base period used in wage request States serves claimants better with respect to the amount and duration of benefits, because the system is more up to date. A wage record system could overcome this disadvantage to a large degree by adopting more liberal benefit formulas to account for the effect on entitlement of the loss of the lag-quarter wages and by adopting a movable base year for new entrants who have insufficient wage credits. (A movable base year would change the base-year period to the last four completed quarters if the claimant was not eligible using the first four of the last five completed quarters.)

2. Wage record States have the potential for a more effective fraud detection program. In addition to the crossmatch, they can use all the detection techniques available to wage request States to enhance fraud detection. On average, however, wage record States have not shown a willingness to take advantage of this potential. These States apparently rely too heavily on the crossmatch and fail to use effectively many techniques developed by wage request States.

3. The employer and administrative error rates in wage record States are greater, due primarily to the large volume of wage data to be processed. These States can stress accuracy of data input to overcome this problem.

4. No excessive burden is imposed on the claimant in either system.

5. The burden for employers is greater in wage record States with respect to the time required to prepare reports and the amount of data to be submitted. This is partially offset by the flexibility of wage record States in accepting data in many formats. The burden imposed on employers by the reporting frequency and deadlines is greater in wage request States, although this problem is not critical.

6. The staff burden is less in wage record States, in spite of the time needed to maintain the wage data base, since the average time required to process claims is much less.

7. There is no significant difference between reporting systems in prompt first payments of intrastate claims; however, the wage record system is more prompt for interstate first payments.

8. The wage record data base is more comprehensive, supports more research activities and, in some States, aids outside agencies in fraud control. These findings are not of major importance, however.

9. The wage record system operates at a substantially lower total cost, even when computer costs are included.

10. Operating costs for personal services and benefits per claim are significantly less in wage record States. For nonpersonal services, costs are greater in wage record States. In the aggregate, however, operating costs are still significantly less than in wage request States.

11. Estimates based on 1978 workloads indicated that the aggregate savings of the Unemployment Insurance Service if all States were to operate under the wage record system could amount to $7 to $12.5 million per year. If all States were to operate under the wage request system, an increase in costs of $21 to $33 million could be expected. Also, as workloads increase, savings increase at an even faster rate. If the workload increased by 50 percent over CY 1978 workloads, then the estimated savings would increase by more than 75 percent.

12. Conversion from a wage request to a wage record system may not be cost-effective for every State, when the addition of computers is required. Considerations must include the existing level of computer sophistication, the volume of the State's claims, the complexity of the State's operations and of those to which it is converting, and the acceptance of the new system by employers and claimants.

There are two other considerations. First, conversion to wage record systems would support the requirements of the Interstate Benefit Project, which is designed to improve promptness, quality, fraud prevention, and administration of interstate claims. Second, annual reporting does not realize the employer savings sometimes attributed to it, since employers must still maintain and manipulate detailed records to provide wage information for claimant entitlement. In any case, employers will continue to be required to provide separation information on claimant eligibility. Unless all quarterly reporting requirements for employers were eliminated and the system was left to police itself, the gain would be minimal. Losses would include increased administrative costs, increased overpayments, and late payments that would diminish the program's quality and increase costs to the taxpayer.

The Feasibility of Alternative UCFE Chargeback Systems

Booz, Allen & Hamilton Inc.

Established in 1954, the Unemployment Compensation Program for Federal Employees (UCFE) extends unemployment compensation (UC) benefits to Federal civilian employees who are either currently unemployed or working less than full time. The program is federally funded through the U.S. Department of Labor (DOL). The DOL administers the program through agreements with 53 State employment security agencies (SESA's). The SESA's provide the program's direct services and pay benefits to eligible workers in accordance with each State's UC laws from funds advanced to them by the Secretary of Labor. UC benefits for employees of every Federal agency except the United States Postal Service (USPS), therefore, are paid from the fund administered by the DOL; the USPS is required to reimburse the DOL for benefits paid to its workers.

This report summarizes the results of Booz, Allen and Hamilton's "Study to Assess the Feasibility of Alternative UCFE Chargeback Systems for All Federal Agencies." The study was to provide an objective assessment of the likely impacts of a system that would require individual Federal agencies to pay directly for their UC costs. This study provides an empirical basis for consideration of the merits of adopting such a chargeback system.

Purpose of the Study

The purpose of this study was to assess the impact on UCFE benefit levels and administrative costs of requiring each Federal agency to pay its share of UCFE program costs directly. The study had two major objectives.

- The primary objective was to assess the feasibility, administrative costs, and benefit-payment savings achievable with a UCFE direct chargeback system.
- A subsidiary objective was to determine the most cost-effective approach to implementing such a program and then to develop the preliminary design of such a chargeback system.

To assess the cost effectiveness of a chargeback system, the data were collected and analyses conducted to obtain empirical estimates of potential benefit savings and expected additional administrative costs. To assess the requirements and cost implications of alternative chargeback systems, several possible designs were reviewed. The approach included detailed review of UCFE operations at the Employment and Training Administration of the DOL, nine SESA's, the USPS, and four other Federal agencies. A major source of information was a comparative analysis of data from 1,800 UCFE claims filed in the nine study States.

Impetus for the Study

The impetus for the study was USPS's reported savings of $13.7 million as a result of its program for active participation in UCFE processes. In December 1973, the USPS assumed direct responsibility for its UC costs. To minimize these costs, the USPS instituted several procedures to review more actively its employees' claims and, where appropriate, to raise issues and file appeals on questionable cases. As a direct result of these actions, the USPS reported benefit savings of $13.7 million in 1978.

The General Accounting Office and the Office of Management and Budget raised the issue of whether cost reductions throughout the program could be achieved if all other Federal agencies were required to cover their share of UCFE program costs. This study was undertaken to evaluate whether a UCFE chargeback system would motivate other Federal agencies to assume as active a role as the USPS, resulting in UCFE cost reductions similar to those reported by the USPS.

Booz, Allen & Hamilton Inc., is an independent consulting firm located in Bethesda, Maryland. This report was completed in May 1980. (The full, unedited version of the report, entitled "Study to Assess the Feasibility of Alternative UCFE Chargeback Systems for All Federal Agencies," is available in the microfiche collection of Government Depository Libraries.)

The study was commissioned to address three key questions.

- Can USPS's reported savings be validated, and if so, what are the actions that result in their UCFE benefit expenditure reductions?
- Is it reasonable to assume that other agencies can duplicate USPS's cost reduction activities, thereby producing benefit savings?
- How would administrative costs balance against potential benefit savings?

Motivation for Other Federal Agencies

The basic issue was whether such a chargeback system would motivate other Federal agencies to assume a higher level of participation in the UCFE program. The suggested change is based on the premise that organizations pay attention to the things that cost them money. The experience of the USPS illustrates this point. Study results showed that the USPS, following its reimbursement requirement, has assumed a more active role in the UCFE program than any other Federal agency.

- The USPS responds to the Request for Wage and Separation Form (ES 931) in an average time of 10 days, compared to 19 days in other agencies.
- More separation issues are raised on USPS claims, presumably as a result of more timely and complete separation information provided by the USPS.
- The USPS is much more active in the appeals process, initiating 20 percent of its lower level appeals and providing personal testimony in 51 percent of its appeals; other agencies initiated no appeals and provided personal testimony in less than 1 percent of their lower level appeals brought by claimants.

These findings demonstrate that the USPS is targeting its activities to the two major parts of the eligibility determination process where employers can take the initiative to ensure that ineligible workers are not permitted to claim benefits. These two major activities are (1) provision of prompt and complete wage, earnings, and separation information and (2) review of SESA eligibility notices to determine which decisions should be questioned and/or appealed.

The primary assumption behind a chargeback system is that it would motivate other Federal agencies to duplicate the active program the USPS has instituted. The result of such activities is expected to be benefit savings of the order of magnitude reported by the USPS.

It was also hypothesized that a chargeback system would produce not only the economic gain of benefit savings, but also related improvements in Federal personnel policies and procedures.

Administration

The study carefully examined major options for the administrative design of the proposed system and concluded that the most feasible approach was DOL administration of an advance allocation account. The initial study scope identified two potential designs for administration of a UCFE chargeback system. Several additional alternatives were identified during fieldwork, when State experiences with similar chargeback systems for State and local governmental agencies were examined.

As a result of these investigations, it was concluded that there were three major phases of UCFE program administration where options for operational alternatives existed. Trade-off analyses were conducted on the following options for obtaining basic eligibility information, billing Federal agencies, and funding the program:

- continuation of the current request reporting system or implementation of wage record procedures;
- direct SESA billing by each Federal agency or central billing by DOL; and
- funding by reimbursement payments made after the States pay claims or advance allocation by each Federal agency into a single UCFE account.

Following evaluation of each of these options, the study recommended a system design in which the DOL centrally administers an advance allocation account.

Cost of the Chargeback System

If the recommended chargeback system design is adopted, initial 1-year startup costs of $9.8 million and annual ongoing costs of $3.8 million are expected. Estimates of current UCFE administrative costs were developed. Using a cost buildup approach based on the staff time and resources devoted to the program by all State and Federal participants, fiscal year 1979 administrative costs were projected at $14.7 million.

Using the fiscal year 1979 costs as a foundation, likely administrative costs for two phases of system implementation were developed. Over a 1-year startup phase, administrative costs are expected to increase by 9.8 million over fiscal year 1979 costs to develop the final system design and to prepare participants for the changeover to the new system. Following the startup phase, the likely incremental increases of the fully operational chargeback system are estimated at $3.8 million annually above current administrative costs.

These cost projections put total administrative costs for the startup year at $24.5 million and total annual ongoing administrative costs at $18.5 million.

Benefit Savings

Actual benefit savings are likely to be significantly less than the projected maximum potential benefit savings, which are estimated at between $7 and $13 million annually. The major reason for considering implementation of a Federal agency-specific chargeback for UCFE is the possibility that it would result in significant reductions in the program's benefit expenditure costs. The USPS's experience provides a basis for projecting the capacity of such a chargeback system for reducing UCFE benefit costs.

The assumption that a chargeback mechanism is sufficient motivation for Federal agencies to adopt USPS's level of program participation is questionable. Study results clearly show that USPS pays much greater attention to its UCFE program than any other Federal agency. Using two independent estimating methods, the study finds that USPS's actions result in net cost reductions estimated between $1 and $4 million annually.

In the absence of other indicators of the potential level of benefit savings possible, that is, performance measures on the number of ineligibles receiving UCFE payments, USPS's level of cost reduction provides the best estimate for calculating the potential benefit savings that might accrue from implementation of a chargeback system. Based on USPS's experience, the *maximum potential* benefit savings (exclusive of USPS savings) for the UCFE program are projected to be between $7 and $13 million annually.

Actual benefit savings, however, are likely to be significantly less. This conclusion arises from a critical examination of the ability of other Federal agencies to replicate the actions that have contributed to USPS's success in reducing benefit expenditures. Benefit savings are the result of preventing ineligible claimants from receiving benefit payments they do not deserve. The USPS's cost reduction program is primarily related to two factors:

- USPS works under a cost-center concept with a profit motive that provides direct incentives for managers to review claims in an effort to minimize UCFE costs;
- USPS has a relatively centralized and effective payroll and personnel system that allows it to respond efficiently and thoroughly to the information requirements for establishing UCFE eligibility.

For the most part, Federal agencies do not share these characteristics. Furthermore, it is unlikely that the cost-saving potential from reducing UCFE benefit payments would be a sufficiently large incentive to Federal agencies to undertake the major systemic changes needed to participate more actively and effectively in the UCFE program.

Significant improvements in government personnel administration are unlikely to be achieved through a chargeback system. It was hypothesized that a UCFE chargeback system would also motivate Federal agencies to initiate actions that would improve Federal personnel and payroll practices. Such improvements however, are needed as the basis for realizing UCFE benefit expenditure savings. Rather than being possible effects of a chargeback system, such changes are the conditions necessary for Federal employers to have the resources required to eliminate ineligible claims and realize benefit savings.

Examination of the various systematic obstacles to adopting an action program to fully carry out their UCFE responsibilities that Federal agencies face shows that a chargeback system itself is unlikely to be sufficient motivation for significant improvements in government personnel administration.

Cost Effectiveness of a Chargeback System

A chargeback system cannot be demonstrated to be substantially more cost effective than the current system. To determine the cost effectiveness of a UCFE chargeback system, potential benefit savings must be weighted against expected administrative costs. The study estimates that (1) maximum potential benefit savings of between $7 and $13 million could be realized if all other agencies can duplicate USPS's experience and (2) likely additional administrative costs for the system would be $3.8 million annually for the ongoing system, again if all other agencies institute an action program comparable to the USPS.

If all other Federal agencies can and will follow USPS's model, then it is possible to expect some net savings as a result of adoption of a chargeback system. This study has seriously challenged the validity of this assumption, however.

On an economic basis, a chargeback system cannot be demonstrated to be more cost effective than the current system. Anticipated actual benefit savings are likely to be significantly less than the $7 to $13 million estimate derived from USPS's experience. This raises a possibility that actual benefit savings would only be equal to or perhaps less than the additional administrative costs for startup and ongoing operations that a chargeback system would incur. The extent to which the DOL, the SESA's, and particularly the Federal agencies are motivated to devote the administrative resources needed to fully implement the requirements of an effective chargeback system also affects the cost effectiveness of the proposed system.

Increasing Operating Effectiveness

Whether or not the chargeback system is adopted, the DOL can take actions to increase the operating effectiveness of the program. The report identifies a variety of measures the DOL can take to improve UCFE procedures, which could potentially result in some benefit savings. These measures could be implemented regardless of whether a chargeback system is adopted. Attention would focus on assisting the Federal agencies to develop strategies to overcome some of the problems that make their UCFE participation less active and effective than it should be. Specifically, the emphasis of these actions would be on helping the Federal agencies to cooperate more fully with the SESA's in identifying ineligible claims. Enhanced program effectiveness is needed and is likely to produce some benefit savings.

Employment Security Administrative Financing: ICESA Recommendations Based on an Analysis of Recommendations by Macro Systems, Inc., With Comments by the Employment and Training Administration of the Department of Labor

The Interstate Conference of Employment Security Agencies, Inc. (ICESA), was engaged by the National Commission on Unemployment Compensation (NCUC) to conduct a major study of the current administrative financing mechanisms, to review potential alternative financing approaches, and to develop recommendations for both short-term and long-term changes to the current system. ICESA undertook the study in conjunction with Macro Systems, Inc. (hereafter called Macro), its contractor. This report includes recommendations by ICESA based on an analysis of recommendations by Macro. Comments by the Employment and Training Administration of the Department of Labor (ETA) are also included.

The project had three distinct elements.[1] The first report of the project documents the current administrative financing system. It reviews the fund source, the Federal Unemployment Taxation Act (FUTA), and the budget and appropriations process. It contains analyses of the source of funding, the budget justification mechanisms, and the allocation of funds. It provides a detailed critique of the mechanisms used in each of the two major funding areas, unemployment insurance (UI) and the Job Service.[2]

The second report of the project focuses on alternative funding mechanisms that might offer merit for the employment security system. Four distinct alternative funding arrangements are described for the UI program, and three alternatives are developed for the Job Service program. Each alternative identifies the source of funds, the budget justification potentials, the resource allocation mechanisms, and the management relationship between the Federal and State partners.

The third report of the project includes short-term and long-term recommendations. The subcontractor, Macro, was instructed to develop independent recommendations based on appraisal of the data. The Interstate Conference also was requested to develop recommendations, responding in part to the recommendations offered by Macro, but also going beyond them where appropriate. This present report contains those recommendations.

The first section of the present study makes short-term recommendations on current administrative financing mechanisms. In this section ICESA's recommendations are printed in roman type; any changes or additions to the Macro analysis of the problem or to Macro's recommendations are printed in italic type under the heading "Note" and follow the ICESA position.

The second section identifies a series of improvements, called "Intermediate Recommendations," that can be effected within the current financing system. This section is, with one exception, solely that of ICESA, and it is printed in roman type. The one exception is Macro's long-term recommendation for funding the Job Service by using the multitier alternative, which Macro describes. ICESA adopted that recommendation as an intermediate recommendation. Thus, it is placed in the "Intermediate Recommendations" section and also appears as model 4 in the section entitled "Macro's Long-Term Recommendations."

The next section of this present report contains these

The Interstate Conference of Employment Security Agencies, Inc. (ICESA), has a membership made up of the heads of all State employment security agencies (SEA's). Macro Systems, Inc., is a private consulting firm. This report was completed in May 1980. The report was originally submitted as two separate reports, one by ICESA and the other by Macro Systems, Inc. The ICESA report is entitled "Recommendations of ICESA," and the Macro Systems report is in two volumes entitled "Description and Critique of Unemployment Insurance Service and Job Service Grants-to-States Funding" and "Conclusions and Recommendations on Employment Security Administration Financing." Both reports are available in the microfiche collection of Government Depository Libraries.

long-term recommendations. Basically, Macro has suggested giving States a large portion of Federal tax money, which the States would be responsible for administering. The Interstate Conference of Employment Security Agencies did not adopt this idea. Instead it recommended strengthening the present system, rather than replacing it with the fundamental changes Macro has suggested. Nevertheless, the Interstate Conference suggested in "Concept for Further Conference Study" that the States give further consideration to the changes Macro recommended.

The final section of this present report contains the comments made by the Employment and Training Administration of the Department of Labor (ETA) on the Macro short-term recommendations.

Short-Term Recommendations

I. General Financing of Systems

A. Adequacy of administrative resources

Nature of problem. The vast majority of funds provided to administer the employment security system are generated through a tax on employers. The Federal Unemployment Tax Act (FUTA) requires all employers having one or more employees to contribute payroll taxes for them. These funds are available solely for providing sound and effective administration of the UI system and the public employment service; paying certain extended unemployment compensation (UC) benefits; and providing a Federal loan fund, from which States may borrow to pay regular benefits. The amount of the FUTA revenue obtained is a function of the wage base upon which the tax is levied, the tax rate, and the number of covered employees.

Under current law the wage base is fixed at $6,000, requiring each employer to pay a percentage of the first $6,000 in wages paid to each employee. The fixed dollar amount of the wage base lacks flexibility and reduces the responsiveness of the FUTA process to generate sufficient receipts to meet administrative costs, particularly in periods of serious recession. Studies have repeatedly suggested that a flexible wage base, tied to some inflation-sensitive index, would provide a sound financing base with a higher degree of responsiveness than exists with a fixed wage base.

Recommendation. For the FUTA fund to attain more responsiveness and to ensure that adequate resources are available, we recommend that Congress enact legislation establishing the FUTA wage base at 66⅔ percent of the national average annual wage in covered employment.

Note

Macro's analysis of the problem and its recommendation were adopted by ICESA without any changes or additions.

B. Administrative financing for noncontributory employers

Nature of problem. With the passage of Public Law 94–566, substantial numbers of employees were brought under coverage of the Federal-State UI system. Prior to the enactment of this law, employees of State and local government entities were not covered by State UI programs. All such individuals are now guaranteed the same UI protections as private-sector workers in each State. Additionally, employees of certain nonprofit organizations were provided with similar unemployment compensation (UC) coverage and benefits.

The Federal law assumes that employers in the public sector are expected to be more stable and provides that these employers need not contribute to the State benefit trust funds to finance the payment of benefits to claimants. Rather, government entities are allowed to elect the option of reimbursing the State trust funds on a dollar-for-dollar basis. Furthermore, there is *no* requirement that government entities or nonprofit employers contribute FUTA taxes for their employees. Therefore, the full administrative costs of providing UI and public employment service to the employees of noncontributing employers is absorbed within existing fund availability; in reality, employers in the private sector, who are charged FUTA taxes, are financing the administrative costs of providing employment security services to both public- and private-sector employees.

The recent and substantial pressure on the FUTA fund is, at a minimum, partially due to the increased costs of providing services to the employees of noncontributing employers. Since noncontributing employers share equally in the benefits of the system, some provision for them to share in the administrative costs is justified.

Recommendation. In order to guarantee that public and private nonprofit employers contribute their fair share to the administrative costs of the employment security system, we recommend that

1. The Employment and Training Administration (ETA) reexamine the employment stability of public and private nonprofit employers and develop an estimate of the administrative costs to the system of supporting these employers; and that

2. Congress enact legislation that provides for funding sources other than the FUTA to the Employment Security Administrative Account (ESAA) covering all employment excluded from the FUTA contributions.

Note

The Macro analysis of the nature of the problem was accepted without any change or addition by the ICESA. The ICESA adopted Macro recommendation 1 without any changes or additions. Macro recommendation 2 read: "In order to guarantee that public and private nonprofit employers contribute their fair share to the administrative costs of the employment security system, we recommend that: (2) Congress enact legislation that provides general Federal revenue contributions to the Employment Security Administrative Account covering all employment excluded from the FUTA contributions." Thus, while the ICESA opted for funding sources other than the FUTA, Macro had suggested that general Federal revenue contributions be used.

C. Administrative financing for new Federal compensation programs

Nature of problem. In recent years a number of special worker-protection programs have been enacted to provide enhanced protection to certain workers impacted by national policy decisions. Such are the Redwood Employee Protection program, the Airline Deregulation Act program, and the Trade Adjustment Assistance Act (TAAA) program. Currently, the administrative costs of these programs are funded from FUTA revenues.

Two other federally enacted programs, the Extended Benefits and Federal Supplemental Benefits programs, provide additional unemployment compensation benefits to workers during periods of high or catastrophic unemployment. (While the Federal Supplemental Benefits program is no longer in existence, it is anticipated that a new program of a similar nature will emerge shortly.) The administrative costs and part or all of the benefit costs of these programs have been also funded from FUTA revenues.

Finally, the Disaster Unemployment Assistance program, which triggers into effect immediately following a declared natural disaster, provides UC benefits to individuals not covered by regular State UC programs. Therefore, the self-employed, certain agricultural workers, and certain domestic workers are afforded an economic cushion when their unemployment results from a natural disaster. Again, the administrative costs are funded from FUTA revenues.

Each of these special Federal programs provides benefits and protections that go beyond the scope of the basic employment security programs authorized through the Social Security Act and the Wagner-Peyser Act. Each program is characterized by unique procedural requirements, each with attendant costs, which have contributed dramatically to the complexity and burden of employment security operations in recent years. Since the purpose of these programs is to address the special needs of workers under conditions that are national in scope, the administrative costs are also a national responsibility.

Recommendation. To address the responsibility of administrative funding for special worker protection programs, we recommend that Congress enact legislation that provides general Federal revenue contributions to the Employment Security Administrative Account (ESAA) for the administrative costs of these programs.

Note

ICESA adopted Macro's analysis of the nature of the problem and its recommendation without any change or addition.

D. FUTA and general revenue funding for the Job Service

Nature of problem. The Wagner-Peyser Act authorized the creation of a public employment service to provide a labor exchange for the employers and workers of the United States. The language in the Act is sufficiently broad to have allowed the mission and objectives of the public employment service to respond to changes in the labor market. In 1970 the Congress addressed itself to the responsibility of employers and citizens to finance the programs now administered by the Job Service. Special notice was taken of the expanded programs aimed at the disadvantaged, the non-job-ready, and the recipients of transfer payments (i.e., welfare clients and food stamp recipients). The Congress provided that the President should set the mix of FUTA and general revenue funds to take into account expansion of Job Service responsibilities beyond the basic labor exchange functions originally authorized by the Wagner-Peyser Act.

While the proportion of general revenue provided to administer the Job Service has been as much as 15 percent of the total costs in recent years, that amount presently has been reduced to 3 percent. The fundamental factor determining the level of general revenue contribution to Job Service administration has been the ratio of covered workers to the civilian labor force; hence, with 97 percent of all workers now covered, the FUTA share of Job Service funding is 97 percent, and the general revenue share is 3 percent.

If the programs operated by Job Service in 1970 and at present are examined, it is clear there have been *no* reductions in the services to special applicant groups. In fact, there have been consistent productivity and service increases without the provision of additional resources for the targeted services to special applicants. In light of the congressional concern that general revenue funds be available to finance the administrative costs of such programs, there should be a review of the current fund mix.

Recommendations. We recommend that the ETA

1. Reevaluate the appropriateness of the current FUTA to general revenue financing mix in light of the 1970 amendments; and

2. Recommend that the Administration increase the Federal general revenue contribution to Job Service funding.

Note

ICESA adopted Macro's analysis of the nature of the problem without any changes or additions. ICESA adopted Macro's first recommendation but did not accept the following language contained in Macro's second recommendation: "We recommend that the Employment and Training Administration: recommends to the Office of Management and Budget a reduced share for the FUTA contribution to Job Service funding." ICESA asked the Administration for an increase in the Federal general revenue contribution to fund the Job Service.

E. Cost of Treasury fees

Nature of problem. The U.S. Treasury acts as an agent for the employment security system in the quarterly collection and accounting of FUTA receipts from employers. In addition, the Treasury handles the authorization, accounting, control, and disbursement of funds to the employment security system.

Recommendation. In light of the substantial annual cost of Treasury ($38 million) services, we recommend that ETA reassess the costs and benefits of such services in terms of their appropriateness and quality, as well as in comparison to alternative service-delivery options.

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendation on Treasury fees but deleted the following language on Postal fees:

> *The employment security system is currently provided with indicia privileges and charged a negotiated sum for postal services each year. The use of the indicia relieves the employment security system from the use of stamps, meters and other mail cost accounting machinery. It provides first class mail priority for benefit checks, priority mail, and correspondence.*
>
> *However, because the indicia is readily available, items of a nonpriority type have frequently been sent first class also. Until recently, there may have been little incentive to send items second or third class mail.*

The Macro recommendation on this read:

> *In light of the substantial annual cost of both Postal ($57 million) and Treasury ($38 million) services, we recommend that the Employment and Training Administration reassess the costs and benefits of such services in terms of their appropriateness and quality, as well as in comparison to alternative service delivery options.*

In the recommendation, ICESA specifically deleted the Macro reference to the "substantial annual cost of Postal services ($57 million)" and by omission did not consider any alternative to the postal service for delivery.

F. Complexity of Employment and Training Administration allocation methods

Nature of problem. Congress appropriates Grants-to-States resources in three categories: UI, Employment Service, and contingency. In recent years, however, the allocation of these resources to the States has become increasingly complex and restrictive as well as being constantly under revision. Presently, the allocation of these resources is accomplished through no less than 10 processes and models. This complex of mechanisms has resulted in increased confusion and frustration in understanding funding concepts, incentives, and mechanisms; more restricted flexibility in the use of resources; and added information and reporting requirements to support the funding process.

Recommendation. We recommend that the Employment and Training Administration, in considering changes to the current allocation system, endeavor to adhere to the following objectives:

1. Provide consistency in funding concepts from year to year, avoiding annual tinkering.

2. Attempt to simplify rather than complicate the mechanisms that allocate resources.

3. Strive to minimize the data and reporting requirements necessary to support the allocation system.

4. Provide maximum flexibility to the States in the use of resources.

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendation without any changes or additions.

II. UI Financing

A. Acceptance and funding of cost model

Nature of problem. The Employment and Training Administration and the State employment security agencies have expended a great deal of time and resources to develop and refine a workable UI cost model. However, with the exception of the first year of operations in 1975, the Office of Management and Budget has refused to fully fund the productivity factors reflected in the State's cost-model studies. Accordingly, the cost model has been used primarily as a tool to adjust State productivity factors to allow allocation of a smaller than needed pool of resources. The result of this adjustment process for FY 1980 is that budgeted productivity factors are on the average 5 percent less than actual productivity factors. This arbitrary tinkering with State productivity factors significantly undermines the credibility of the cost-model concept and raises serious questions about the utility of expending the large amount of resources needed to support the cost model system.

Recommendation. After examining numerous other Federal assistance programs, we believe that the cost model represents a sound and effective concept for funding UI activities and allocating UI resources. Therefore, we urge the Employment and Training Administration to pursue, with Office of Management and Budget agreement and acceptance, a cost-model basis for justifying needed resources, recognizing that the employment security system must be prepared to demonstrate

1. an effective system for validating workload counts and eliminating inefficient procedures,
2. periodic restudy of productivity factors among the States, and
3. a relationship between full funding and quality and cost-effective performance.

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendation without any changes or additions.

B. Correlation between funding and program performance

Nature of problem. The current UI budgeting and resource allocation system is primarily oriented toward increased productivity and cost efficiency. Concerns about program quality and cost benefit are not directly integrated into the current UI funding mechanisms (i.e., State funding is not tied to better or poorer program performance or management). Similarly, there are no State financial incentives in the current system for cost efficiency. In fact, it could be argued that under the current system there are disincentives for efficiency, because the cost savings from productivity improvements are fully recaptured by the Employment and Training Administration when a cost-model restudy is completed, and wide variances in State productivity factors are acknowledged and financed by current funding approaches.

Recommendation. In recognition of these shortcomings, we recommend that the Employment and Training Administration explore alternative ways in which States can

1. share in the savings generated by productivity improvements and
2. receive additional financial resources for achieving specified levels of program quality.

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendation without any changes or additions.

C. UI workload estimating

Nature of problem. The UI program is funded at both a base and a contingency level. The base level of funding was originally intended to provide the system with a stable work force of permanent, trained staff. The contingency level supports a temporary or intermittent staff that can be brought on board quickly during times of rapidly increasing workload. However, the estimation and definition of base and contingency workload by the Office of Management and Budget has resulted in the following:

1. A historical underestimating of the tax function workload
2. An artificially low definition of base workload tied to the Administration's assumptions about anticipated level of unemployment

Recommendation. In recognition of these historical problems, we recommend that the Employment and Training Administration reach agreement with the Office of Management and Budget on a definition and basis for the estimation of base and contingency workload that is consistent with the concepts used in the allocation of UI resources to the States (i.e., at a minimum 100 percent of each State's low quarter activity).

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendations without any changes. ICESA added the explanation in parentheses that was not part of Macro's recommendation "(i.e., at a minimum 100 percent of each State's low quarter of activity)."

D. Adjustment of State time factors

Nature of problem. As a result of the consistent underfunding of cost-model time factors during the budget formulation process, the Employment and Training Administration is forced annually to adjust State minutes per unit (MPU) to reflect the financial shortfall. Each year the Employment and Training Administration has experimented with a variety of methodologies (e.g., range setting, clustering, high MPU cost reduction) that have been applied to one or more UI functions to accomplish the necessary MPU adjustment. The net result is that there has been no consistent policy or approach followed by the Employment and Training Administration in the adjustment process, leaving the States in the position of annually speculating on how their MPU will be affected, and confidence in the cost-model concept is further undermined.

Recommendation. We recommend that, until full funding of the cost model is obtained, the Employment and Training Administration should attempt to be consistent from year to year in its approach to adjusting State time factors.

Note

ICESA adopted Macro's analysis of the nature of the problem and recommendation with a change in the title of the section and in the first sentence. Macro had called this section "Adjustment of State Productivity Factors." ICESA substituted the word "time" for "productivity" in the title and in the first sentence. Macro's first sentence under "Nature of the problem" read:

> *Due to consistent underfunding of cost model productivity factors during the budget formulation process, the Employment and Training Administration is forced annually to adjust State Minutes Per Unit (MPU's) to reflect the financial shortfall.*

E. Funding of contingency workload

Nature of problem. UI administrative funding needs to be flexible and responsive in order to provide proper funding levels as the workload fluctuates during the year. The basic approaches in place in UI theoretically could provide for necessary fund flexibility during the year; however, the cumulative effect of a single-year base appropriation, the quarterly recovery of the lesser of earned or used positions, and line-item budgeting of UI support and administrative dollars is a system that provides limited administrative flexibility. Although recent changes have allowed for the retention of 50 percent of excess earnings each quarter, UI administrators are still faced with the dilemma of operating not on an annual, but on a quarterly, funding basis. Even under the current contingency-funding approach, State administrators are forced to speculate that a workload will materialize in a given quarter to justify the addition of intermittent staff. If they gamble correctly and the workload is accomplished, appropriate funding is provided. However, if they overstaff offices, they must absorb the overrun. Furthermore, if they understaff offices, typically, either the quality of service deteriorates or the workload is backlogged. If the workload is accomplished at the cost of quality, the contingency-funding process produces a "phantom windfall" (i.e., greater earnings than usage).

Furthermore, although the Employment and Training Administration has recently supported the position that the contingency workload be funded at 100 percent of a State's MPU, current Employment and Training Administration funding mechanisms assume that the contingency workload should be funded at reduced levels of support (7 percent), administration (2 percent), and nonpersonal services (5 percent).

Recommendation. In recognition of these problems, we recommend that the Employment and Training Administration

1. modify the policy of "quarterly recovery" and make no quarterly recovery until the third quarter of each fiscal year;

2. establish, as a permanent policy, the retention of 50 percent of contingency earnings over usage by the States; and

3. reexamine the accuracy of the assumptions for reduced support, administrative, and nonpersonal service levels for the contingency workload in light of data available from the "Administrative Staff and Technical/Non-Personal Services Study."

Note

ICESA adopted all of Macro's analysis of the nature of the problem without any changes or additions. ICESA made several changes in the recommendations. Macro's first recommendation read as follows:

> *In recognition of these problems, we recommend that the Employment and Training Administration reexamine its policy of "quarterly recovery" and "funding of lesser of earnings or usage" with respect to their benefits and timing in contrast to their adverse impact on program planning, stability, and responsiveness.*

ICESA added the second recommendation shown above; it did not appear in Macro's recommendations. The third recommendation listed above was accepted without any changes or additions.

III. Job Service Financing

A. Adequacy of Job Service funding

ICESA does not recommend including the following analysis of the nature of the problem or the recommendation as a short-term recommendation.

Note

Macro analyzed the problem as follows:

Nature of problem. *An adequate level of funding is clearly one of the most difficult and perplexing problems facing the Job Service. Closely allied is the issue of what the Job Service should be doing relative to what it is doing. The broad language of Wagner-Peyser leaves the Job Service with its doors open to all applicants. The Social Security Act implies that the Job Service administer the UI tests of claimant's work availability, and further implies that the Job Service be available to employees in covered jobs to assist in an active search for work. Since 1966, the Presidential budget proposals have not recommended a staffing level of more than 30,000 positions for the Job Service despite a 32 percent growth of the labor force and an increased use of the Job Service by both employers and job seekers. Clearly, since 1966, the Job Service's ability to maintain its relative capability as labor market intermediary and work test administrator has been slowly, but surely, eroded. However, without clarification of the mission, objectives, and target populations to be served by the Job Service, no specific assessment of the adequacy of the 30,000 staffing level or of the current allocation approach can be made.*

Recommendation. *In order to resolve the standstill funding of the Job Service, which has persisted since 1966, we urge Congress to conduct a thorough examination of the mission, objectives, and target population to be served by Job Service and to develop a sound and appropriate basis for funding the program.*

B. Diversion of Job Service resources

Nature of problem. A comparison of today's Job Service with the relatively simple program initiated by the Wagner-Peyser Act reveals a complex program saddled with Executive Orders, public laws, interagency agreements, and court orders. The original labor exchange orientation of the Job Service has experienced many changes and diversions from the basic legislative mission set forth in the Wagner-Peyser Act. Many of these add-on program mandates are neither explicitly funded from a prescribed appropriation nor directly related to the Job Service's original charter. In fact, it can be argued that some of the activities associated with enforcement, compliance, and mandatory registrant functions present a conflict with basic Job Service objectives.

Recommendation. The problems associated with the appropriateness of the Job Service performing specified functions needs to be addressed by the Employment and Training Administration in considering Wagner-Peyser reform legislation. However, in our attempt to resolve the immediate funding problem associated with the diversion of Job Service resources, we urge the Employment and Training Administration to

1. secure from the Department of Agriculture and other mandatory registrant programs resources equal to the full cost of providing "work test" related services and

2. establish a unit cost for each required enforcement and compliance service (e.g., alien certification, migrant, seasonal farm workers activities, etc.) and to seek appropriate resources from Congress to fund these activities-forecasted workloads.

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendation without any changes or additions.

C. UI work test administration

Nature of problem. Like all income transfer programs, UI is hampered by ambivalent public attitudes toward the work requirement. This ambivalence manifests itself, for example, in the enactment of strong laws with little funding for their implementation. Another example is the enactment of multitiered appeals systems that prevent prompt disqualification from benefits.

The UI work test includes two distinct objectives: (1) providing effective job-finding services to assist the claimant job seeker and (2) providing motivation and/or sanctions where the claimant fails to make an adequate search for work.

Based on these objectives, the effectiveness of the UI work test cannot be measured adequately by Employment Service placements or registrations. Instead, the appropriate outcomes of the UI work test are: entered employments with other than the previous employer; average duration of claims; and weeks of disqualification for lack of an active work search or not being able and available for work.

Financing for UI and the Employment Service has generally been inadequate to accomplish the work test. At present the UI budget includes only 1,300 positions to monitor 3.2 million workers per week (on the average) for work-test activity. Employment Service staffing has been frozen at 30,000 positions for 15 years, and funding formulas have disincentives for providing services to claimants. The emphasis on quantity under the Resource Allocation Formula (RAF) has been a detriment to providing assistance for claimants who have no readily marketable skills. In addition, time spent by the Employment Service staff on potential disqualifications may actually reduce the State's allocation.

Recommendations

1. As the statewide labor exchange, the Employment Service is the logical vehicle to perform the statewide UI work test. The Employment and Training Administration should provide sufficient funding and strong funding incentives to enable the Employment Service to provide effective job-finding services to all claimants who are not subject to short-term recall by their former employers. The original rationale for using Federal Unemployment Tax Act (FUTA) financing for the Employment Service is still sound: to provide effective job-finding services to claimants and a nationwide labor exchange to fill employer vacancies, thereby minimizing frictional unemployment.

2. State agencies should provide a joint UI/employment service work test, in accordance with State law, that takes into account the conditions of the local labor market, the claimant's skills and experience, and attachment to the previous employer or industry.

3. The concept of contingency funding should be extended to the work test, including both Employment Service placement services and UI eligibility review.

Note

The material in the preceding section is completely that of ICESA.

IV. Administration, Staff, and Technical/Nonpersonal Service Financing

A. Adequacy and flexibility of Administration, Staff, and Technical/Nonpersonal Service (AS&T/NPS) funding

Nature of problem. Aside from the resources provided for UI and Job Service personnel, the States receive resources to finance the administration of the agencies, to ensure that adequate technical and staff services (AS&T) are available and to fund the cost of premises, equipment, supplies, and other overhead costs (NPS). Historically, the functions and activities funded through the AS&T/NPS allocation have been the subject of much debate and even greater confusion among the States. Furthermore, there has been no method available to document or justify resource requirements in the States or to guarantee equity in allocating the available resources.

Through a major study, an analysis of the AS&T/NPS environment, several problems have emerged that must be addressed, including the following:

1. Non-grant-funded activities, such as the Comprehensive Employment and Training Act (CETA) programs, the Food Stamp program and the Disabled Veterans Outreach program, reside in State employment security agencies, but they do not pay their full share of AS&T and NPS costs.

2. No methodology has previously been available for recognizing the legitimate difference in the cost of doing business faced by State employment security agencies in various regions of the Nation.

3. There have been no mechanisms in use that recognize the cost-effective use of NPS resources by States or that permit a State to share in reduced systemwide costs (e.g., leave/purchase cost savings).

4. Inadequate and inflexible funding in the NPS areas has forced States to convert a significant number of program positions to cover the funding deficiency.

Recommendation. Both the Employment and Training Administration and the Conference have agreed that the adequacy of Administration, Staff, and Technical and Nonpersonal Service (AS&T and NPS) should be addressed. In recognition of the problems just identified, we urge the Employment and Training Administration to consider the following recommendations:

1. Establish appropriate funding objectives and mechanisms to ensure that all non-grant-funded programs contribute a full and appropriate share of the cost of required administrative and nonpersonal service activities.

2. Revise the current AS&T/NPS allocation system to more clearly define the functions and activities funded, recognize legitimate cost differentials among the States, provide for a sharing of the cost savings of prudent investment decisions, and provide States needed flexibility in the use of AS&T/NPS and program resources.

3. Reassess the size of the current AS&T/NPS resource pool and attempt to fund the pool at a level that closely approximates the level of need experienced in the States.

Note

ICESA adopted all of Macro's analysis of the nature of the problem and recommendations without any changes or additions.

B. Use of Reed Act funds

Nature of problem. The Reed Act provided that funds be made available to individual State accounts when the statutory limits in all other FUTA fund accounts had been reached. Reed Act funds could be used to pay State UI benefits or for the improvement of a State's employment security system. Accordingly, many States have prudently utilized Reed Act funds to make major capital purchases, primarily of premises. These investments have resulted in substantial cost savings to the entire employment security system from reduced expenditures for facilities. For example, in FY 1977 approximately $11.5 million was spent for building purchases and capital improvements. The comparable rental costs for leasing the same space would have been about $35.4 million. The $24 million difference is a crude indicator of the savings that accrued to the system as a result of these Reed Act expenditures.

The Employment and Training Administration's interpretation of the Title IX language in the Social Security Act requires any State with a Reed Act balance to expend that balance prior to receiving loan funds to pay UI benefits. Therefore, many States that needed loans in 1974–75 had to draw down their Reed accounts and have not been able to replenish those accounts upon repayment of their loans.

Recommendation. We urge the Employment and Training Administration to seek reauthorization of the Reed Act and, if necessary, modify the current policy on Reed accounts, with a view toward allowing borrowing States to replenish their Reed accounts upon repayment of any outstanding loans. Requirements could provide that a State's trust fund balance reach an actuarially acceptable level prior to the refinancing of the Reed account. Given the potential cost saving available to the entire employment security system, it would appear wise to encourage the rebuilding of previously exhausted Reed accounts.

Note

ICESA adopted all of Macro's analysis of the nature of the problem. ICESA adopted all of the recommendations Macro made except for the first sentence. Macro's first sentence in the recommendation read:

> *We urge the Employment and Training Administration to give serious attention to the current policy on Reed accounts, with a view toward allowing borrowing States to replenish their Reed accounts upon repayment of any outstanding loans.*

ICESA's language in the first sentence of the recommendation is more specific: ETA should "seek reauthorization of the Reed Act and, if necessary, modify the current policy on Reed accounts. . . ."

V. Automatic Data Processing Financing

A. Funding for automation

Nature of problem. The use of automation to support operational and management information requirements in employment security has been increasing steadily since the early 1960's. The Employment and Training Administration's active encouragement and support of the use of automation has resulted in a substantial increase in automated capabilities throughout the system. However, there are two major problems of budget justification with respect to past and current approaches used by the Employment and Training Administration to finance automatic data processing (ADP) operations. First, the Office of Management and Budget has criticized the Employment and Training Administration for not knowing the cost and composition of ADP operations in the States and thus has been reluctant to support additional funding for ADP. Second, the General Accounting Office has criticized the Employment and Training Administration's approach to the Employment Security Automation project, stating that the methods of automation advocated by the Employment and Training Administration have not been properly "planned, tested, or evaluated," and thus recommended a halt to funding the Employment and Training Administration's approach to the Employment Security Automation project.

Recommendation. Macro feels strongly that increased levels of automated capabilities are critical if the employment security system is to be cost-effective in responding to future claimant, applicant, and employer workloads. Therefore, we urge the Employment and Training Administration to continue to pursue increased funding for the design and implementation of automated State Employment Security Administration systems from the Office of Management and Budget and Congress. Furthermore, the States must be willing to support the Employment and Training Administration in the demonstration of the cost/benefit or cost-effectiveness of the systems advocated as well as in the collection of more comprehensive information on the cost and composition of ADP operations in the States.

Note

ICESA adopted all of Macro's analysis of the problem and recommendation without any changes or additions.

B. Allocation of automatic data processing (ADP) resources

Nature of problem. Funding of basic State employment security administration automatic data processing (ADP) operations traditionally has come from a variety of sources without a clear definition of what functions or activities are funded from which sources and in what amounts. Furthermore, the Employment Security Automation project, while providing financial incentives for development of automated systems, provided no mechanisms for converting program position resources to cover increased automation costs. Also, the allocation of existing ADP resources is historically based; and current allocation mechanisms are not directly sensitive to funding changes caused by implementation of the Employment Security Automation project type of systems, acquisition or transfer of ADP equipment, and changes in the method of providing ADP services.

Recommendation. In order to resolve the confusion and inequity that exists in the current allocation of ADP resources, we recommend that the Employment and Training Administration refine the current system for allocating ADP resources to more clearly define activities funded and to be more directly sensitive to resource needs caused by implementation of automated systems, acquisition or transfer of ADP equipment, and changes in method of providing automatic data processing services.

Note

ICESA adopted all of Macro's analysis of the problem and recommendation without any changes or additions.

Intermediate Recommendations

Both the ICESA Administrative Finance Committee and the ICESA Board of Directors are concerned about the increasing Federal involvement in detailed employment security operations. The principal concerns relate to the adequacy of funds and the lack of financial management flexibility. The Federal partner uses control of the purse strings as the means of establishing operating-level procedures and program priorities. The original concept of a State-Federal partnership envisioned decisions of this kind as being made best at the State level. ICESA fully supports continuation of the State-Federal partnership but believes that substantial changes are necessary to restore balance between the partners. Following are changes that the ICESA recommends for sound administrative funding of the employment security system.

I. Unemployment Insurance (UI)

1. The Department of Labor's (DOL) budget request for the financing of the State UI programs should be based on current cost-model time factors and State-by-State workload data.

2. National base funding (permanent staff) for UI should be no lower than the sum of each State's lowest-quarter staff projected for the year.

3. Above-base UI workload should be funded using the same time factors, management support, and nonpersonal services as the base budget.

4. States should have the flexibility to shift UI funds among various functions and among quarters within a fiscal year.

II. Employment Service (ES)

Of the four alternatives presented by Macro (under long-term recommendations), the multitier alternative is recommended as an intermediate recommendation because it brings together the existing policies of the ICESA. That alternative encompasses the following concepts:

1. Funding for the Employment Service (ES) would be derived from both the Federal Unemployment Tax Act (FUTA) and Federal general revenues, as at present.

2. FUTA would fund the basic labor exchange, which includes comprehensive employer and applicant services necessary to match workers with jobs.

3. General revenues should be continued to fund special programs for members of such targeted groups as welfare recipients and disabled veterans.

4. Non-labor-exchange services such as enforcement and compliance actions should be funded from general revenues instead of the FUTA.

5. The budget for the basic labor exchange should be expanded on the basis of both demonstrated results and the need for services. Evidence suggests that reducing the length of unemployment by as little as 1 day has a significant measurable impact on the gross national product. Since 1966 the civilian labor force has increased by approximately 39 percent, unemployment compensation coverage has expanded, and the budget for providing services to claimants and applicants has not been increased to meet the needs of these individuals.

6. The special services budget, including items such as WIN for welfare recipients, should be expanded. Other activities such as special youth initiatives should be established and funded on the basis of workload.

7. Funds for basic labor exchange service should be allocated to States principally on the basis of need with a productivity incentive. Funds for the special services and other activities should be allocated on the basis of the projected workload.

8. Greater flexibility must be provided in developing program budgets to improve service and coordination with other activities at the State and local levels.

Long-Term Recommendations

Concept for Further Conference Study

The following proposal was reviewed by the ICESA membership and rejected as a long-term recommendation. The ICESA Board of Directors felt, however, that it should be presented with other administrative financing material as a concept for future Conference study.

The Interstate Conference is committed to the principle that all workers be protected by UI and have access to a nationwide public employment service. The employment security system has proven its worth to the Nation for over 40 years. In making the following recommendations for changes to the system, the Conference has a twofold goal. First, the Conference seeks to provide a structure that will permit greater responsiveness and accountability to both program recipients and those who finance the system. The Conference believes that the interests of both workers and employers will be better served by placing decisionmaking authority closer to those affected by those decisions. Second, the Conference seeks to decrease administrative expenditures. Millions of dollars can be saved by returning to the simple, clear relationship between the States and the Federal Government that was a founding principle of the employment security system.

To address these problems and to provide a sound long-term budget system, the following general concepts are recommended:

1. The Federal/State partnership should be retained but with the State role being restored to that envisioned when the program was adopted.

2. The appropriate role of the Federal partner would be to

a. establish statutory conformity standards for a nationwide employment security system, including retention of a statewide job placement service within a nationwide placement network, a UI system within each State network, and labor market information activities;

b. insure State conformity with those standards through retention of a Federal tax penalty on employers;

c. maintain the extended unemployment compensation and Federal unemployment benefit accounts, administer the Federal portion of the Extended Benefits program and other Federal unemployment compensation programs, and offer assistance to States experiencing a funding shortfall during national economic downturns; and

d. maintain and administer a loan fund to provide temporary assistance to States experiencing a funding shortfall during national economic downturns.

3. Restore to the States a full partnership role by removing from the Department of Labor the responsibility for establishing and monitoring performance standards and other requirements that currently impact on the day-to-day operation of the system.

4. States should be authorized to set a tax rate and collect all revenues to fund the employment security systems, including that portion presently collected by the Federal Government from which administrative costs are funded. State collection would produce greater revenues at less cost.

5. Such revenues would be merged with the State trust fund accounts, and States would be authorized to spend a State-specified amount of the total annual program expenditure earmarked for administration of the system. Expenditures from the trust fund should be made solely for the payment of benefits and administration of the employment security system.

6. States would be authorized to retain the merged administration and benefit trust funds and invest them within each State. Greater earnings would result than occurs now with Federal investment. Interest would be added to the trust fund accounts.

7. States would remit to the Federal Government an amount equal to the Federal tax that is necessary to fund the Federal share of the Extended Benefits program and for discharging the Federal Supplemental Benefits/Extended Benefits debt.

8. Administrative funding of other activities including benefits for ex-Federal employees and special unemployment compensation programs such as the Trade Adjustment Assistance Act would be provided through Federal general revenues.

Macro's Long-Term Recommendations

The following section contains Macro's long-term recommendations. ICESA did not adopt them.

In its second report to the Commission, Macro discussed a series of alternative administrative financing approaches for the UI program and for the Job Service. The alternatives presented were formulated with a view toward incorporating the advantages of particular funding concepts used in other Federal programs while also addressing the employment security funding problems addressed previously. As such, the alternatives represented in some aspects a significant departure from the concepts of equity supported under the current financing structure.

Macro recognizes that the current financing system has emerged after many years of careful evaluation, modification, and refinements. Macro further recognizes that the UI cost-model system represents a most comprehensive work-measurement management system, unique among Federal assistance programs, which has been invaluable in efforts to secure and distribute needed resources in a constantly changing program and workload environment. Therefore, Macro's recommendations for long-term change to the employment security financing system are made assuming that substantially more study, analysis, and simulation will be conducted to confirm the viability and acceptability of the approaches recommended than was permissible with the short time periods and limited resources available for this study.

Long-term recommendations for UI financing

The existing UI administrative system described in model 1 obtains all of its funding from Federal trust funds, specifically derived from the Employment Security Administration Account (ESAA). The revenue to finance the system is generated by the Federal tax on employers. The annual budget is formulated and justified by the Department of Labor, Employment and Training Administration, using expected staff productivity and forecasted workload. The budget is formulated in two components, base and contingency, with contingency funds used only if increases in workload go beyond the base. Funds are allocated to States on the basis of State-specific cost models whose outputs are typically reduced to meet appropriated fund levels. Program administration is performed by the States; but the Federal Government sets standards, procedures, and so forth.

Model 1: UI—Existing System Alternative

Fund source

One hundred percent Federal. Funds are obtained from the net Federal tax (0.7 percent) on employers. Currently, the Federal tax is 3.4 percent, with a State credit for conforming UI state law equal to 2.7 percent; all revenues are automatically appropriated to the Federal Unemployment Tax Act trust funds for the following uses:

- Administration of State and Federal programs, subject to 95 percent limitation of available funds in the Employment Security Administration Account
- Extended Unemployment Compensation Account (EUCA) benefit fund
- Federal Unemployment Account (FUA)—for repayable advances if benefit resources are depleted

If the ESAA is insufficient, funds are appropriated from Federal general funds.

Budget justification

General productivity factors and forecasted workload. The budget basis is expected nationwide staff productivity and forecasted workload; the calculation results in projected staff need. This is funded at State average salary and benefit levels. The two primary budget components are base funds and contingency funds.

Resource allocation

State productivity factors and forecasted workload. Funds are allocated to States on the basis of State-specific cost models; State-specific models results are reduced by approximately 5 percent to meet the FY 1980 appropriation level.

Program operation

Federal/State partnership. The Federal partner is very heavily involved in setting standards, stipulating procedure, promulgating regulations, formulating budgets, allocating funds, and so on. States implement and carry out the Federal policy, regulations, and procedures with minimum input into budget formulation.

The current system embraces a concept of equity defined as follows: "Each State is funded for its reasonable cost of performing UI functions, without regard to the FUTA contributions by the State's employers." This approach tends to be less equitable (i.e., to allocate fewer administrative dollars) to States in the system that exhibit the following characteristics:

- *Lower annual staff salaries and benefits.* The system funds States at their approved average salary and benefit rate, which fluctuates significantly among the States both in terms of dollars and standard working hours.
- *Simpler UI procedures and/or higher efficiency.* The system funds States at significantly different minutes per unit (MPU), which reflect differences in UI approaches (e.g., wage request, wage reporting), procedures (e.g., single bypass, double bypass), legislative requirements, and staff efficiency.
- *Higher FUTA contributions by employers to administrative grant dollars received.* The current system pools all FUTA contributions in a common account (ESAA) and distributes these resources without regard to the contributing State.
- *Fluctuating UI workloads.* The current system funds States in their base allocation at varying percentages of total forecasted workload ranging from a low of 42 percent to a high of 85 percent; because contingency workload is funded at a slightly lower Administration, Staff, and Technical (AS&T), Nonpersonal Services (NPS), and support rate. Thus, the States with a lower level of base funding receive fewer total dollars for workload accomplished.

The current system also allows for minimum State sharing of savings generated by staff efficiency and provides no financial incentives or disincentives that are tied to a State's performance with respect to program quality. Last, the current cost model requires a substantial amount of periodic maintenance activity (estimated to cost approximately $8 million annually) and is a relatively complex system for the States to understand and support.

Macro has evaluated the range of alternative UI financing systems presented previously to the Commission. Macro believes that after careful analysis of the concepts embraced by each alternative and of the preliminary statistical simulations constructed, the Federal *reimbursement alternative* (model 2) offers a future direction for change that possesses substantial potential for improving the current financing system.

In this general reimbursement concept the fund source would continue to be FUTA; but the employer tax revenues would, in part, be separately accounted for in individual State administrative funds, with the balance of the revenues pooled in a common UI administrative account, such as the Employment Security Administration Account (ESAA). States would be reimbursed by the Federal Government at a uniform time or cost for UI workload accomplished. Costs incurred above the Federal reimbursement level would be paid from the State's administrative account or if necessary from State general funds or additional tax revenues. States could earn a higher reimbursement rate by maintaining specified program quality and performance levels. In addition, States could be eligible for loans from the Federal administrative fund if their own administrative funds were depleted and the State's program were operated at acceptable quality and performance levels. Federal budget justification would be based on forecasted workload, the Federal reimbursement time per unit of workload, and an average cost per unit. Resource allocation could be based on a direct reimbursement to the States for workload accomplished.

The specific reimbursement options proposed for assessment and consideration are the following:

- *Uniform time versus uniform cost.* Macro recommends development of a *uniform time per workload* item, on which UI workload would be reimbursed, thus funding the legitimate salary, benefit, and work-hour differentials among the States.
- *Uniform time versus multiple time concept.* Macro recommends that an average time concept be developed for each UI workload function (e.g., weeks claimed, nonmonetary determinations, etc.), with the single exception being the creation of a separate wage request and wage-record time for initial claims. Macro recommends that time differentials in other UI functions (e.g., weeks claimed—single bypass, double bypass; nonmonetary determinations—centralized, decentralized; etc.) should not be recognized in the uniform reimbursement time.

Model 2: UI—Federal Reimbursement Alternative

Fund source

Federal trust fund/State trust funds. The primary source of funds would continue to be FUTA, with the existing FUTA taxing structure left intact. However, a portion of the tax receipts generated by each State would be credited to State-specific UI administrative trust funds, with the remaining portion of receipts pooled in the Employment Security Administration Account (ESAA), thus giving each State its own administrative trust fund for meeting its share of administrative costs. Federal reimbursement would pay for a standard cost of workload accomplished.

Options:

- Federal reimbursement could provide a minimum cost for all functions, an average cost for all functions, full cost of specified functions, or some combination of these.
- Cost standards could be based on national average cost or State-specific cost levels.
- States could earn a higher level of Federal reimbursement by maintaining specified levels of quality and performance.
- States could borrow from a Federal trust fund reserve if State trust funds were inadequate to cover the added cost of program operations.

Budget justification

Productivity and forecasted workload. The Federal budget would be based on national cost standards applied to forecasted workloads. The current cost model could be used to develop a range of unit costs, minimum costs, or staff requirements. Such standards in conjunction with estimated workload would determine the amount of the budget. Concepts of base and contingency funding would no longer be necessary. States would be reimbursed for all workload accomplished at the standard reimbursement rate; reimbursement would be at less than full cost, and States would supplement incrementals above the reimbursed amount through their State trust fund or through State general revenue, if necessary.

Resource allocation

Strict reimbursement. Since standard reimbursements are established during budget formulation, allocation is based on experienced workload funded at the reimbursement rate.

Program operation

State/Federal. The Federal role would become significantly less concerned with program operations because of the standard reimbursement nature of the program. Each of the States would be afforded increased program flexibility and would become increasingly accountable to its Governor and State legislature, to justify program costs in excess of the Federal standards.

Federal reimbursement level

After preliminary analysis of reimbursement simulation data for 1979, Macro recommends that the Federal reimbursement rate be set at approximately 90 percent of the estimated total cost incurred by the system in delivering UI services. This 90 percent funding concept would mean that the Federal reimbursement rate would be set at approximately the average time for the low half of the States' budgeted-time factors for each UI function. Macro also recommends a small base level of funding to provide adequate funds, particularly for small States.

Accounting for FUTA receipts

After preliminary analysis of FUTA receipts versus administrative obligation data for 1972–77, Macro recommends that approximately 10 percent of a State's employer receipts should be credited to the State's administrative trust fund, with the balance being pooled, as presently controlled, in a common administrative account (i.e., ESAA).

Macro believes that the UI financing system incorporating the basic concepts suggested previously has the potential for providing the following benefits and improvements:

- *Improved Federal budget justification basis.* The reimbursement concept eliminates the funding by the Federal Government of a wide range of State time factors, which vary by as much as 200 to 300 percent. This variance is a primary Office of Management and Budget (OMB) criticism of the cost model. This concept essentially transfers to the States the burden of justifying more costly or complex procedures or less efficient management and staff activities.
- *More equitable allocation of resources.* The reimbursement concept provides a more equitable basis for allocating resources in that it promotes more cost-effective operations, procedures, and administration; recognizes the differentials in State salary and benefit rates; funds all workload, both base and contingency, at a uniform rate of reimbursement; and reduces the level of interstate subsidization of the administrative costs of the program.
- *Direct financial incentives for efficiency and quality.* The reimbursement concept proposed provides improved incentives for operational efficiency, because States can retain 100 percent of savings generated; direct financial incentives for higher reimbursement rates; and Federal loans that are contingent on the State's maintaining specified program quality levels.
- *Reduced complexity and cost of maintaining the UI financing system.* Under the reimbursement concept States would not have to maintain the cost model for resource allocation purposes, although States may choose to retain the system for internal management purposes. At the Federal level, the cost model would be used to assist in establishing the initial reimbursement times and rates, and studies would be performed periodically (perhaps every 2 to 3 years) to verify the reasonableness of the Federal reimbursement time. Funding of State administrative costs should be simpler and more straightforward due to the reimbursement nature of the program.
- *Reduced Federal involvement/increased State flexibility.* The reimbursement concept proposed would most probably result in less Federal involvement in State program operations, more State flexibility in program operations, and more accountability to the State legislature and Governor for program operations.

This proposed reimbursement concept has several potential problem areas. First, although the concept offers a more credible basis for budget justification, there is no guarantee that the Office of Management and Budget (OMB) or Congress will agree to fund 90 percent of the estimated annual operating costs or that the Employment and Training Administration (ETA) will take appropriate steps to ensure that the reimbursement rates reflect 90 percent of the average time requirements. Also, there are a number of States that consistently, over a several-year period, do not generate sufficient FUTA receipts (even at a 10 percent funding level) to cover their annual operating costs. These States face the potential of either reducing services, being more efficient (perhaps at the cost of quality), or soliciting additional revenues from the State general funds or the employer community.

Furthermore, Macro recommends the reimbursement alternative over other alternatives proposed for the following reasons:

- *State matching alternative.* This alternative is less attractive because it retains the concept of funding a wide range of cost-model time factors and provides fewer financial incentives for program efficiency than the reimbursement concept. It also retains the need for a State-specific cost model and for the current complexity and paperwork required to support the system.
- *UI State entitlement alternative.* This alternative is less attractive because it discriminates substantially against States with low FUTA-contribution-to-adminis-

trative-cost ratios as well as higher salary and benefit rates. While it does have excellent incentives for improved program efficiency, it provides limited Federal control over program quality. While providing maximum State flexibility, it provides very limited controls or assurances for maintaining a minimum national UI system.

On balance, Macro believes that the reimbursement concept proposed has substantial merit for further study and offers significant potential to balance fairly the concepts of adequacy, equity, efficiency, quality, maintainability, and control required to support a sound national UI program.

Long-term recommendations for Job Service financing

Without a clear definition of the mission, objectives, and target population to be served by the Job Service (JS), it is difficult to assess the adequacy or equity of the current Job Service financing system. Ideally, the development of long-term recommendations for Job Service financing should be formulated after deciding what the proper role and function of the Job Service is; but this issue was not within the scope of the project. Thus, the recommendations presented in this section were formulated based on the functions that the Job Service is doing and not on what it could or should be doing.

Under the existing JS financing structure presented in model 3, 97 percent of JS administrative funding is derived from Federal trust funds (ESAA), and 3 percent is derived from Federal general funds. This mix is determined by the percentage of jobs covered by UI provisions. The amount of annual funding is basically historically determined, and the budget has been relatively standstill since 1966. Resource allocation is based on historical funding with adjustments for placement performance and need (as indicated by the State's share of the civilian labor force). Program operation is a Federal-State sharing, with a heavy Federal influence over standards, methods of operation, budget formulation and allocation, and like matters. The primary role of the JS under this alternative is that of labor-market intermediary; in addition, it performs UI work testing and operates a variety of other special programs.

Model 3: Job Service (JS)—Existing System Alternative

Fund source

Federal trust funds/Federal general funds. Ninety-seven percent of JS funds are derived from the FUTA trust fund; the remaining 3 percent are derived from Federal general funds. The trust fund share obtained from the ESAA is based on the criterion that 97 percent of the nation's jobs are covered by UI provisions.

Budget justification

Historical. Since 1966 the JS has had essentially a standstill budget. Funding has been at approximately 30,000 Grants-to-States staff positions.

Resource allocation

Historical, performance, need. The primary allocation of dollars has been on the basis of State historical funding, State need as indicated by the civilian labor force, and comparative State placement performance. Residual amounts are allocated to the States using a historical special projects allocation and a historical Administration Staff, and Technical (AS&T) and Nonpersonal Services (NPS) allocation.

Program operation

Federal/State partnership. The Federal partner is heavily involved in establishing procedures, setting standards, promulgating regulations, formulating budgets, allocating funds, etc.; the State program operators implement Federal policy and regulations. There is minimum State involvement in or input into the Federal budget process.

The salient advantages or shortcomings of the existing Job Service financing system are summarized below:

- *Adequacy of funding.* The existing system has provided standstill funding in spite of significant additional program mandates and has used increasingly greater amounts of trust funds and increasingly smaller amounts of general funds.
- *Management incentives.* The current system provides limited State incentives for administrative efficiency and effectiveness; however, it has provided a direct monetary incentive for placement performance.
- *Equity of allocation.* Past allocations have caused inequities when measured against a variety of need criteria for the States.
- *Quality/accountability of program.* Though a State-operated program, performance accountability has been primarily to the Federal Government; limited financial incentives have been provided linking funding to program quality.
- *Flexibility of operations.* Program operators are subject to a fairly rigid set of operating procedures and funding mechanisms.
- *Complexity of funding.* Funding is complicated by the variety of individual budget components and the difficulties in understanding how the allocation model is influenced by State performance.
- *Logic of fund mix.* The heavy use of FUTA trust

funds appears inappropriate, given the level of service to UI [by JS] and to UI claimants.

Macro evaluated the alternative Job Service financing systems presented previously to the NCUC. Macro believes, after careful analysis of the concepts presented in each alternative, that the multitier alternative (model 4) offers a structure that has the best potential for improving the financing system currently in place.

This alternative, presented as model 4, proposes a multitier approach to JS administrative funding. Funds for administration would be obtained from two sources: Federal general funds and FUTA Federal trust funds. Basic labor market exchange activities would be primarily funded from the FUTA trust fund. Special and intensive applicant services as well as enforcement, compliance, and cooperative services could be general-revenue funded. Interagency and interprogram services would be funded either through a direct-reimbursement or interagency financial agreement based on workload accomplished and full sharing of service costs.

Model 4: Job Service—Multitier Alternative

Fund source

Federal trust fund/Federal general revenue. Total funding for the program would be derived from two sources: FUTA trust funds and Federal general revenues.

- *Labor market exchange.* Basic labor market exchange activities, including basic applicant, employer, UI work test, and labor market information (LMI) functions, would be funded primarily from the FUTA, with some general revenues.
- *Special/intensive applicant services.* Specialized or intensive services to target groups for outreach, counseling, career guidance, testing, job development, etc., would be funded from general revenue.
- *Enforcement / compliance / cooperative services.* Specific enforcement, compliance or cooperative mandates, including alien certification, rural loan certification, working condition compliance, and specialized LMI activities, would be funded from general revenue.

Specific services to other agencies/programs, including work test, Trade Act, and special LMI services, would be funded on a direct-reimbursement basis or through interagency agreements covering full cost of services provided.

Budget justification

Program impact/needs basis. The budget would be justified on a combination of program impact and needs basis. More specifically, the following justifications would be formulated:

- *Labor market exchange.* Ideally, this component of the budget would be justified using an economic-impact theory of increased productivity, such as Gross National Product (GNP) or reduced budget expenditures versus alternative market mechanisms. In the alternative, a more generalized needs-based supply-demand model would have to be developed.
- *Special/intensive applicant services.* This component of the budget would be justified in a general needs model, similar to the administrative approach contained in the Comprehensive Employment Training Act (CETA), structured around the target groups to be served and prevailing economic and budget conditions.
- *Enforcement / compliance / cooperative services.* This component of the budget would be justified in a general needs model that estimated workload and associated cost data for specified activities.

Resource allocation

Needs basis. Funds would be allocated on the basis of a model that distributed (1) basic labor-exchange and intensive-service dollars by a State-specific needs model, using data on unemployment, civilian labor force, and placement potential and (2) compliance/enforcement dollars on a State-specific workload basis.

Program operations

Federal/State partnership. Program operations would remain essentially as they are under the existing system.

The Federal budget justification would be developed around a program-impact theory for the basic labor-exchange functions, and a general needs model, structured around estimated target groups to be served, enforcement and compliance, workload, and general budget and economic conditions. Appropriated funds would be allocated to the States on a State-specific need or estimated workload basis. Program operations would continue to be a Federal and State partnership, retaining most of its existing structure and function.

Macro believes that a Job Service financing system incorporating the basic concepts suggested here has the potential for providing the following benefits and improvements:

- *Adequacy of funding.* The primary fund source would continue to be the FUTA. In addition, other specific activities such as intensive services to applicants would be funded from general funds. Program funding of both FUTA and general revenues, though 100 percent Federal grants, would be more susceptible to budget-balancing decisions than the current approach. However, the multitier budget structure should offer an improved basis for justifying needed program resources.

• *Incentive to administer the program effectively.* Incentive to perform would be focused on each activity, separately identified in the budget. For each funding item, program operators would be expected to use funds effectively in order to justify succeeding budget levels. This alternative should ease some of the disincentives to use funds for nonplacement activities.

• *Equity of allocation of funds.* Equity would be defined in terms of specific indicators of need, e.g., unemployment, civilian labor force, and so on, thus providing a common base for establishment of each States' share of resources. Some effort would be made to distribute a portion of the resources on a workload basis.

• *Quality of services and performance accountability.* Funding would be more closely aligned with specific tiers/activities within tiers. Primary accountability for performance/use of funds would continue to be to the Federal Government.

• *Flexibility of operations.* Flexibility to use funds, in general, may be diminished. Funding/budgeting along the lines of specific components implies that funds will be used only in those areas.

• *Complexity and maintainability.* The alternative would be at least as complicated as the current approach. Budget justification must occur for all explicit tiers/components. Allocation would cut across these in some cases; in other cases it would be a workload computation—that is, at least two different formulas would be used for allocation alone.

• *Logic of funding.* The funding mix is more clearly tied to particular missions or objectives that the JS is to accomplish. This alternative has the desired feature of specifically identifying budget justification to the various mandates placed on the JS. The funding mix (approximately 70 percent FUTA and 30 percent general revenue) is more defensible than the current ratio

Several potential problem areas in the proposed multitier approach deserve mention. First, more of the Job Service budget will be at risk than under the current approach, and the Job Service will have to compete for general-revenue financing with other Federal assistance programs, particularly the Comprehensive Employment and Training Act (CETA). Also, flexibility in the use of funds may be more restricted as a result of the more targeted funding of program resources.

Nevertheless, Macro recommends this alternative over both of the other alternatives proposed for the following reasons:

• *JS State matching.* This alternative is less attractive because of its limited potential for support at either the Federal or the State legislative levels. Also, the development of a program-impact-based budgeting approach is a difficult undertaking, which the JS has been unsuccessful in developing to date.

• *JS fund mix alternative.* This alternative is less attractive because, though resolving the fund mix problem in the JS, it offers little improvement to the basis for budget justification.

On balance, Macro believes that the multitier concept proposed offers significant merit to balance fairly the concepts of adequacy, equity, efficiency, quality, maintainability, and control required to support a sound national public Job Service.

Employment and Training Administration Comments on Macro's Short-Term Recommendations for Financing UI [3]

In general, the Macro recommendations are either current Employment and Training Administration (ETA)/ Unemployment Insurance Service (UIS) operating policy or planned program initiatives. This paper will address each UI recommendation proposed by Macro.

I. The ETA should pursue with the Office of Management and Budget (OMB) agreement/acceptance of full funding of a refined UI cost model, including

• *Effective validation of workload.* During FY 1979, UIS performed an extensive validation of budgeted workloads. The validation revealed that although State Employment Security Agencies (SESA's) were fairly accurate in counting workloads, the definitions of what to count and what not to count varied considerably. UIS has spent a significant amount of staff time to assist States in uniformly interpreting definitions and in installing revised counting systems. Another validation is scheduled for all States in FY 1980. After this validation, States without counting problems will be required to validate workloads only every 3 years. States that continue to count incorrectly will be required to perform validations every year until the problems are corrected.

• *Continuous examination of inefficient procedures.* During fiscal years 1978 and 1979, UIS sponsored a project designed to identify inefficient procedures in the initial claims and weeks-claimed program areas. The results of this initiative were mixed. Some dollar savings were realized; however, the cost of conducting the project was quite high. During the remainder of FY 1980 and during FY 1981, UIS will again conduct a concentrated analysis of operating procedures, attendant costs, and related program performance. Recognizing the significant reductions in ETA staffing and travel resources, the level of effort spent in this area will be less than in 1978 and 1979; however, by designing the program to concentrate on high-cost and/or low-performance States, favorable results are expected.

• *Systematic restudy of States.* States are required to conduct work-measurement (cost-model) studies no less frequently than every 3 years. During FY 1979 and 1980 all States studied benefits operations. During FY 1981 all States will study tax operations. In addition to required study activity, any State may choose to study whenever its legal or procedural environment changes.

• *Demonstrated relationship between full funding and quality/cost-effective performance.* During FY 1981, UIS will perform in-depth studies of the relationship between full funding and quality/cost-effective performance. Some research on the relationship of base staff level to performance level has been initiated, with still inconclusive results.

II. The ETA needs to reach agreement with the OMB on a more representative basis for estimating base and contingency workload to respond to the following historical problems:

• *Underestimating of tax workload.* Tax workloads have not been consistently underestimated. For FY 1978 the workload was underestimated, a problem corrected in subsequent fiscal years.

• *Artificially low definition of base workload.* In most areas, and in most States, the UI program is adequately funded. Funding at 90 percent of the low quarter workloads for base staff is a realistic financial management policy and provides for a continually functioning intermittent staff-hiring process to enable the State to more quickly staff up when necessary.

• *Inability of budget process to respond to unanticipated changes in economic assumptions.* Under current policy the UIS budget is planned essentially 18 months in advance of its effective date. It is indeed difficult under these appropriation-process ground rules to respond to significant and unanticipated changes in economic assumptions. The ETA can, with the concurrence of the OMB, remedy this problem by submitting requests for supplemental appropriations. However, it is almost impossible to adjust base funding through the supplemental appropriation process, since the OMB would consider an upward adjustment of base as too costly within the budget year, and the Department as well as the Congress does not understand the concept of base funding.

III. If full funding of cost model is not obtained, adjustment of State productivity factors, minutes per unit (MPUs), by ETA should be consistent from year to year.

Full funding of cost-model MPU is a goal of UIS. Workload validation, operational improvement cost equalization (OICE), and other activities are ultimately oriented toward ensuring that MPU are accurate and equitable among the States. As long as inefficiencies exist, however, full funding of all States will not be achieved. As a policy, UIS will continue to full-fund the lower MPU. Any administrative funding shortages will continue to be assessed at the highest MPU levels. In FY 1980, 25 percent of the MPU nationally were full-funded. Our goal is to increase this percentage of full funding each year.

Allocation methods have changed somewhat from year to year. Although some shifts in positions among the States can be attributed to revisions in the allocation method, *most* changes can be primarily traced to shifts in workloads, and to a lesser degree to changes in MPU.

IV. ETA should continue full funding of contingency workload and reexamine the assumption that contingency workload should be funded at reduced levels of support, administrative, and nonpersonal services.

ETA/UIS will continue to full-fund contingency workloads if current economic assumptions hold true. However, if workloads expand significantly, the OMB will probably apply some sort of productivity factor based on the economy-of-scale concept. This concept also applies to funding support and NPS at lowered levels (above base). The UIS position is that no economy of scale exists except in States where benefit operations are highly automated.

Currently, the Comptroller's Office is developing a different method of funding Administration, Staff, and Technical and Nonpersonal Services (AS&T and NPS) costs for FY 1981; this change should result in a more realistic distribution of these resources.

V. ETA should integrate into the current system direct financial incentives to reward quality service, operational efficiency, and responsive management.

ETA/UIS advocates a system of incentives for increased efficiency. Perhaps the easiest incentive is a financial reward, through the budget process, to an organization. This would be contrary to rewarding efficiency, because we would be spending more to accomplish the same level of work. However, UIS is investigating a method of personal incentives—rewarding the managers in a State Employment Security Administration (SESA) organization who contribute to improved efficiency, rather than rewarding the organization.

VI. ETA should reexamine its policy of "quarterly recovery" and "funding of lower of earnings or usage" with respect to their benefits and timing in light of the quarterly recovery's adverse impact on program planning, stability, and responsiveness.

The issue of quarterly recovery has been frequently discussed by ETA and SESA financial managers over the last several years. The policy of funding either earnings or usage, whichever is lower, has also been periodically reviewed. In fact, ETA policy in these areas has been slightly modified since FY 1979.

ETA/UIS feels that quarterly budgeting and funding of the lesser of what is earned or used is sound financial management. These policies do not have to have an adverse impact on SESA program planning, stability, and responsiveness. There should be sufficient managerial skill and technical tools available within each SESA to live with the contingency financing system. Also, it should be recognized that the quarterly pickup is beneficial to the system as a whole, since it provides ETA/UIS with moneys to allocate where the need (workload) is greatest.

The quarterly recovery policy and the funding of the lower of amounts used/earned has been modified during the 2 most recent fiscal years (1979 and 1980) to lessen the negative impact within any given State.

In FY 1979 SESA's were permitted to retain 50 percent of the difference between earned and used where earned exceeded used. In FY 1980 an additional 10 percent of first quarter earnings was made available to the States for use during a subsequent quarter to enable staffing up for the processing of anticipated higher workloads.

Summary

In summary, we [ETA] are pleased that our objectives are reinforced by the interim recommendations from the Macro study. Our cost-model management system has been built step by step to meet head-on the difficult and detailed questions that must be answered to install a modern, effective, full-functioning financial management process that meets the specific needs of UI program administration. Much remains to be accomplished, but we have made real headway toward the ultimate goal of creating a financial management system that gives UI program managers the necessary tools to justify administrative funding resources and to make cost-effective changes in program operations.

Notes

1. The first two elements of the Macro project are available on microfiche at all Federal Depository Libraries.

2. The National Commission on Unemployment Compensation preferred the name *Employment Service,* whereas the Interstate Conference of Employment Security Agencies preferred the name *Job Service.*

3. The Employment and Training Administration also commented on the long-term recommendations made by Macro, but these comments did not receive clearance from the Office of Management and Budget.

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