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6 Layoffs and Unemployment Insurance

Frank Brechling

6.1 Introduction

In recent years researchers have paid increasing attention to the impact of the unemployment insurance system on various labor market phenomena. Two strands of research in this area can be distinguished. In the first, researchers have been concerned with the influence of unemployment benefits on labor supply and unemployment. The decision to participate in the labor force or to end a spell of unemployment rests with the individual person. Unemployment benefits are viewed as a subsidy to participation, leisure, or search, and, hence, both labor force participation and unemployment duration should increase with unemployment benefits (see Classen 1977; Ehrenberg and Oaxaca 1976; Hamermesh 1977 1978; Katz 1977).

The second strand of research has been developed from the recent work on labor contracts (see Azariadis 1975; Baily 1974; Gordon 1973). Explicit allowance is made for temporary layoffs and recalls by firms in response to changes in the demand for their output. Since laid off employees qualify for unemployment benefits, the level of benefits may well influence the pattern of layoffs and recalls. Moreover, benefit payments are financed in the U.S. by a payroll tax which typically is partially

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experience rated. Experience rating means that a firm's tax rate rises (falls) in response to increases (decreases) in benefit payments to the firm's own ex-employees. Thus the higher the degree of experience rating, the higher will be the tax cost of temporary layoffs. Examples of theoretical models of a typical firm's response to changes in the unemployment insurance system are presented in the papers by Baily (1977), Brechling (1977a b), and Feldstein (1976). Although these models have not been subjected to extensive tests, relevant empirical information is presented in Brechling and Jehn (1978), Feldstein (1978), and Halpin (in press).

In this paper, an attempt is made to contribute to the second strand of research. In particular, it contains the results of empirical tests of the Baily-Feldstein type of model. For this purpose the main structure and theoretical predictions of the Baily-Feldstein model are presented summarily in section 6.2. Section 6.3 contains amendments, elaborations, and extentions of the Baily-Feldstein model. The main part of section 6.3 consists of parameterization of the experience-rating system which corresponds as precisely as possible to a system currently in use in the U.S. The empirical tests are presented in section 6.4, and section 6.5 contains the main conclusions of the paper.

The empirical evidence lends substantial support to the Baily-Feldstein type of model. In particular the parameters which determine a firm's layoff and rehire decisions seem to be strongly influenced by the degree of experience rating. It would appear, therefore, that increases in the degree of experience rating are likely to lead to substantial decreases in layoffs and, hence, in unemployment.

6.2 The Baily-Feldstein Model

Although the papers by Baily (1977) and Feldstein (1976) differ in detail and exposition, they contain substantially the same model of layoffs and unemployment insurance. Hence no distinction is made between them. Moreover, since both papers are published in eminent and readily available journals the following summary of the model is verbal, nonformal, and brief.[1]

In the Baily-Feldstein model, the firm offers its employees a long-term—say, annual—set of employment conditions. These conditions cover (1) wage rates; (2) hours worked; (3) the probability of being laid off; and (4) duration of the layoff. The total utility which the worker derives from these four items is a constraint to the firm. It is given by competitive conditions in the labor market. Thus although the firm may vary the four items in a mutually offsetting manner, the value of the total package cannot be changed by the firm which is assumed to maximize its profits subject to this constraint.

The total contract period is divided into two subperiods: In the first, the firm faces a high price for its output; in the second, a low price. Hence, both employment and hours tend to be lower in the second than in the first subperiod, and some workers are likely to be laid off at the beginning of the second subperiod. In the long run, however, these layoffs are not involuntary from the workers' point of view because the total expected remuneration contains compensation for the expected layoffs.

The introduction of an unemployment benefit system without experience rating raises the total expected remuneration of workers who are subject to layoffs, and, hence, both the workers and the firm should gain. It is important to note, however, that the gain can be realized only through layoffs, and, hence, the firm has an incentive to lay off more workers than in the absence of unemployment benefits. In other words, when there is no unemployment benefit system, firms must compensate workers for spells of layoff unemployment. With a benefit system, on the other hand, part of the compensation for layoffs is borne by the unemployment benefit system. Unemployment benefits thus lower the marginal cost of layoffs to firms.

Experience rating may offset, partially or fully, the reduction in the marginal cost of layoffs caused by unemployment benefits. For instance, if the firm were billed immediately for the benefit payments, then, in the absence of income tax on benefits, the marginal costs of layoffs would not be changed, and layoffs would be neither encouraged nor discouraged.

The above arguments can be illustrated conveniently by Feldstein's formula for the subsidy to layoffs:

$$J_1 = \frac{[(1-t_b)-(1-t_y)e]b}{(1-t_y)} \tag{1}$$

where b is the benefit received by laid off workers per period of time, e is the proportion of b payable immediately by the firm, t_b is the tax on unemployment benefits, and t_y is the income tax rate payable on wage income. In the U.S., $t_b = 0$, so that the formula becomes $J_2 = [1-(1-t_y)e]b/(1-t_y)$. This expression shows that, even if experience rating were perfect, so that $e = 1$, the subsidy to layoffs would be positive, namely $J_3 = t_y b/(1-t_y)$. The reason is that the firm's wage compensation for layoffs is (income) taxable, while unemployment benefits are not. These tax effects would disappear only when $t_b = t_y$ so that equation 1 becomes $J_4 = (1-e)b$, which, in turn, becomes zero when $e = 1$, that is, when experience rating is perfect.

So far, attention has been confined to the impact of the unemployment benefit system upon layoffs. But the Baily-Feldstein model also yields a unique prediction for the impact of the unemployment benefit system on the level of hours worked during the second subperiod. A rise in the

layoff subsidy J raises the level of layoffs, but it also raises the level of hours worked by the employees who have *not* been laid off.

The theoretical predictions of the Baily-Feldstein model can thus be stated summarily as follows: given that unemployment benefits are not (income) taxed, layoffs and average hours worked in the depressed subperiod rise with (1) ceteris paribus increases in unemployment benefits; (2) ceteris paribus decreases in the degree of experience rating; and (3) ceteris paribus increases in the tax rate on wage income.

It should perhaps be pointed out that one prediction of the Baily-Feldstein model depends crucially on the assumption that the composition of the long-term compensation package changes in response to changes in unemployment benefits. This assumption is attractive and plausible, especially for a long-run analysis. It may be, however, that in some industries competition in the labor market does not generate the kinds of responses that are obtained by Baily and Feldstein. What happens, for instance, if the firm's compensation package is independent of unemployment benefits? In the papers by Brechling (1977a b), this assumption was made. It leads to the following intuitively plausible results: when the system is experience rated, then an increase in unemployment benefits generates a *rise* in the marginal tax costs of layoffs, and, hence, a *decline* in the optimal level of layoffs. An increase in the degree of experience rating also raises the marginal tax costs and, hence, as in the Baily-Feldstein model, lowers optimal layoffs. In other words, an increase in unemployment benefits leads to a rise in layoffs in the Baily-Feldstein model, but to a reduction in layoffs in the Brechling model. But increases in the degree of experience rating reduce layoffs in both types of models. Since the real world may well be a mixture of the Baily-Feldstein and Brechling models, the impact of unemployment benefits on layoffs may not be as strong as that of experience rating.[2]

6.3 Extensions of the Model

In this section, two amendments of the Baily-Feldstein model are described and discussed. The first refers to the duration of temporary layoffs, and the second to the precise nature of experience rating. Let us deal with the two amendments in turn.

6.3.1 Amendments for the Duration of Temporary Layoffs

In the Baily-Feldstein model, the price for the firm's output drops to some low level at the beginning of the second subperiod and remains at that level until the end of the subperiod. In response, the firm lays off some employees for the entire subperiod, after which presumably they are recalled. In other words, the duration of layoffs for workers who do

not search for and obtain jobs at other firms is assumed to equal the second subperiod.

It should be realized, however, that the layoff subsidy J can be obtained by the firm not only by laying off more employees but also by lengthening the layoff duration of a given number of layoffs, unless the layoff duration exceeds the maximum unemployment benefit period. Hence, if the firm does have some control over the layoff duration, this duration must be expected to increase with increases in the level of unemployment benefits and with decreases in the degree of experience rating.

It would appear that a relatively minor change in the structure of the Baily-Feldstein model should make the layoff duration a choice variable for the firm. Suppose, for instance, that the firm holds inventories which could be accumulated in the first subperiod and decumulated in the second subperiod. In these circumstances, the following conjecture has intuitive appeal: a rise in unemployment benefits or a fall in the degree of experience rating should induce the firm to raise its production at the beginning of the first subperiod, accumulate inventories, lay off some employees before the beginning of the second subperiod and, thereafter, decumulate inventories. In this case, the layoff duration for at least some laid off workers is likely to exceed the second subperiod. Since the main focus of this paper is empirical rather than theoretical, the above conjecture has not been examined formally. It is simply hypothesized that, since firms have an inducement to lengthen the layoff duration in response to a rise in the layoff subsidy, some firms actually do so. Hence the average layoff duration is expected to react positively to increases in unemployment benefits and negatively to increases in the degree of experience rating.

6.3.2 Amendments for Experience Rating Provisions

The second amendment to the Baily-Feldstein model consists of a precise parameterization of the experience-rating provisions. In the Feldstein (1976) treatment, for instance, the degree of experience rating is summarized by one parameter, the proportion e of benefit payments charged to the firm. Actually the relevant laws do not fix e but another set of parameters, so that observed levels of e are likely to be endogenous in the firm's decision process.

Several systems of experience rating are currently in use in the U.S. The reserve ratio method is, however, the most common system, used in thirty-two states. The ensuing theoretical discussion as well as the later empirical analysis is confined entirely to the reserve ratio method.

Under the reserve ratio method of experience rating, each firm is assigned an account in the state unemployment insurance system. The

balance in this account changes in response to tax inflows and benefit outflows. Formally:

$$B_t - B_{t-1} = \tau_t m - b_t \tag{2}$$

where B_t is the firm's balance at the end of period t, τ is the tax rate, m is the tax base or taxable payroll, and b are the benefit payments which are charged to the firm. All flows are measured per calendar year, and, for the sake of simplicity, B_t, m, and b_t are normalized for the level of employment, so that they measure balance, taxable payroll, and benefits *per employee*. When equation 2 is divided by m, its left-hand side represents changes in the reserve ratio:

$$R_t - R_{t-1} = \tau_t - \frac{b_t}{m} \tag{3}$$

where R_t is the reserve ratio at the end of period t.

The essence of the reserve ratio method of experience rating consists of a link between τ_t and R_{t-1} which is given by the tax schedule. A typical such schedule is presented in figure 6.1. The unbroken Line (*A-B-C-D-E-F*) is described fully by five parameters: NEGTAX, MAXTAX, SLOPE, MINTAX and MINRES. Let us discuss them in turn.

NEGTAX is the tax rate which applies to firms with a negative balance, that is along (*A-B*).

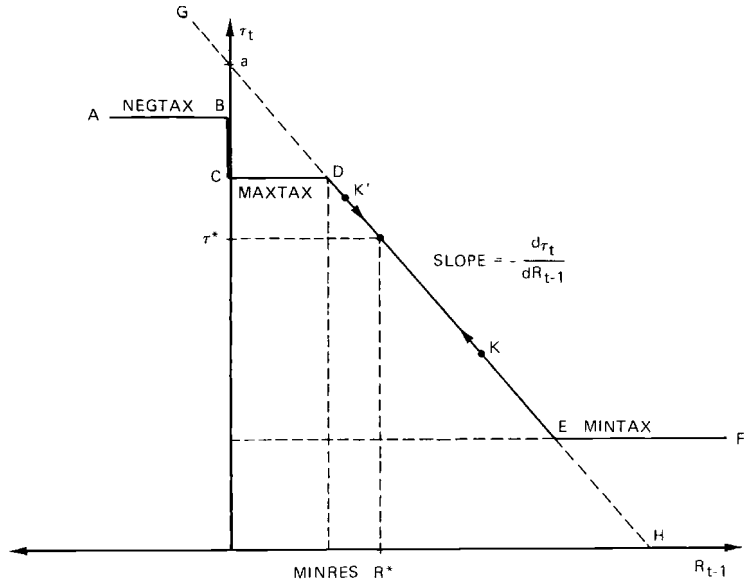

Figure 6.1 Typical Tax Schedule

MAXTAX is the highest tax rate applicable for firms with positive balances along (*C-D*).

SLOPE measures the slope of the line (*D-E*). Actually there are a large number of small steps along (*D-E*) which have been approximated by a straight line.

MINTAX is a critical low tax rate at which the tax schedule becomes horizontal, namely along (*E-F*).

MINRES is the minimum reserve ratio at which the sloped part of the tax schedule begins.

All five parameters are necessary and sufficient for a complete description of the schedule. Moreover, each may change ceteris paribus. The laws of the thirty-two states with the reserve ratio method of experience rating determine the tax schedules which imply the above five parameters. Moreover, the parameters vary automatically with the aggregate balance in a state's unemployment insurance fund. When the fund level falls below certain trigger levels, the parameters are changed so as to ensure increased tax flows, and vice versa.

The next question is: how do changes in the above five parameters affect the degree of experience rating? To answer this, let us begin by assuming that the tax schedule has no kinks or steps, so that it is sloped throughout like the line (*G-H*) which has its intercept at *a*. The tax rate τ_t can then be expressed as a simple function of R_{t-1}:

$$\tau_t = a - s\, R_{t-1} \tag{4}$$

where s = SLOPE. Note that s is measured as a positive number: a rise in s means that the slope of the function gets steeper. When equations 3 and 4 are combined, a simple first-order difference equation is obtained:

$$R_t = (1-s)\, R_{t-1} + a - \frac{b_t}{m} \tag{5}$$

Since s is always smaller than unity (typically $s \simeq .3$), equation 5 is stable in the sense that it approaches $R^* = R_t = R_{t-1}$ for any constant $a - (b_t/m)$. The steady state reserve ratio is given by:

$$R_t^* = \frac{1}{s}\left(a - \frac{b_t}{m}\right) \tag{6}$$

which, in turn, implies:

$$\tau_t^* = \frac{b_t}{m} \text{ or } \tau_t^*\, m = b_t \tag{7}$$

Thus, in the steady state, tax inflows just equal benefit outflows, and, hence, the balance and reserve ratio do not change.

The dynamic pattern described by equation 5 depends crucially on autonomous changes in the average benefit payments per employee. b_t.

The latter is equal to the product of (a) the firm's layoff rate; (b) the average duration of layoffs; and (c) unemployment benefit per period of time. Increases in one or more of these three variables lead to an increase in b and, hence, raise benefit outflows in relation to tax inflows.

Suppose, for instance, that the reserve ratio and tax rate are at K in figure 6.1. If R_t^* and τ_t^* are the relevant steady state values, then K represents a point at which benefit outflows exceed tax inflows, so that R_{t-1} is falling and τ_t is rising. During the transition, the firm's balance is reduced. Conversely, if the firm is initially at K', then tax inflows exceed benefit outflows and hence the firm's reserve ratio must rise and the tax rate must fall. During the transition period the balance is built up.

Suppose now that there is a cyclical pattern in b_t: let it be high in recessions and low in booms. Consequently the firm's balance is run down in recessions and built up in booms. But since τ_t and R_{t-1} always move toward a position where benefit outflows equal tax inflows, the firm's tax payments tend to equal benefit outflows, when both are summed over a sufficiently long period of time. In this limited sense, a tax schedule without kinks or steps and a nonzero slope would ensure full experience rating.

So far, however, neither benefit outflows nor tax inflows have been discounted. Once discounting is introduced, the speed with which the tax rate adjusts to benefit outflows becomes important. Suppose, for instance, that the firm increases its layoffs, thereby raising b_t. If, in response, tax rates rise very slowly, then the tax cost of the layoffs is payable in the distant future and its discounted value is quite small. Conversely, if the firm reduces b_t and tax rates fall very slowly, the discounted value of the future tax savings may be minimal. The speed with which the tax rate adjusts to benefit outflows depends on two factors: (1) the discrete lag of τ_t behind R_{t-1}, which seems to be necessary for administrative purposes, and (2) the speed at which the reserve ratio R_t moves toward its steady state value R_t^*. As is evident from equation 5, this speed depends crucially on the slope of the tax schedule(s). For the sake of realism, let us confine attention to the case in which $0 < s \leq 1$. As s rises from zero toward unity, the dependence of R_t on the state variable R_{t-1} decreases, and, hence, the relative importance of b_t increases. When $s = 1$, R_t becomes independent of R_{t-1}:

$$R_t = a - \frac{b_t}{m} = R_t^* \tag{8}$$

and hence:

$$\tau_t = \frac{b_{t-1}}{m} = \tau_{t-1}^* \tag{9}$$

so that the reserve ratio R_t is invariably at the steady state value which is appropriate for period t, while the tax rate τ_t is the steady state value

which is appropriate for period $(t-1)$. Given that the discrete lag of τ_t behind R_{t-1} is necessary for administrative purposes, $s=1$ represents the fastest reaction of the tax rate to changes in benefit flows. It represents the highest achievable degree of synchronization between benefit outflows and tax inflows.

The following important conclusion has thus been reached. If the tax schedule has no kinks or steps and has a negative slope throughout, then in the long run a firm's tax inflows equal its benefit outflows. But tax inflows lag behind benefit outflows. The speed with which taxes adjust to benefits depends on the slope of the tax schedule. As s rises from zero to unity this speed increases. The degree of experience rating thus reaches a maximum when $s=1$. At the other extreme, when $s=0$, the tax rate is independent of benefit outflows so that the degree of experience rating is zero.

Unfortunately the existence of steps and kinks in actual tax schedules necessitates some revision of the above simple conclusion. Let us, therefore, analyze the effects of ceteris paribus changes in all five parameters, NEGTAX, MAXTAX, SLOPE, MINTAX, and MINRES.

An increase in NEGTAX is illustrated in figure 6.2a. It simply raises the step which occurs at $R_{t-1}=0$. This change can be interpreted as an increase in the average slope of the schedule in its upper range, and, hence, an increase in the degree of experience rating. In other words, firms now have an increased incentive to avoid NEGTAX and thus an increased incentive to reduce benefit outflows.

An increase in MAXTAX is shown in figure 6.2b. Two effects of this change can be distinguished. First, the step at $R_{t-1}=0$ is reduced and this leads to a reduction in the average slope of the schedule in its upper range. This reduces the degree of experience rating. Second, firms which initially are at MINTAX between E and E' are now shifted, at least temporarily, to the sloped part of the schedule between G and E' and this increases the degree of experience rating. Thus a rise in MAXTAX leads to a decrease in the degree of experience rating in the upper range of the tax schedule and to an increase in the lower range.

Next consider an increase in SLOPE which is illustrated in figure 6.2c. Again two effects can be distinguished. First, for firms that are initially located between D and G the tax schedule becomes steeper, and, hence, the degree of experience rating is increased. Second, firms initially located between G and E are now moved (at least temporarily) to MINTAX and cease to be experience rated. Thus, between D and G the tax becomes more experience rated and between G and E it becomes less experience rated.

An increase in MINTAX is shown in figure 6.2d. It unambiguously reduces the degree of experience rating because firms that are located initially between E' and E are no longer experience rated. A rise in

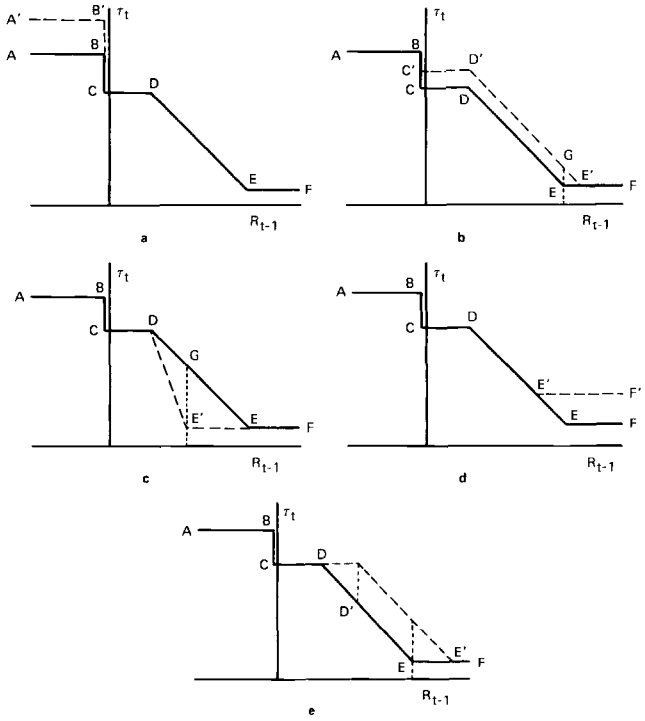

Figure 6.2 Increases in NEGTAX, MAXTAX, SLOPE, MINTAX, and MINRES

MINTAX thus reduces the range of tax rates over which experience rating applies.

Finally, a rise in MINRES is illustrated in figure 6.2e. Again the impact on experience rating is ambiguous. Firms initially located between D and D' cease to be experience rated at least temporarily. Firms initially located between E and E', on the other hand, are moved to the sloped part of the schedule and therefore become experience rated.

This concludes the discussion of the two extensions to the Baily-Feldstein model. According to the first, the layoff duration is treated as a variable which responds positively to increases in unemployment benefits and negatively to increases in the degree of experience rating. The second extension concerns the parameterization of experience rating. It has been related to the parameters of the tax schedule for the reserve ratio method. The degree of experience rating is related positively to NEGTAX and negatively to MINTAX. MAXTAX, SLOPE, and MINRES also tend to influence the degree of experience rating, but a priori argument does not yield unambiguous sign predictions.

6.4 Empirical Evidence

This section contains some relevant empirical evidence on the relationship between the parameters of the unemployment insurance system and layoffs, rehires, hours, and layoff duration. First, the theoretical predictions are restated summarily; second, the data are discussed and the results presented.

The theoretical arguments in sections 6.2 and 6.3 have generated the prediction that layoffs, hours, and layoff duration should all rise with increases in unemployment benefits and with decreases in the degree of experience rating. Since the flow of temporary layoffs may be measured either by layoffs or by rehires, the above prediction applies also to rehires. The prediction can be made specific by using the parameters of the tax structure. Thus, the four dependent variables—layoffs, rehires, hours, and layoff duration—should: (1) increase with increases in unemployment benefit rate; (2) decrease with increases in NEGTAX and; (3) increase with increases in MINTAX. Their responses to changes in MAXTAX, SLOPE, and MINRES may be positive or negative. Further, in view of the qualifying comments at the end of section 6.2, the impact of unemployment benefits may be weak. The empirical research underlying this paper has been designed to test these specific propositions.

Since the models discussed in sections 6.2 and 6.3 describe the behavior of individual firms, the data on layoffs, rehires, hours, and layoff duration should ideally also refer to individual firms. Unfortunately, however, no such micro data are readily available. Consequently the data used in the actual computations are aggregates. Specifically, layoff rates, rehire rates, and average weekly hours refer to averages in industry-state-year categories. Further, since no information on layoff duration is readily available, the duration variable is average unemployment duration (in weeks). Unemployment duration, average unemployment benefits (weekly in dollars), and the tax parameters NEGTAX, MAXTAX, SLOPE, MINTAX, and MINRES all refer to state-year categories. The years covered are 1962–69, and the states are all reserve ratio states. But for some industry-state-year categories not all relevant data are available, and, hence, these categories have been omitted. The number of observations is 170 for total manufacturing, and for two-digit industries it varies between 126 and 48 with a mean of about 96. All the data are readily available from *Employment and Earnings* and various publications of the Federal Unemployment Insurance Service.

For the purposes of estimation the following specific assumptions and amendments have been made.

1. Unemployment benefits are calculated typically as a fraction of previous earnings up to a certain limit. Hence, a state's benefit liberality should be measured, not by absolute benefits but by benefits in relation to

wage rates. For this reason the straight-time hourly wage rate was introduced as an additional explanatory variable. This procedure has some obvious disadvantages, and it is to be hoped that at some future date it will be replaced by the use of a set of parameters which describe benefit liberality.

2. The influence of all the explanatory variables upon the four dependent variables is assumed to be linear.

3. An additional explanatory variable is COVERAGE which is the ratio of employees covered by unemployment insurance to total employees. This variable has been included to take account of the fact that layoffs, rehires, and hours refer to total employment while the other variables refer only to covered employment.

4. Since the four dependent variables fluctuate cyclically, annual intercept dummies have been included as explanatory variables.

Now that we have stated the theoretical predictions and discussed the data used in the empirical analysis, let us now turn to an examination of the empirical results. Table 6.1 contains the regression coefficients when layoffs, rehires, hours, wage, and coverage refer to total manufacturing. Let us discuss, in turn, the influence of the various parameters of the unemployment insurance system.

1. BENEFITS have a positive but weak influence upon layoffs and duration and none on rehires and hours. This may be owing to the reasons given at the end of section 6.2. But this weak result may also be due to multicollinearity. The simple coefficient of correlation between wage and benefits is 0.82. This may have caused the standard errors of both variables to be large.

2. NEGTAX has a strong negative influence upon all four dependent variables. This finding lends substantial empirical support to the theoretical argument that a ceteris paribus increase in NEGTAX increases the degree of experience rating and, hence, reduces all four dependent variables.

3. MAXTAX has a strong positive influence on all four dependent variables. The joint impact of NEGTAX and MAXTAX suggests that the average slope of the tax schedule in its upper range is an especially important determinant of the degree of experience rating.

4. SLOPE has a positive influence which is weak for layoffs but quite strong for the other three dependent variables. In terms of the theoretical arguments in section 6.3, the positive relationship can be interpreted as follows: as SLOPE increases, some firms cease to be experience rated, and their reaction must be stronger than that of firms which remain on the sloped part of the schedule and thus face an increase in the degree of experience rating.

5. The influence of MINTAX is positive and quite strong for layoffs, rehires, and duration and weakly negative for hours. The theory predicts

Table 6.1 **Regression Coefficients for total Manufacturing (t-statistics in parentheses)**

Independent Variable		Dependent Variable			
	Mean Value	Layoffs	Rehires	Hours	Duration
		1.449	1.262	41.12	11.18
WAGE	2.490	.2556 (1.78)	−.0657 (.63)	−.1082 (.38)	.1329 (.28)
BENEFITS	36.20	.0136 (1.37)	.0047 (.66)	−.0068 (.35)	.0486 (1.51)
NEGTAX	3.452	−.2398 (3.68)	−.1113 (2.37)	−.3011 (2.34)	−.6810 (3.22)
MAXTAX	2.899	.2391 (3.00)	.1929 (3.35)	.6541 (4.15)	.5202 (2.01)
SLOPE	.3237	.1998 (.6472)	.6054 (2.72)	3.458 (5.67)	2.3846 (2.38)
MINTAX	.4731	.1474 (1.84)	.1286 (2.23)	−.2276 (1.44)	1.0264 (3.96)
MINRES	3.535	.0146 (.66)	−.0229 (1.43)	−.0571 (1.30)	.1308 (1.82)
COVERAGE	.9941	−12.884 (4.84)	−8.401 (4.37)	−30.446 (5.79)	−6.721 (.78)
DUM 63		−.1985 (1.35)	.0072 (.07)	.1458 (.50)	−.2491 (.52)
DUM 64		−.2475 (1.69)	−.0252 (.24)	.3064 (1.06)	−.3512 (.74)
DUM 65		−.4253 (2.91)	−.1532 (1.45)	.6055 (2.10)	−1.0128 (2.13)
DUM 66		−.4940 (3.14)	−.0741 (.65)	1.1739 (3.78)	−1.8601 (3.65)
DUM 67		−.4899 (3.00)	−.0607 (.51)	.3745 (1.16)	−1.9971 (3.77)
DUM 68		−.7873 (4.59)	−.1417 (1.14)	.5113 (1.51)	−1.7286 (3.10)
DUM 69		−.8390 (4.69)	−.2518 (1.95)	.3197 (.90)	−2.0440 (3.52)
Constant		13.514 (5.20)	9.344 (4.97)	69.793 (13.59)	16.055 (1.90)
R^2		.440	.358	.559	.428

an unambiguous positive sign. Hence, the empirical evidence lends some support to the theory.

6. The influence of MINRES is not iniform. It is strong only for duration in which case it is positive.

7. COVERAGE has a very strong negative impact on layoffs, rehires, and hours, and a weak one on duration. There are two possible explanations of this strong effect. In the first place, it might be argued that extensions of the unemployment insurance system reduce layoffs, rehires, and hours among *newly covered* employees. If this interpretation is accepted, then the coefficients of COVERAGE constitute fairly strong prima facie evidence against the Baily-Feldstein model. In the second place, it might be argued that COVERAGE simply corrects for the fact that layoffs, rehires, and hours refer to total employment, while the unemployment insurance parameters apply to only covered employment. Let X be such a parameter and let $f(X)$ be the layoff rate for covered employees and α that for uncovered employees. It can then be shown easily that the total layoff rate is the weighted average of the covered and uncovered rates $f(X)$ COVERAGE $+ \alpha$(1-COVERAGE), so that the linear effect of COVERAGE is negative. A complete test of this proposition would, however, require that COVERAGE be used multiplicatively with the other unemployment insurance parameters. The fact that duration, which refers only to covered employees, is not affected by COVERAGE lends some support to the second explanation.

8. The annual dummy variables reflect the well-known cyclical pattern in labor turnover, hours, and unemployment: as the economy moves into a boom, layoffs, rehires, and duration decline and hours rise.

Table 6.2 contains the number of positive and negative coefficients as well as the number of significant coefficients for the layoff, rehire, and hours equations run on date for sixteen two-digit manufacturing industries. Since duration is not available by industry, its equation is not included. Further, the reader is reminded that BENEFITS refers to benefits in the state as a whole and not to those paid in the industry.

By and large the disaggregated data reflect the same pattern as the aggregate ones. BENEFITS, MAXTAX, and MINTAX still seem to have predominantly positive coefficients. The influence of NEGTAX is still strongly negative. Disaggregation has led to a fair number of negative signs for SLOPE. Moreover, disaggregation has much weakened the strong negative effect of COVERAGE, especially for rehires and hours.

The strong and consistent negative influence of NEGTAX is especially encouraging because it is incompatible with the argument that high labor turnover rates cause high tax schedules. As already mentioned, in most states the laws provide for automatic increases in the entire tax schedule as the state unemployment insurance fund falls. It might be argued,

Table 6.2 **Signs and Significance of Regression Coefficients for 16 Two-Digit Manufacturing Industries**

	Layoffs				Rehires				Hours			
	Pos		Neg		Pos		Neg		Pos		Neg	
	Tot	Sig	Tot	Sig	Tot	Sig	Tot	Sig	Tot	Sig	Tot	Sig
WAGE	8	3	8	6	7	6	9	6	4	4	12	9
BENEFITS	10	8	6	1	9	4	7	3	12	3	4	3
NEGTAX	2	0	14	11	4	0	12	6	4	2	12	6
MAXTAX	13	6	3	1	10	5	6	4	7	7	9	5
SLOPE	5	1	11	5	7	5	9	3	11	5	5	2
MINTAX	9	5	7	2	11	6	5	3	8	4	8	5
MINRES	9	2	10	5	9	3	7	4	10	4	6	3
COVERAGE	6	2	10	5	9	3	7	4	10	3	6	2

Note: A significant coefficient is one with a t-statistic in excess of 1.5 (all t-statistics are treated as positive numbers).

therefore, that a rise in layoffs may cause a rise in benefit payments, a fall in the state fund and, hence, a rise in the tax schedule. This argument would not, however, generate a *fall* in NEGTAX.

Another interesting aspect of the empirical results appears in the duration equation. Hitherto, unemployment duration has been investigated primarily in terms of unemployment benefits and personal characteristics. As mentioned in the introduction, the papers by Classen (1977) and Ehrenberg and Oaxaca (1976) are excellent examples of this type of research. The evidence in table 6.1 suggests, however, that duration is much more responsive to the tax parameters than to BENEFITS. All five tax parameters, NEGTAX, MAXTAX, SLOPE, MINTAX and MINRES have a significant impact on duration. This evidence is consistent with a theory according to which duration is controlled to a significant extent by firms through their recalls of temporarily laid off workers.

This concludes the presentation of the empirical results. In view of the fact that the unemployment insurance tax constitutes a relatively small proportion of the payroll, the empirical results seem quite strong. NEGTAX has a consistently strong negative impact on layoffs, rehires, hours, and duration. MINTAX and BENEFITS have predominantly positive effects. All three effects are unambiguous predictions of the theory. Two other parameters of the tax structure, MAXTAX and SLOPE, tend to have significant effects on the four dependent variables. Thus the results seem to be quite consistent with a Baily-Feldstein type of model. Even if this kind of model should be refuted by future evidence, it seems clear that many strong empirical associations exist among labor market phenomena and the parameters of the unemployment insurance system.

6.5 Conclusions

In this paper an attempt has been made to examine the relationship between layoffs and the unemployment insurance system. The starting point of the analysis has been the Baily-Feldstein model according to which both layoffs and average hours worked increase with (1) increases in unemployment benefits, and (2) decreases in the degree of experience rating of the unemployment insurance tax. This model has been extended by letting the layoff duration be endogenous and by parameterizing experience rating. The empirical examination of the relationship between layoffs, rehires, hours, and unemployment duration as dependent variables and the parameters of the unemployment insurance system as explanatory variables has yielded very encouraging results. The strongest impact is that of NEGTAX, the tax rate which applies to firms with a negative balance in the unemployment insurance fund. A rise in NEGTAX reduces layoffs, rehires, hours, and unemployment duration.

Although the empirical results have been encouraging, they also suggest further research. In particular, it seems desirable to have a better parameterization of benefit liberality than has been used in this paper. Further, it may be necessary to model explicitly the determination of the parameters of the unemployment insurance tax.

The implications of the research findings are fairly obvious. Increases in NEGTAX tend to reduce strongly both layoffs and unemployment duration. The approximate elasticities of these two relationships are .55 and .21, respectively, so that a rise in NEGTAX of ten percent (from, say, 3.4 to 3.74) might reduce layoff unemployment by as much as seven percent. Moreover, increases in NEGTAX would improve the financial viability of the unemployment insurance system on two counts: tax inflows would rise and benefit outflows would fall because of the reduced layoff unemployment.

It is not claimed that the empirical research underlying this paper is more than a first attempt at discovering potentially important relationships. Thus, while the results are most encouraging, no finality is claimed for them at this stage.

Notes

1. In a recent paper Dale Mortensen presents a generalized version of the Baily-Feldstein model and shows that under theoretically standard conditions layoffs will not occur in the Baily-Feldstein model. See: Mortensen; "On the Theory of Layoffs." Discussion Paper No. 322, Center for Mathematical Studies in Economics and Management Science, Northwestern University, March 1978.

2. It should also be pointed out that the shifting and redistribution of both the unemployment benefits and the unemployment tax is likely to follow a possibly complex dynamic path.

Comment

Daniel S. Hamermesh

Brechling's work is an important contribution to the analysis of the effects of unemployment insurance (UI) and, more generally, to the economics of labor market policy. It takes the analysis two steps forward. First, and most important, Brechling shows how the structure of the experience-rated tax that finances UI can be parameterized in an empirically fruitful way. This is a major step forward, both because of the closer link forged between the constraints facing employers and their behavior, and because Brechling is one of the first even to consider the empirical effects of this tax. Bypassing simplistic approaches—for example, allowing the effective tax rate alone to reflect the degree of experience rating, an approach that has been used in studying the effects of UI benefits on unemployment until recently[1]—he has advanced the literature by moving directly to modeling and testing the institutional details of this tax.

The second contribution is the analysis of how the tax structure can affect the duration of temporary layoff employment. Implicitly, Brechling conducts a "horse race" between the UI tax parameters and the weekly UI benefit in explaining intertemporal variations in layoff rates. While I have some problems with the formulation of this race —particularly with the hobbles placed on the benefit variables in this sweepstakes—the role of imperfect experience rating in affecting the duration of unemployment spells has not been pointed out before.

While Brechling's intuition about the effects of the individual tax parameters on layoff duration seems correct, formal modeling of their role would be worthwhile verification. The Baily-Feldstein model contains one simple parameter (the fraction e of layoff costs paid by the firm through higher UI taxes). Imposing a complicated set of five tax parameters implies that the firm faces different constraints on its profit-maximizing behavior at different times, depending upon its past layoff experience. In other problems of this sort, the effects of changes in these constraints on choice variables are often counterintuitive, mainly because of the nonlinearities or discontinuities of the constraints.[2]

Modeling the experience-rated UI tax by a set of five parameters is important, but this particular set is not unique. For example, the reserve ratio at which the minimum tax rate becomes applicable—call it MAXRES—could have been used in place of SLOPE. Alternatively, MAXRES and SLOPE could have been used in place of MINRES to describe the tax structure completely along with the other three parameters. Obviously, if we measure the tax structure perfectly, the particular set of parameters chosen is immaterial. However, partly because of the

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steps in the tax function between MAXRES and MINRES, but also because of administrative problems in assigning tax rates to firms—both problems that can be characterized as errors in variables—we do not measure the tax structure exactly. The empirical work would thus be far more convincing if each of the alternative parameterizations were used in the layoff and other regressions to test whether the interesting results are merely an artifact of the particular parameterization Brechling has chosen.

The perennial bugaboo of any empirical work on UI (or indeed any social insurance program in the U.S.) is the burden of the payroll tax that finances the program. Empirical work even in the area of the flat rate payroll tax for OASDHI is weak; on the experience-rated UI tax it is nonexistent. If the tax is not shifted at all, or if only the average tax rate in a labor (product) market is shifted backward (forward), Brechling is correct in ignoring the shifting problem in analyzing the effects of this tax. If, though, firms correctly perceive the results of their layoff actions and are able to shift their own tax costs at least partly onto labor or to consumers of their products, tax shifting will moderate the effects of taxes implicit in Brechling's theoretical discussion. Especially in the horse race between the tax parameters and an appropriate parameterization of benefits, the shifting issue should be considered. That the Baily-Feldstein model ignores it is no argument for ignoring it here.

Perhaps the most important problem with the theory and empirical work is the dynamic simultaneity between layoffs and the parameters of the UI tax structure facing the individual firm. If the layoff rate in year t increases because of some exogenous shock, benefit payments rise and the entire tax schedule facing firms in year $t+1$ will be higher. Thus a random error in year t will be correlated with each of the parameters in year $t+1$ because of the existence of multiple tax schedules in each state. This correlation induces a complicated form of simultaneity bias into the equations Brechling estimates. To take account of this problem and provide better estimates of the effects of the tax parameters on layoffs, rehires, etc., a simultaneous model that includes the determination of the tax parameters themselves as functions of past years' layoffs and benefit payments should be estimated.

That this point is not merely a minor econometric quibble is shown by the substantial variation in tax rates within many states as the overall state fund balance changes. For example, in 1974, in New York, the highest tax rate in effect (NEGTAX) was 3.0 percent, yet on the highest schedule the rate was 5.2 percent. The corresponding figures for Massachusetts were 2.9 and 5.1 percent. With the shocks that occurred in 1974 and 1975, these higher tax rates in fact became effective in 1976. The variation in the tax parameters over time is of roughly the same magnitude as interstate

variation, suggesting that the dynamic feedback effect should be modeled.

Some specific estimation problems should be considered in any further work on UI financing and its effects. The COVERAGE variable produces very strange results—an effect on layoffs of − 13 percentage points (the variable's mean is only 1.4), and on hours worked of − 30 hours per week. While the paper goes to some lengths to rationalize these findings, they are far better rationalized by looking at the structure of the UI system. In manufacturing in the 1960s, coverage was nearly universal, as shown by the mean of this variable, .994. While the data are such that the COVERAGE measure could exceed one, it is likely that most of the variation in this measure is accounted for by several outliers whose layoff experience happens to be correlated with this variable.

Apart from the simultaneity problems noted above, the regression results appear convincing. However, it is well known that in most states firms with negative balances (for which NEGTAX is applicable) are in construction and certain seasonal manufacturing industries, while those to which the minimum tax rate (MINTAX) applies are in services, trade, and stable manufacturing industries. Recognizing this, we should observe that interstate variations in variables like MAXTAX and NEGTAX should be reflected in differences in turnover rates mostly in industries like autos, food processing, and lumber—seasonal industries. Similarly, variables like SLOPE and MINTAX should be most important in industries like trade, industries that unfortunately are not included in Brechling's regressions. A strong test of the hypothesis would involve constraining the coefficients of the variables describing taxes at the lower reserve ratios to be zero in seasonal industries, and those at the high end (SLOPE, MINTAX) to be zero in nonseasonal industries. If both constraints are rejected, that would indeed be impressive.

This suggests an interpretation of Brechling's strong results for NEGTAX and MAXTAX, and the relatively weak ones for the other parameters, particularly SLOPE and MINTAX. Manufacturing generates above-average benefits relative to manufacturing payrolls.[3] That being the case, manufacturing firms are in most cases on that part of the tax structure where the parameters applicable to firms with low reserve ratios are relevant. That it is these tax parameters that appear significant in regressions explaining layoff and other behavior in manufacturing is not surprising; the other parameters simply do not form part of the set of constraints affecting profit-maximizing behavior in this industry.

While the results clearly show that experience rating matters, the implicit size of its effects are too large to credit. For example, if the value of NEGTAX were changed from its minimum in the sample, 2.7 percent, to its maximum, 5.4 percent, the change in the layoff rate would be − .65,

nearly half the mean of the layoff rate. Even simulating the effect of a change from the mean of NEGTAX to its maximum produces a reduction in layoffs of .47, one-third of the layoff rate. Results that imply that changing one parameter of a tax that has not exceeded 1.5 percent of payrolls since 1950 would reduce layoffs by one-third strain credulity severely.

Perhaps the most important result of Brechling's work is its implications for the political economy of the social insurance scheme. Nearly all of the recent empirical work by economists has focused on benefits and implied that the deleterious effects of the system could be removed by such steps as shortening potential duration or taxing benefits. Brechling's study suggests that much of the same improvement can be effected instead by improving the experience rating in the UI tax. Changes on the benefit side are likely to be hard to implement, as workers nearly unanimously see such changes as harmful to their interests. Improvements in experience rating, on the other hand, are clearly perceived by many employers (generally larger firms with stable work forces) as beneficial, and appear not to concern workers. Accordingly, the results of the study should provide an intellectual basis for a reform of UI that would be effective in keeping the program financially sound while removing some of its unfortunate side effects.

Notes

1. The usual technique has been to include the weekly benefit payment and the wage prior to unemployment as separate variables or in ratio form (see Ehrenberg and Oaxaca 1976; Classen 1977). More recently, Hamermesh (1979) has parameterized the structure of benefits to include amount, potential duration, and qualifying requirements.

2. For example, in the analysis of the effects of the availability of UI benefits on labor supply, we find that eligibility requirements induce a discontinuity in the budget constraint facing the household with unusual results on the choice of hours within some range of hours (see Hamermesh 1980).

3. Becker (1972: 14–15) finds that in nine of the ten states for which data were available, the cost rate—benefit payments as a percent of taxable payrolls—in manufacturing in 1967 exceeded the average for the state.

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