



## Temporary Layoffs in the Theory of Unemployment

Martin Feldstein

*The Journal of Political Economy*, Vol. 84, No. 5. (Oct., 1976), pp. 937-958.

Stable URL:

<http://links.jstor.org/sici?sici=0022-3808%28197610%2984%3A5%3C937%3ATLITTO%3E2.0.CO%3B2-U>

*The Journal of Political Economy* is currently published by The University of Chicago Press.

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/ucpress.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

---

The JSTOR Archive is a trusted digital repository providing for long-term preservation and access to leading academic journals and scholarly literature from around the world. The Archive is supported by libraries, scholarly societies, publishers, and foundations. It is an initiative of JSTOR, a not-for-profit organization with a mission to help the scholarly community take advantage of advances in technology. For more information regarding JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

# Temporary Layoffs in the Theory of Unemployment

---

Martin Feldstein

*Harvard University*

The typical worker who is laid off is soon rehired by his original employer. This important and generally unnoticed fact requires a major reevaluation of our current theories of unemployment. This paper develops a theory of temporary layoffs. Specific attention is given to the question of why employment is reduced instead of hours. The role of unemployment insurance and of taxes is examined in detail.

Most workers who are laid off are subsequently rehired by their original employers. This important and generally unnoticed fact requires a major reevaluation of our current theories of unemployment.<sup>1</sup>

The Keynesian theory of unemployment, shaped by the experience of the Great Depression, emphasizes the worker who lost his job when demand fell and who will only find a new job when aggregate demand increases sufficiently. In contrast, the best of the modern work on unemployment<sup>2</sup> has elaborated Stigler's (1961) analysis of search behavior with a model in which the unemployed worker samples job offers until he finds one that exceeds his optimal reservation wage. In this view, layoffs are characterized as involuntary while the return to work is regarded as the choice of the individual. A number of writers have suggested that the serious problem of unemployment is associated with

I am grateful to the National Science Foundation for financial support, to the University of California at Berkeley for the opportunity to return to this problem during my term as Ford Research Professor, and to Alan Auerbach and Robert Hall for comments on a previous draft.

<sup>1</sup> Specific evidence on the relative importance of temporary layoffs is presented in Sec. 1 below.

<sup>2</sup> This includes, e.g., Hall (1970, 1972), Holt (1970), McCall (1970), Mortensen (1970), Phelps (1970, 1972), Perry (1972), Tobin (1972), and Gordon (1973). This general view of unemployment can be traced back to Hicks (1932) and Pigou (1933).

*[Journal of Political Economy, 1976, vol. 84, no. 5]*

© 1976 by The University of Chicago. All rights reserved.

these apparently involuntary layoffs rather than with the substantial number of voluntary quits.

These theoretical formulations ignore the overwhelming importance of temporary layoffs. Most workers remain with a single firm for a very substantial period even though they may experience frequent spells of temporary unemployment. Most of those who are laid off know that they will soon return to their employer, protected by seniority arrangements and by their job-specific human capital.<sup>3</sup> For them, the theory of job search is largely irrelevant.<sup>4</sup> Moreover, in contrast to the search theory, it is the employers who determine the durations of these individuals' spells of unemployment.

The traditional distinction between quits as voluntary and layoffs as involuntary also ceases to be valid. Because workers remain with the same employer through several spells of unemployment, the frequency and duration of temporary layoffs must be regarded as part of the total package of compensation and conditions. In a competitive labor market, employers will have to offer the economically feasible combination of unemployment, wages, and conditions *that workers prefer*. In collective-bargaining situations, the pattern of temporary layoffs may be an explicit part of the labor contract. Although any particular layoff may be involuntary, the general pattern and rules are the result of explicit or implicit voluntary agreements. Moreover, even particular layoffs may be voluntary. Many collective-bargaining agreements contain "inverse seniority" provisions that give the most senior workers the opportunity to be laid off first and rehired last.<sup>5</sup> Union contracts may also require that firms lay workers off instead of reducing average hours per week.<sup>6</sup>

This paper will develop a theory of temporary layoffs. Specific attention will be given to the question of why employment is reduced instead of hours. The role of unemployment insurance and of taxes will be examined in detail.

In an earlier study of unemployment,<sup>7</sup> I emphasized both temporary layoffs and unemployment insurance. I explained there, and more fully in a subsequent paper (Feldstein 1974), that the impact of unemployment

<sup>3</sup> See Oi (1962), Becker (1964), and Parsons (1972) for analyses of the relation of specific human capital to the relatively permanent attachment of workers to individual firms.

<sup>4</sup> There is some evidence that those who return to their original employer also investigate other jobs while they are out of work. This may in part reflect a local unemployment insurance requirement that those who receive benefits must generally engage in active job search. Whatever the reason for this search, the fact remains that most of those who are laid off do return and can expect to return to their original employer.

<sup>5</sup> A study by the Bureau of Labor Statistics (U.S. Department of Labor 1972) describes the inverse seniority provisions in a large number of union contracts.

<sup>6</sup> See, e.g., the contract between the United Auto Workers and General Motors.

<sup>7</sup> Feldstein (1973a). Part of this study was reprinted in Feldstein (1973b).

insurance is magnified by its interaction with the income tax. The general nature of this effect is clear, but a formal model is needed to indicate the order of magnitude of the impact and to provide a framework for future empirical research. The model of temporary layoffs that is developed in the current paper shows how unemployment insurance magnifies the effect on employment of changes in demand and increases the change in employment relative to the change in average hours. The analysis also shows how the unemployment insurance program can induce temporary layoffs or “unemployment holidays” even when there is no decrease in demand.

The current paper focuses on the role of temporary layoffs as part of the higher “permanent” rate of unemployment.<sup>8</sup> During normal times, random fluctuations in demand for specific products contribute to a continuously high rate of layoffs. It is this phenomenon rather than occasional cyclical increases in unemployment that is the subject of the current analysis.<sup>9</sup>

### 1. The Magnitude of Temporary Layoffs<sup>10</sup>

Although the purpose of this paper is to develop a theoretical analysis, it is useful to provide some empirical information about the relative importance of temporary layoffs.

The National Longitudinal Survey that was conducted for the Department of Labor provides information on temporary layoffs among older men in all industries.<sup>11</sup> In the survey year 1966–67, 9 percent of those surveyed experienced some unemployment while only 4 percent reported an involuntary job change.<sup>12</sup> Since many of those who are unemployed have more than one spell per year and since some of those who are laid off will move directly into a new job without experiencing any unemployment, the ratio of job changes to total layoffs will be less than four-ninths. Moreover, over the 3-year period 1966–69, only

<sup>8</sup> I have used the term “permanent” rate of unemployment rather than “natural” rate to emphasize that this equilibrium rate reflects taxes, unemployment insurance, and other institutional features of the labor market. Any decrease in unemployment below this rate *through increases in aggregate demand* increases the rate of inflation. In contrast, institutional changes can lower the unemployment rate without increasing inflation.

<sup>9</sup> After the work for this paper was substantially complete, I had the opportunity to read Baily (1974b). He develops, especially in pp. 16–23, an interesting alternative model of the impact of unemployment insurance. There are too many differences in the structure of the models to permit direct comparison with the implications of the current model.

<sup>10</sup> I have done extensive empirical analysis of temporary layoffs since this paper was written. Some basic estimates are presented in Feldstein (1976).

<sup>11</sup> The survey was directed by Dr. Herbert Parnes and conducted by the Bureau of the Census. The figures cited here were published in U.S. Department of Labor (1970) and Parnes, Nestel, and Andrisani (1972).

<sup>12</sup> U.S. Department of Labor (1970), pp. 25 and 54.

6 percent of those surveyed changed jobs involuntarily while there were at least 30 layoffs per 100 workers.<sup>13</sup>

A quite different type of information is provided by the question in the Current Population Survey about job search activities of the unemployed population. To be counted as unemployed by this survey, an individual must have made specific efforts to find a job during the past 4 weeks unless he is waiting to be called back to a job from which he had been laid off or is waiting to report to a new job within 30 days. It is striking therefore that, in February 1975, more than 41 percent of the unemployed men aged 25–64 were not classed as job seekers. The unreported percentage of nonsearchers among those who had been laid off is of course much higher.<sup>14</sup>

There is further evidence that a very high proportion of workers laid off by manufacturing firms are subsequently recalled to the same employer. During the past decade, there were approximately 1.33 layoffs per 100 employees each month in manufacturing firms.<sup>15</sup> During the same period, accessions other than new hires by these firms averaged 1.11 per 100 employees per month, or 83 percent of the number of layoffs. These accessions include only rehires and transfers between establishments within the same firms. Although separate estimates of the numbers of rehires and transfers are not available, there is some evidence that the number of transfers is very small.<sup>16</sup> This implies that at least 75 percent of the workers laid off in manufacturing are subsequently rehired by their original employer.

Although more detailed analysis of those who have been laid off would be desirable, the current data are sufficient to show the importance of temporary layoffs among workers who have long affiliations with their

<sup>13</sup> See Parnes et al. (1972), p. 32, for the rate of involuntary job changes. The layoff rate is a conservative estimate based on the number reporting some unemployment during each year.

<sup>14</sup> U.S. Department of Labor (1975), p. 30. These individuals were not “discouraged workers” who did not seek work because they believed that none was available; such individuals are not counted as part of the unemployed.

<sup>15</sup> These figures on manufacturing turnover are published in *Employment and Earnings*, a monthly publication of the Department of Labor. Layoffs are defined by the Department of Labor as “suspensions without pay lasting or expected to last more than 7 consecutive days, initiated by the employer without prejudice to the worker” (see, e.g., U.S. Department of Labor [1975], p. 145). In addition to voluntary quits, other separations include death, retirement, permanent disability, entrance into the armed forces, transfers to other establishments of the same company, or discharges “for cause” (e.g., incompetence, dishonesty, etc.). No information is available on the composition of these other separations.

<sup>16</sup> Telephone interviews with the individuals who prepared the turnover report for the Department of Labor at each of the six largest manufacturing employers in the Boston metropolitan area disclosed that reported transfers were always not greater than 5 percent of other accessions. Two firms did not even count transfers in their turnover figures. Hamermesh (1969) also states that the flow of other accessions is composed mainly of rehires.

firms. I turn therefore to the theoretical analysis of this type of unemployment.

## 2. A Model with Temporary Unemployment and Variable Hours

The current section presents a model of a firm that can adjust employment and hours in response to variations in the demand for its products. These variations in demand are taken to be random fluctuations that are independent of the aggregate fluctuations in demand and in employment.

The firm will be treated as a price taker in its product market. To emphasize the role of temporary layoffs, the firm's employees will be assumed to be "permanently" attached to the firm, that is, attached for the relevant planning period.<sup>17</sup> For simplicity, a fixed capital stock that is appropriate for this number of employees will also be assumed. If the labor market is competitive, the combination of wages, hours, and employment offered to these workers must produce as high a level of utility as they could obtain elsewhere. Stated somewhat differently, a competitive labor market will result in that combination of wages, hours, and employment which maximizes the utility of the workers subject to the economic constraints imposed by demand, production, the cost of capital, and the relevant tax and transfer rules. The current model will therefore pose the problem as one of maximizing the utility of the firm's "permanent" employees. Treating the problem of optimal layoffs from the point of view of these employees themselves should underscore the inappropriateness of the traditional notion that such layoffs are involuntary.

The analysis assumes all employees are identical and ignores employee risk aversion. The absence of risk aversion seems a reasonable simplification, since the spells of unemployment are both temporary and brief.<sup>18</sup> With no risk aversion, the variation in demand can be regarded as periodic rather than stochastic.<sup>19</sup> More specifically, I will study the behavior of employment and hours during a "year" when demand falls

<sup>17</sup> To avoid misunderstanding, I should emphasize that I regard this as an analytically useful limiting case and not as a description of reality. A more realistic model of a firm would have to recognize a spectrum of workers of varying degrees of attachment.

<sup>18</sup> The Current Population Survey estimated that the unemployed survey respondents in 1974 had been out of work for an average of 9.7 weeks. This substantially overstates the average duration of completed spells of unemployment. Kaitz (1970) estimated that the average duration of completed spells is only about 65 percent of the average duration to survey as estimated by the Current Population Survey. The duration of temporary layoffs is also substantially shorter than the duration of permanent separations (see Feldstein 1976).

<sup>19</sup> That is, with no risk aversion, the individuals are concerned only with expected values of income and work. The random period of reduced demand can be summarized by its expected duration.

for a fraction  $\lambda$  of that year. Each worker bases his consumption during the year on his expected net income and uses his assets to smooth any difference between actual and expected income.<sup>20</sup>

The current analysis assumes that employed workers are paid the same hourly wage rate when demand is low as when it is normal. This corresponds roughly to observed experience<sup>21</sup> and can be justified explicitly in the context of the current model. Since employees in this model are affiliated with the firm "permanently" and since they use their personal assets to stabilize consumption when employment and hours vary, the employees (and the firm) are concerned only about the expected annual income and not about any pattern of within-year variation.<sup>22</sup>

This discussion is in sharp contrast to the analysis of Baily (1974a) and Gordon (1974), who show that wage rates do remain stable if workers are risk averse while firms are risk neutral. The force of their analysis is substantially weakened if it is recognized that, because employees can use assets to smooth the level of consumption, the potential aversion to risk in the form of varying wages will be substantially reduced. Moreover, the risk-avoidance logic of the Baily-Gordon model requires that firms stabilize *real* wages where the observed evidence is that money wages may adjust slowly to increasing or decreasing prices. The Baily-Gordon model is thus inadequate for the job of explaining the relatively stable money wages when prices are rising or falling. The actual reason for wage stickiness must be sought elsewhere in such things as the desire to avoid arbitrary wage changes and to choose the workers who will be permanently or temporarily laid off. It is clear that the pattern of a nearly permanent attachment of each worker to a single firm must play a central role in the explanation of the observed wage stability.

The firm's technology will be represented by a production function that recognizes the important distinction between increasing the number of employees and increasing the average hours per employee:

$$X = G(K, N, h), \quad (2.1)$$

<sup>20</sup> A worker who has 8 weeks of unemployment in a year will find that, because of income taxes and unemployment compensation, his annual earnings will fall by substantially less than 10 percent. In families with two earners, total family income will fall proportionately less. Surveys of the unemployed indicate that dissaving and postponing payments are used to maintain the level of consumption (see, e.g., Cohen [1960] and Lester [1962]). This weak "permanent-income" assumption, i.e., that workers maintain an effectively constant level of consumption, is in sharp contrast to recent models of Baily (1974a) and Gordon (1974) that emphasize risk aversion and that assume either that employees do not have sufficient assets to smooth their consumption or that they base consumption on current income rather than permanent income. For the analysis of temporary unemployment, the current assumption seems preferable.

<sup>21</sup> In practice, the average hourly earnings of a worker may fall when demand is low because overtime is eliminated and because workers are "bumped down" into lower-grade jobs.

<sup>22</sup> Recall that employees are not assumed to be risk averse or, more precisely, that the effects of risk aversion are small enough to be ignored.

where  $X$  is the current annual rate of output,  $N$  is the number of employees,  $h$  is the average hours per employee, and  $K$  is the capital stock. The traditional specification of the labor input as man-hours ( $h \cdot N$ ) ignores the fact that an increase in average hours per man also increases the flow of capital services. This suggests the specification  $X = G(hK, hN)$  or, with constant returns to scale,  $X = hG(K, N)$ . In practice, a variation in average hours will have a more complex effect. Because of the fixed time involved in starting and stopping work each day, the number of effective working hours will increase more than proportionately to the number of hours for which a worker is paid. Offsetting this is the greater fatigue that accompanies long hours. It is best, therefore, to use the unrestricted form of equation (2.1).<sup>23</sup>

The variation in the demand for the firm's product can be described by a fall in the price that the firm receives. When demand is normal, the price is  $p_0$ . During a fraction  $\lambda$  of the year, the price falls to  $p_1$ .<sup>24</sup> The total annual revenue of the firm is thus

$$(1 - \lambda)p_0X_0 + \lambda p_1X_1 = (1 - \lambda)p_0 \cdot G(K, N_0, h_0) + \lambda p_1 \cdot G(K, N_1, h_1). \quad (2.2)$$

Note that both the original number of employees ( $N_0$ ) and the capital stock ( $K$ ) is fixed.

Workers who are laid off when demand falls receive unemployment insurance benefits at an annual rate of  $b$ . Total unemployment benefits per year are therefore

$$B = \lambda b(N_0 - N_1). \quad (2.3)$$

In the model, as in the United States, these benefits are financed by a tax on firms that is related to the previous benefits collected by the firm's employees. This system of "experience rating" is very imperfect; many firms pay a flat rate of tax per employee that is unaffected by marginal changes in unemployment.<sup>25</sup> This imperfect experience rating will be

<sup>23</sup> In Feldstein (1967) I estimated a Cobb-Douglas production function with separate coefficients of men and hours using an aggregate cross section of industries. The results implied that the elasticity of output with respect to average hours exceeds the sum of the elasticities with respect to the number of employees and the capital stock.

<sup>24</sup> This model of price variation can also be regarded as an approximation to a more realistic description in which firms respond to lower demand by increasing sales effort or accumulating inventories. These cost increases are, for the current purpose, equivalent to a reduction in price. The model can be modified to allow for a price-setting firm that experiences a shifting demand curve; price setting does not affect any conclusions of the analysis.

<sup>25</sup> Although the exact provisions of the law differ among the states, the usual pattern is a tax rate that varies among firms on the basis of each firm's past experience. More specifically, the tax rate is a decreasing function of the difference between its cumulative tax payments (since the beginning of the unemployment insurance program) and the cumulative benefits paid to its employees (including former employees). A crucial feature of the tax schedule is that there is a relatively low maximum tax rate and a positive minimum tax rate. As a result, many firms with high unemployment rates have "negative balances" in their accounts, i.e., have paid less in taxes than their employees

represented in the current steady-state context by making the tax a fraction  $e$  of annual benefits plus a constant  $T$ . Thus the unemployment tax is  $eB + T$ .<sup>26</sup>

Since markets are assumed here to be competitive, the firm's total revenue must be exhaustively divided among the cost of capital services<sup>27</sup> ( $cK$ ), the aggregate wage bill ( $W$ ), and the unemployment tax ( $eB + T$ ). From (2.2), this implies

$$cK + W + eB + T = (1 - \lambda)p_0G(K, N_0, h_0) + \lambda p_1G(K, N_1, h_1). \quad (2.4)$$

The total income of the  $N_0$  permanent employees<sup>28</sup> is the sum of the aggregate wage bill and the unemployment benefits,  $W + B$ . If wage income is taxed at rate  $t_y$  while unemployment benefits are taxed at rate  $t_b$ ,<sup>29</sup> total net income is

$$Y = (1 - t_y)W + (1 - t_b)B. \quad (2.5)$$

Before the year begins, each employee has an equal probability of becoming unemployed. For each employee, the expected net income is thus

$$y = (1 - t_y) \frac{W}{N_0} + (1 - t_b) \frac{B}{N_0}. \quad (2.6)$$

Since there is no risk aversion, this expected income is a sufficient description of the employee's stochastic income prospect.

The utility of the representative employee will be represented by a strongly separable function. Utility at each point in time depends only on the level of consumption and the amount of work done at that time. In addition, the instantaneous utility function is separable so that the number of working hours does not affect the utility of consumption and

have received in benefits. These firms with high unemployment rates face the maximum tax rate; an increase in layoffs causes no increase in tax payments. Similarly, the large number of firms with substantial "positive balances" face the minimum rate and would continue to do so even if their rate of layoffs increased, as long as that increase was not too great. Becker (1972) presents extensive evidence of the importance of the firms that pay no effective marginal tax. For example, in New York in 1967 some 59 percent of all benefits were related to firms with negative balances while 28 percent of firms paid the minimum tax. Similarly, in Massachusetts, 57 percent of benefits were related to firms with negative balances while 18 percent of firms paid the minimum tax.

<sup>26</sup> For firms at the maximum or minimum tax rates,  $e = 0$ . The evidence in the previous footnote that more than half of the benefits are paid to such firms in Massachusetts and New York implies that the average of the  $e$  values is less than one-half in those states.

<sup>27</sup> This includes both the interest cost and depreciation. It is defined as the net after-tax cost of capital services.

<sup>28</sup> Exclusive of any income from assets that they own. Total income refers to the total income derived from employment by the firm.

<sup>29</sup> In the United States,  $t_b = 0$  if sales taxes are ignored. In Canada and some other countries,  $t_b$  is the rate of personal income tax ( $t_y$  minus the payroll tax rate).

the level of consumption does not affect the utility of leisure. Since consumption is constant during the year and independent of whether the individual becomes unemployed, the utility function can be written<sup>30</sup>

$$U = u(y) + (1 - \lambda) \cdot v(h_0) + \lambda \frac{N_1}{N_0} v(h_1) + \lambda \frac{N_0 - N_1}{N_0} v(0). \quad (2.7)$$

Because of the competitive labor market, the firm's problem is to select the values of  $h_0$ ,  $h_1$ , and  $N_1$  that maximize this utility of the representative employee, subject to the constraint implied by equations (2.1)–(2.6). The properties of this optimum will now be examined.

### 3. The Effects of Changes in Demand

The purpose of this section is to assess how a change in the demand price ( $p_1$ ) affects employment ( $N_1$ ) and average hours ( $h_1$ ). The sensitivity of this response to the unemployment insurance and tax parameters will be examined. The analysis shows that the current unemployment insurance greatly magnifies the effect on employment of changes in demand and reduces its effect on hours. The analysis also shows that the unemployment insurance program may induce unemployment even if there is no fall in demand.

The optimum policy of employment and hours is characterized by the three first-order conditions for the maximization of utility in equation (2.7):<sup>31</sup>

$$u'(y) \cdot \frac{\partial y}{\partial N_1} + \frac{\lambda}{N_0} [v(h_1) - v(0)] = 0, \quad (3.1)$$

$$u'(y) \frac{\partial y}{\partial h_1} + \lambda \left( \frac{N_1}{N_0} \right) v'(h_1) = 0, \quad (3.2)$$

and

$$u'(y) \frac{\partial y}{\partial h_0} + (1 - \lambda)v'(h_0) = 0. \quad (3.3)$$

<sup>30</sup> The utility of consumption is written  $u(y)$  since consumption depends on the steady-state net income  $y$ . The separability of the instantaneous utility function implies that

$$\begin{aligned} u(y) &= (1 - \lambda) \cdot u(y | h = h_0) + \lambda(N_1/N_0) \cdot u(y | h = h_1) \\ &\quad + \lambda[(N_0 - N_1)/N_0] \cdot u(y | h = 0) \\ &= \{(1 - \lambda) + \lambda(N_1/N_0) + \lambda[(N_0 - N_1)/N_0]\}u(y). \end{aligned}$$

Recall that I am examining the polar case in which layoffs are temporary, so that there is no permanent separation and no job search.

<sup>31</sup> There are also two further constraints: that  $N_1 \leq N_0$  and that both  $h_1$  and  $h_0$  not exceed some upper limit. These constraints will generally not be binding and can therefore be ignored. Exceptions will be noted below.

From equations (2.2)–(2.6), the derivatives of average net income with respect to employment and hours are

$$\frac{\partial y}{\partial N_1} = \frac{\lambda(1 - t_y)}{N_0} [p_1 G_{N_1} + eb] - \frac{(1 - t_b)b\lambda}{N_0}, \quad (3.4)$$

$$\frac{\partial y}{\partial h_1} = \frac{\lambda(1 - t_y)}{N_0} p_1 G_{h_1}, \quad (3.5)$$

and

$$\frac{\partial y}{\partial h_0} = \frac{(1 - \lambda)(1 - t_y)}{N_0} p_0 G_{h_0}, \quad (3.6)$$

where  $G_{N_1} = \partial G/\partial N_1$ , etc. The derivatives of income with respect to  $h_1$  and  $h_0$  are simply the marginal revenue product per employee after income tax. In contrast, the derivative of income with respect to employment ( $N_1$ ) must be adjusted for the difference between the forgone unemployment insurance benefits  $[(1 - t_b)b\lambda/N_0]$  and the incremental net cost of additional experience-rated tax that would have to be paid  $[\lambda(1 - t_y)eb/N_0]$ .

#### a) *Optimal Employment with Fixed Hours*

Before examining the implications of the conditions for optimal average hours, it is useful to consider the behavior of employment if hours are arbitrarily fixed. Substituting equation (3.4) into equation (3.1) and rearranging terms yields the first-order condition

$$G_{N_1} = \left[ \frac{[(1 - t_b) - (1 - t_y)e]b}{(1 - t_y)} + \frac{v(0) - v(h_1)}{(1 - t_y)u'(y)} \right] p_1^{-1}. \quad (3.7)$$

This implies that the optimal marginal product of an additional employee during the period of reduced demand varies inversely with the price of the product. Since this marginal product ( $G_{N_1}$ ) varies inversely with employment ( $N_1$ ), equation (3.7) implies that a fall in  $p_1$  decreases  $N_1$ .<sup>32</sup> The magnitude of the change in  $N_1$  depends on two factors. (1) The net unemployment insurance subsidy,

$$J = \frac{[(1 - t_b) - (1 - t_y)e]b}{(1 - t_y)}, \quad (3.8)$$

is the value, measured in terms of equivalent pretax earnings, of the excess of the net unemployment benefits  $[(1 - t_b)b]$  over the net cost of

<sup>32</sup> It is possible to satisfy (3.7) when  $p_1$  falls without a reduction in  $N_1$  if  $h_1$  increases sufficiently. I return to this below. Note that (3.7) is a generalization of the textbook case in which  $b = t_y = v(0) = 0$  implies  $p_1 G_{N_1} = -v(h_1)/u'(y)$ , that is, the marginal revenue product of labor equals the disutility of hours divided by the marginal propensity of money.

the experience-rated tax  $[(1 - t_y)eb]$ . (2) The value of leisure,

$$L(h_1) = \frac{v(0) - v(h_1)}{(1 - t_y)u'(y)}, \quad (3.9)$$

is the value, measured in terms of pretax earnings, of the utility difference between no-work  $[v(0)]$  and working  $h_1$  hours  $[v(h_1)]$ .

It is useful to consider the empirical magnitudes of these two terms in order to have a sense of their potential significance in the analysis that follows. Consider first the unemployment compensation term. As I noted above,  $t_b = 0$  in the United States. In the large fraction of cases in which there is no effective experience rating,  $e = 0$  and the unemployment insurance subsidy is  $J = b/(1 - t_y)$ , that is, the value of unemployment benefits in terms of equivalent taxable wages. In a detailed study of unemployment insurance in each state (Feldstein 1974), I found that the average value of  $b/(1 - t_y)$  is approximately two-thirds of the average gross wage. For those firms in which there is full experience rating,  $e = 1$  and the unemployment insurance subsidy is  $J = t_y b/(1 - t_y)$ . The relevant marginal income tax rate ( $t_y$ ) includes not only the federal and state income tax rates but also the employer and employee contributions for social security; a conservative estimate of the relevant marginal rate for unemployment insurance recipients is one-third.<sup>33</sup> This implies a value of  $t_y b/(1 - t_y)$  equal to two-ninths of the gross wage. If half of the unemployment benefits are paid to those with  $e = 0$  and half to those with  $e = 1$ , the overall average of the unemployment insurance subsidy is approximately four-ninths, or nearly 50 percent of the corresponding gross wage.

The relative value of leisure,  $[v(0) - v(h_1)]/(1 - t_y)u'(y)$ , is harder to assess. For many, such leisure has little or no value. For others, a short spell of leisure may be worth as much as the lost earnings. Gordon (1973) estimated that the value of waiting time and search time during unemployment was equal to only 53 cents per hour for 1971. Because search is irrelevant in our analysis, this represents an overestimate of the value of waiting time during temporary layoff. But even 53 cents per hour for 40 hours per week and a marginal income tax rate of  $t_y = 1/3$  imply a value of  $[v(0) - u(h_1)]/(1 - t_y)u'(y) = \$32$ , or less than 40 percent of the corresponding gross wage.<sup>34</sup> This calculation suggests that, on

<sup>33</sup> For temporary layoffs, the relevant tax includes the employer's social security tax as well as the employee's. Any family that pays federal income tax therefore has a combined marginal rate of at least 26 percent. In Massachusetts, a family with \$4,000 of taxable income would pay a combined rate (including state income tax) of 33 percent.

<sup>34</sup> The average 1971 gross weekly wage in private nonagricultural employment was \$127.28. Stein (1963) estimated that the unemployed earn substantially less than all employees; Gordon (1973) updated his figures and concluded that the unemployed had previously earned only 69 percent of the average wage. This implies a wage of \$88 and therefore a relative value of leisure of 39 percent.

average, the unemployment compensation subsidy exceeds the value of leisure and, in firms where there is no marginal experience rating, the subsidy may be nearly twice the value of leisure. This implies that, on average, the unemployment insurance subsidy more than doubles the impact of a change in  $p_1$  on the optimal marginal product of employment. Where there is no marginal experience-rated tax ( $e = 0$ ), unemployment insurance increases the change in  $G_N$  to more than three times what it would otherwise be.

With these order-of-magnitude calculations as background, let us consider the implications of (3.7) in more detail. Note first the obvious implication that it is optimal to maintain full employment ( $N_1 = N_0$ ) if the unemployment program provides no net subsidy [ $(1 - t_b)b = (1 - t_y)eb$ ] and there is no disutility of work [ $v(0) = v(h_1)$ ]. With these conditions, the right-hand side of equation (3.7) is zero. Taken literally, this implies that employment should be expanded indefinitely until the marginal product of labor is driven to zero. Correctly interpreted, this implies expansion of unemployment until the constraint  $N_1 \leq N_0$  becomes binding.

The opposite extreme, in which it is desirable to lay off all the employees during the period of reduced demand, is also interesting to examine. Let  $G_{N_1}(0)$  be the marginal product of the last employee.<sup>35</sup> Then  $N_1 = 0$  is optimal if

$$p_1 G_{N_1}(0) < \frac{[1 - t_b - (1 - t_y)e]b}{(1 - t_y)} + \frac{v(0) - v(h_1)}{(1 - t_y)u'(y)}, \quad (3.10)$$

that is, if the marginal revenue product is less than the combined value of net unemployment insurance benefits and the income equivalent of the leisure. As I noted above, when  $e = 0$  the unemployment insurance subsidy is equal to approximately two-thirds of the regular gross wage. Since this greatly increases the value of the right-hand side, it makes it much more likely that it would be optimal to close the plant temporarily.

Totally differentiating equation (3.7) with respect to  $N_1$  and  $p_1$  for given  $J$  yields (with  $G_{NN} = \partial^2 G / \partial N_1^2$ )

$$\frac{dN_1}{dp_1} = \frac{-G_N - [v(0) - v(h_1)] / [(1 - t_y)u'(y)] \cdot [u''(y)/u'(y)] \cdot (\partial y / \partial p_1)}{p_1 G_{NN} + [v(0) - v(h_1)] / [(1 - t_y)u'(y)] \cdot [u''(y)/u'(y)] \cdot (\partial y / \partial N_1)}. \quad (3.11)$$

If  $u'' = 0$ , it follows directly from the technological properties ( $G_N > 0$  and  $G_{NN} < 0$ ) that  $dN_1/dp_1 > 0$ , that is, that a fall in demand will decrease employment. If  $u'' < 0$ , the second term is also negative so that

<sup>35</sup> Or, to be more realistic, the average product of the smallest number of employees who can technologically be employed.

the conclusion is unchanged.<sup>36</sup> The analysis that follows will be simplified by assuming a constant marginal utility of income,  $u' > 0$  and  $u'' = 0$ .

With this assumption, it also follows from totally differentiating (3.7) with respect to  $N_1$  and  $J$  that

$$\frac{dN_1}{dJ} = \frac{1}{p_1 G_{NN}} < 0. \quad (3.12)$$

Increasing the unemployment insurance subsidy reduces employment at any level of reduced demand.

An example based on a Cobb-Douglas technology will illustrate the order of magnitude of this effect. Since  $h_1$  as well as  $K$  is temporarily regarded as fixed, the Cobb-Douglas production function can be written  $G = aN_1^\alpha$ . The first-order condition of equation (3.7) thus becomes

$$\alpha a N_1^{\alpha-1} = \left[ \frac{[(1-t_b) - (1-t_y)e]b}{(1-t_y)} + \frac{v(0) - v(h_1)}{(1-t_y)u'(y)} \right] p_1^{-1} \quad (3.13)$$

or

$$N_1 = (\alpha a)^{1/(1-\alpha)} \left[ \frac{[(1-t_b) - (1-t_y)e]b}{(1-t_y)} + \frac{v(0) - v(h_1)}{(1-t_y)u'(y)} \right]^{1/(1-\alpha)} p_1^{1/(1-\alpha)}. \quad (3.14)$$

The Cobb-Douglas technology therefore implies a constant elasticity of employment with respect to the price during the period of reduced demand.

Of greater interest is the effect of the unemployment insurance subsidy on this level of unemployment. Note that at any value of  $p_1$  there is a constant elasticity relation between  $N_1$  and the sum of the insurance subsidy and the value of leisure:

$$\frac{J + L(h)}{N_1} \cdot \frac{\partial N_1}{\partial (J + L(h))} = \frac{-1}{1 - \alpha}. \quad (3.15)$$

This implies that the current unemployment insurance subsidy is likely to have a substantial effect on the level of employment during the period of reduced demand. Most empirical estimates place  $\alpha$  at two-thirds or higher. This makes the elasticity of  $N_1$  with respect to  $J + L(h)$  equal to  $-3$  or greater. I noted above that  $J$  is probably greater than  $L(h)$  on average and may be twice as great for firms in which there is no effective experience rating ( $e = 0$ ). Even  $J = L(h)$  implies that the current unemployment insurance subsidy doubles  $J + L(h)$  and, with an

<sup>36</sup> This assumes that  $\partial y / \partial N_1 > 0$ , i.e., that more employment increases average income. This must be true at an optimum, since more employment reduces leisure. Although for particular individuals  $\partial y / \partial N_1 < 0$  because the unemployment insurance subsidy exceeds the net wage (see examples in Feldstein [1974]), for the firm's employees as a whole this will not be true.

elasticity of  $-3$ , reduces  $N_1$  to one-eighth of the value that would be optimal with no unemployment insurance subsidy. The effect of the subsidy is thus to reduce optimal employment drastically.<sup>37</sup>

It is interesting also to examine the elasticity of  $N_1$  with respect to  $J$  for  $J > 0$ . Equation (3.15) implies

$$\frac{J}{N_1} \frac{\partial N_1}{\partial J} = - \frac{1}{1 - \alpha} \cdot \frac{J}{J + L(h_1)}. \quad (3.16)$$

With  $\alpha = 2/3$  and  $J = L(h)$ , this yields an elasticity of employment during the period of reduced demand with respect to the unemployment insurance subsidy of  $-1.5$ . From the definition in equation (3.8), it is clear that a 10 percent increase in the benefit level implies a 10 percent increase in  $J$  and therefore a 15 percent decrease in employment. Making unemployment compensation taxable like ordinary income would reduce  $J$  by at least  $100t_y$  percent;<sup>38</sup> with  $t_y = 0.3$ ,  $J$  is cut by at least 30 percent and therefore  $N_1$  increases by at least 45 percent.<sup>39</sup> Similarly, introducing experience rating (raising the value of  $e$  from zero to  $e > 0$ ) reduces  $J$  by  $100(1 - t_y)e/(1 - t_b)$ ; with  $t_b = 0$ ,  $t_y = 0.3$ , and  $e = 1$ ,  $J$  falls by 70 percent and optimal employment doubles.<sup>40</sup>

It should be emphasized that these conclusions rest on the assumption that working hours are institutionally fixed, unable to respond to changes in demand, and unaffected by the existence of the unemployment insurance subsidy. It is now time to examine the implications of dropping that assumption.

### *b) Optimal Working Hours and Employment*

When hours as well as the number of workers can be varied, the response to a fall in demand is much more complex. It may be optimal for the firm to reduce either employment or hours or both, and, more surprisingly, it may be optimal for the firm to increase either one of these.<sup>41</sup> The optimal

<sup>37</sup> Note that equation (3.11) shows that  $N_1 < N_0$  even if  $J = 0$ . Two caveats should also be noted. First, the average condition that  $J$  is approximately equal to  $L(h)$  may not be representative of any particular firm. For those firms with  $e = 1$ , I noted above that  $J$  is approximately two-ninths of gross wages or approximately half of the value of  $L(h)$  assumed here. For such firms, the existence of  $J > 0$  reduces  $N_1$  by a factor of  $(9/11)^3 = 0.55$ . In contrast, for firms with  $e = 0$ , the effect is even greater than the reduction indicated in the text. Second, the implied changes in employment do not refer to all of the employees of a firm but only to those who produce that particular product for which demand has temporarily fallen. Temporary layoffs for particular types of workers are consistent with an observed relatively high overall level of employment.

<sup>38</sup> With  $e = 0$ ,  $J$  is reduced from  $b/(1 - t_y)$  to  $b$ ; this implies a proportionate reduction of  $t_y$ . With  $e > 0$ , the reduction in  $J$  is larger.

<sup>39</sup> This increase in  $N_1$  may make  $N_1 > N_0$  and therefore imply full employment.

<sup>40</sup> See n. 39 above.

<sup>41</sup> Of course, the constraint  $N_1 \leq N_0$  may be binding and may thus induce a decrease in  $h_1$  that would not otherwise be optimal. Similarly, if there is a constraint that permits hours to be reduced but not increased ( $h_1 \leq h_0$ ), this constraint may be binding; the problem is then equivalent to the fixed-hours case of Sec. 3.1. For a different model of the determination of working hours with special reference to overtime, see Flemming (1974).

behavior will depend on the properties of the production function and on the individuals' preferences for leisure. This section will examine this ambiguity and will assess the effect of the unemployment insurance subsidy on both employment and hours.

The first-order condition for average hours during the period of reduced demand is, from equations (3.2) and (3.5),

$$G_{h_1} = - \frac{N_1 v'(h_1)}{(1 - t_y)u'(y)p_1}. \quad (3.17)$$

Since  $G_{h_1}/N_1$  is the marginal product per employed worker of increasing average hours, equation (3.17) states that the utility of the after-tax marginal revenue product per employed worker [ $u'(y)(1 - t_y)p_1 G_{h_1}/N_1$ ] is equal to the marginal utility of additional leisure [ $-v'(h_1)$ ]. Note that, although the equilibrium condition is not directly affected by the unemployment insurance subsidy, it is affected indirectly. Since the subsidy changes  $N_1$ , it directly alters the right-hand side of (3.17) and also changes the values of  $G_{h_1}$  at every level of  $h_1$ . The net effect of the subsidy on optimal hours can only be determined by examining the joint optimum of hours and employment.

First, however, it is necessary to consider the optimum average hours during the period of normal demand. From equations (3.3) and (3.6), the first-order condition is

$$G_{h_0} = - \frac{N_0 v'(h_0)}{(1 - t_y)u'(y)p_0}. \quad (3.18)$$

The interpretation of this equation is also straightforward: the utility of the after-tax marginal revenue product of increasing average hours must equal the marginal utility of additional leisure. The most important implication is that, if the marginal utility of income is constant [ $u''(y) = 0$ ], the optimal number of hours during the period of normal demand is not affected by the magnitude of the unemployment insurance subsidy or by the response to the fall in demand. This decomposition of the optimum conditions permits us to focus on the two first-order conditions for  $N_1$  and  $h_1$ , equations (3.7) and 3.17).

To assess the effects of changes in demand ( $p_1$ ) and in the unemployment insurance subsidy ( $J$ ), we totally differentiate these equations and obtain

$$\begin{aligned} (1 - t_y)u'(y)p_1 G_{NN} dN_1 + [(1 - t_y)u'(y)p_1 G_{Nh} + v'(h_1)] dh_1 \\ = (dJ - G_N dp_1)(1 - t_y)u'(y) \end{aligned} \quad (3.19)$$

and

$$\begin{aligned} [(1 - t_y)u'(y)p_1 G_{Nh} + v'(h_1)] dN_1 \\ + [(1 - t_y)u'(y)p_1 G_{hh} + N_1 v''(h_1)] dh_1 \\ = -(1 - t_y)u'(y)G_h dp_1. \end{aligned} \quad (3.20)$$

Consider first the effect of a change in the unemployment insurance subsidy at any level of reduced demand ( $p_1$ ). Solving these two equations yields

$$\frac{dN_1}{dJ} = \frac{p_1 G_{hh} + N_1 v''(h_1)(1 - t_y)^{-1}[u'(y)]^{-1}}{\Delta} \quad (3.21)$$

and

$$\frac{dh_1}{dJ} = \frac{-p_1 G_{Nh} - v'(h_1)(1 - t_y)^{-1}[u'(y)]^{-1}}{\Delta}, \quad (3.22)$$

where  $\Delta$  is the determinant of the coefficients of equations (3.19) and (3.20) and is positive as a necessary second-order condition for the maximization of utility in equation (2.7).

Since  $(1 - t_y)u'(y)p_1 G_{hh} + N_1 v''(h_1) < 0$  is also a necessary second-order condition,  $dN_1/dJ$  is unambiguously negative. The result of the previous section, that an increase in the unemployment insurance subsidy decreases employment, remains true even when hours are allowed to adjust. Moreover, since  $(1 - t_y)u'(y)p_1 G_{Nh} + v'(h_1) < 0$ ,<sup>42</sup> equation (3.22) shows that the unemployment insurance subsidy increases the average hours per worker during the period of reduced demand. Thus, unemployment insurance exacerbates the effect of demand on employment and increases the incentive to use layoffs rather than shorter hours for any given reduction in man-hours.

Although the effect of the unemployment insurance subsidy is unambiguous, the effect of a change in demand cannot be determined without further restriction. Equations (3.19) and (3.20) imply

$$\begin{aligned} \frac{dN_1}{dp_1} = & \frac{-[(1 - t_y)u'(y)p_1 G_{hh} + N_1 v''(h_1)]G_{N1}}{\Delta} \\ & + \frac{[(1 - t_y)u'(y)p_1 G_{Nh} + v'(h_1)]G_{h1}}{\Delta} \end{aligned} \quad (3.23)$$

and

$$\begin{aligned} \frac{dh_1}{dp_1} = & \frac{[(1 - t_y)u'(y)p_1 G_{Nh} + v'(h_1)]G_{N1}}{\Delta} \\ & - \frac{(1 - t_y)u'(y)p_1 G_{NN}G_{h1}}{\Delta}. \end{aligned} \quad (3.24)$$

Since the denominators are positive, the signs of the optimal changes in  $N_1$  and  $h_1$  depend on the relative magnitudes of the positive and negative

<sup>42</sup> It is easy to show that this inequality is true. Recall from equation (3.17) that  $(1 - t_y)u'(y)p_1 G_h + N_1 v'(h_1) = 0$ . Dividing by  $N_1 > 0$  and recognizing that  $G_h/N > G_{hN}$  follows from the decreasing returns to variations in employment alone yield

$$(1 - t_y)u'(y)p_1 G_{hN} + v'(h_1) < (1 - t_y)u'(y)p_1 G_h N_1^{-1} + v'(h_1) = 0$$

as required.

terms in the numerator. This depends on both the technological conditions and the employees' preferences for leisure. Without further restriction, it is possible to eliminate only the combination  $dN_1/dp_1 < 0$  and  $dh_1/dp_1 < 0$ , that is, that a decrease in price raises both employment and hours.<sup>43</sup> Of course,  $dN_1/dp_1 < 0$  violates the restriction  $N_1 \leq N_0$  and actually results in a change in  $h_1$  only. *What can be said unequivocally is that the unemployment insurance subsidy increases the likelihood of a fall in employment and magnifies the size of any unemployment that occurs.*

Finally, it is interesting to note that, even with no fall in demand, the presence of the unemployment subsidy makes it optimal to have a period of feigned unemployment, an unemployment insurance holiday. This is easily seen in the basic first-order condition for employment, equation (3.7). Even if  $p_1 = p_0$ , the possibility of obtaining a subsidy at rate  $J$  for some part of the year ( $J > 0$ ) implies that it is optimal to increase  $G_N$  during those weeks, that is, to reduce employment. Moreover, equation (3.21) shows that  $dN_1/dJ < 0$  even if  $p_1 = p_0$ , that is, any increase in the unemployment insurance subsidy increases the optimal unemployment insurance holiday.

#### 4. Some Further Implications

The analysis of Sections 2 and 3 is essentially microeconomic, focusing on the behavior of the individual firm and its employees. The macroeconomic implications of this pattern of temporary layoffs and the scope for a reform of unemployment insurance to achieve macroeconomic goals will be considered briefly in this section.

##### *a) Macroeconomic Effects of Unemployment Insurance*

The analysis in this paper implies that, under the economic conditions that have prevailed in the postwar period, our current system of unemployment compensation is likely to have increased the average rate of unemployment. The usual presumption, that unemployment compensation reduces unemployment because it automatically increases government spending when unemployment rises, is really irrelevant. When the economy is experiencing the average high "permanent" rate of unemployment, that is, when there is neither a cyclical peak nor a cyclical trough, the unemployment insurance system collects as much in tax

<sup>43</sup> Note that  $dN_1/dp_1 < 0$  implies  $-G_N[(1 - t_y)u'(y)p_1G_{hh} + N_1v''(h_1)] < -G_H[(1 - t_y)u'(y)p_1G_{Nh} + v'(h)]$  while  $dh_1/dp_1 < 0$  implies  $-G_H(1 - t_y)u'(y)p_1G_{NN} < -G_N[(1 - t_y)u'(y)p_1G_{Nh} + v'(h)]$ . Since all four terms are positive, this implies that the product of the two smaller parts of the inequalities is less than the product of the two larger parts. After factoring out  $G_NG_H$ , this is equivalent to  $\Delta < 0$ , which is false. Therefore,  $dN_1/dp_1$  and  $dh_1/dp_1$  cannot both be negative.

revenue as it pays out in benefits. Although benefits do exceed tax revenues during cyclical downturns, the same fiscal stimulus would be provided through other expenditure increases or tax cuts by a government committed to maintaining aggregate demand. The primary effect of our current system of unemployment compensation is not its contribution to aggregate demand but its adverse impact on the incentives of employers and employees.

Section 3 shows explicitly how the unemployment insurance subsidy increases the change in unemployment that follows any change in demand.<sup>44</sup> If the subsidy were reduced to zero, the induced temporary unemployment would be eliminated. At this point, the reader may well be puzzled: if demand falls by as much but there is a smaller reduction in employment, will there not be extra output that is not purchased?<sup>45</sup> The puzzle is easily solved. Note first that it is clear that an increase in the supply of labor will, by Walras's law, result in demand for the additional output unless monetary policy does not provide adequate support for the new level of income. What is the microeconomic process by which this occurs?

Clearly, if the firm's demand fluctuates during the year and its rate of output is nevertheless determined by a higher level of employment than is optimal for the periods of reduced demand, the firm will have to maintain an inventory that increases during the periods of reduced demand. In order to reduce the inventory when demand returns to the "normal" level,<sup>46</sup> the full employment output of the firm must be less than the normal level of demand. The immediate consequence of this is to require the firm to reduce the permanent size of its labor force below the current level of  $N_0$ . Two things should be noted. First, the workers who are dismissed in this process would find jobs in other firms; this is a consequence of the full employment assured by Walras's law. Second, and more important, if every firm shares proportionately in the increased demand that results from increased employment, each firm will be able to retain its original  $N_0$  workers and to employ them with a lower average rate of unemployment. Any actual dismissals (and hires by other firms) would occur only because of the second-order effects of a nonproportional expansion of demand. In short, there is no problem in achieving the additional demand required to support the increased supply of labor.

The current analysis is clearly related to recent evidence that "the Phillips curve has shifted outward" or, alternatively, that the "critical

<sup>44</sup> Let me emphasize again that it is the unemployment insurance *subsidy* ( $J > 0$ ) and not unemployment insurance itself ( $b > 0$ ) that causes the increase in temporary layoffs.

<sup>45</sup> It is of course true that a fall in average hours caused by this reduced unemployment will reduce output. But the problem remains if hours are institutionally fixed. The solution to be described is valid in either case.

<sup>46</sup> I assume here, as in the previous sections, that demand varies between "normal" and "low."

level of unemployment at which the rate of inflation begins to accelerate has increased."<sup>47</sup> There has been much emphasis on the changing demographic structure of the labor force as a reason for this shift of the Phillips curve. However, these demographic changes do not account fully for this shift. Moreover, these calculations fail to reflect other changes in labor force composition that would lead to lower unemployment rates, for example, the growing share of college-educated employees or the increasing share of workers who are employed in the government sector.

The increasing unemployment insurance subsidy is a potentially important cause of the rising trend in unemployment rates and the apparent shift of the Phillips curve. Maximum weekly benefits have been rising more rapidly than wages during the past decade. More significantly, the relevant marginal tax rate ( $t_y$ ) paid by those who are likely to become unemployed has also risen rapidly, especially because of the growth of the social security tax (from a rate of 6.0 percent on the first \$4,800 of earnings in 1960 to a rate of 11.7 percent on the first \$14,100 in 1975) and of state and local income taxes. The impact of this growing subsidy on the Phillips curve clearly deserves further empirical analysis.

## 5. Conclusion

The overwhelming importance of temporary layoffs requires a revision of the basic conceptual framework within which layoffs and unemployment are now discussed. This paper shows that the usual dichotomy between quits as voluntary separations and layoffs as involuntary is often wrong. The common model of job search is relevant to understanding the behavior of those who quit their last job or who are entering the labor force, but it is not generally helpful for analyzing the experience of those who are laid off. For most of this group, unlike the searchers, the return to work is not the result of a voluntary decision by the employee but of recall by the employer.

And yet, as I stress by the technique of using a model that maximizes the utility of the representative employee, the optimal pattern or rules for temporary layoffs are part of the voluntary package of wages, hours, and work-sharing rules that employees choose or for which they bargain. Any particular spell of unemployment may be both involuntary and loudly protested, even though the decision rule that led to the layoff may have been chosen by the employees.<sup>48</sup>

<sup>47</sup> I put these two formulations in quotation marks to avoid taking sides in the debate over whether there is a nonvertical Phillips curve over at least some of the range. I will use the two formulations interchangeably in what follows. Phelps (1972) summarizes the evidence that the curve has been shifting, while Hall (1974) provides an estimate that that critical level of unemployment for a stable level of inflation has reached 5.5 percent.

<sup>48</sup> In using this broad definition of voluntary unemployment, I do not wish to imply that there is no involuntary unemployment. There are clearly circumstances in which, by any definition, there is involuntary unemployment.

The employees' preference for the existing pattern of temporary layoffs is, of course, a preference that has been shaped by the unemployment insurance subsidy. There is nothing natural or optimal about the resulting high rate of unemployment. The current analysis shows that the 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 the layoffs that do occur. It is important to emphasize that it is not unemployment insurance per se but the subsidy that it currently entails that causes this adverse distortion. If there were full experience rating in the unemployment insurance tax ( $e = 1$ ) and if benefits were taxed like other income ( $t_b = t_y$ ), the subsidy to temporary layoffs would be eliminated ( $J = 0$ ). Unemployment insurance could then continue to provide protection for those who are temporarily laid off without any distortion in their behavior.<sup>49</sup>

About half the adult unemployed at any time have been laid off. Among men aged 25–64, the fraction of layoffs rises to nearly three-fourths. The evidence presented in Section 1 of this paper indicates that most of this group of unemployed return to their original employers after a short spell of unemployment. The model of temporary layoffs derived here indicates that the unemployment insurance subsidy may be responsible for a very high fraction of such layoffs. If these conclusions are supported in future research, they will point the way to a reform of unemployment insurance that could substantially lower the permanent rate of unemployment without reducing the protection that is available to those who are without work.

## References

- Baily, M. N. "Wages and Employment under Uncertain Demand." *Rev. Econ. Studies* 41, no. 125 (January 1974): 37–50. (a)
- . "Unemployment and Unemployment Insurance." Yale Discussion Paper, 1974. (b)
- Becker, Gary. *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. New York: Columbia Univ. Press, 1964.
- Becker, Joseph. *Experience Rating in Unemployment Insurance*. Baltimore: Johns Hopkins Press, 1972.
- Cohen, W. J.; Haber, W.; and Mueller, E. *The Impact of Unemployment in the 1958 Recession*. Special Committee on Unemployment Problems, U.S. Senate, Committee Print, June 1960.
- Feldstein, M. S. "Specification of the Labor Input in the Aggregate Production Function." *Rev. Econ. Studies* 34 (October 1967): 375–86.
- . *Lowering the Permanent Rate of Unemployment*. A study prepared for the use of the Joint Economic Committee. Congress of the United States. Washington: Government Printing Office, 1973. (a)
- . "The Economics of the New Unemployment." *Public Interest* 33 (Fall 1973): 3–42. (b)

<sup>49</sup> There is still a distortion in the search behavior for those who are permanently laid off or who can become eligible for unemployment insurance after quitting their previous job.

- . "Unemployment Compensation: Adverse Incentives and Distributional Anomalies." *Nat. Tax J.* 37, no. 2 (June 1974): 231-44.
- . "The Importance of Temporary Layoffs: An Empirical Analysis." *Brookings Papers Econ. Activity*, 1976, in press.
- Flemming, J. S. "Wage Rigidity and Employment Adjustment: Alternative Micro-Foundations." Mimeographed. 1974.
- Gordon, R. J. "The Welfare Cost of Higher Unemployment." *Brookings Papers Econ. Activity*, no. 1 (1973), pp. 133-205.
- . "The Microeconomic Foundations of Wage Rigidity." Mimeographed. January 1974.
- Hall, R. E. "Why Is the Unemployment Rate So High at Full Employment?" *Brookings Papers Econ. Activity*, no. 3 (1970), pp. 369-402.
- . "Turnover in the Labor Force." *Brookings Papers Econ. Activity*, no. 3 (1972): pp. 709-56.
- . "The Process of Inflation in the Labor Market." *Brookings Papers Econ. Activity*, no. 2 (1974), pp. 343-409.
- Hamermesh, D. S. "A Disaggregative Econometric Model of Gross Changes in Employment." *Yale Econ. Essays* (1969), pp. 107-45.
- Hicks, J. R. *The Theory of Wages*. London: Macmillan, 1932.
- Holt, C. C. "How Can the Phillips Curve Be Moved to Reduce Both Inflation and Unemployment?" In *Microeconomic Foundations of Employment and Inflation Theory*, edited by E. S. Phelps. New York: Norton, 1970.
- Kaitz, H. "Analyzing the Length of Spells of Unemployment." *Monthly Labor Rev.* 93 (November 1970): 11-20.
- Lester, R. A. *The Economics of Unemployment Compensation*. Princeton, N.J.: Indus. Relations Sec., Princeton Univ., 1962.
- McCall, J. J. "Economics of Information and Job Search." *Q.J.E.* 84 (February 1970): 113-25.
- Mortensen, D. T. "Job Search, the Duration of Unemployment and the Phillips Curve." *A.E.R.* 60 (December 1970): 847-62.
- Oi, W. Y. "Labor as a Quasi-fixed Factor." *J.P.E.* 70, no. 6 (December 1962): 538-55.
- Parnes, H. S.; Nestel, G.; and Andrisani, P. *The Pre-Retirement Years*. Longitudinal Study of the Labor Market Experience of Men, vol. 3 (August 1972). Columbus: Center Human Resource Res., Ohio State Univ., 1972.
- Parsons, D. O. "Specific Human Capital: An Application to Quit Rates and Layoff Rates." *J.P.E.* 80, no. 6 (November/December 1972): 1120-43.
- Perry, G. "Unemployment Flows in the U.S. Labor Market." *Brookings Papers Econ. Activity*, no. 2 (1972), pp. 245-78.
- Phelps, E. S., ed. *Microeconomic Foundations of Employment and Inflation Theory*. New York: Norton, 1970.
- . *Inflation Policy and Unemployment Theory*. New York: Norton, 1972.
- Pigou, A. C. *The Theory of Unemployment*. London: Macmillan, 1933.
- Stein, R. L. "Work History, Attitudes and Income of the Unemployed." *Monthly Labor Rev.*, vol. 86 (December 1963).
- Stigler, G. J. "The Economics of Information." *J.P.E.* 69, no. 3 (June 1961): 312-25.
- Tobin, J. E. "Inflation and Unemployment." *A.E.R.* 62 (March 1972): 1-18.
- U.S. Department of Labor, Manpower Administration. *The Pre-Retirement Years*. Longitudinal Study of the Labor Market Experience of Men, vol. 2. Manpower Research Monograph, no. 15. Washington: Government Printing Office, 1970.
- U.S. Department of Labor, Bureau of Labor Statistics. *Layoff, Recall, and Worksharing Procedures*. Bulletin 1425-13. Washington: Government Printing Office, 1972.
- . *Employment and Earnings*, vol. 21, no. 10 (April 1975).

## LINKED CITATIONS

- Page 1 of 2 -



You have printed the following article:

### **Temporary Layoffs in the Theory of Unemployment**

Martin Feldstein

*The Journal of Political Economy*, Vol. 84, No. 5. (Oct., 1976), pp. 937-958.

Stable URL:

<http://links.jstor.org/sici?sici=0022-3808%28197610%2984%3A5%3C937%3ATLITTO%3E2.0.CO%3B2-U>

---

*This article references the following linked citations. If you are trying to access articles from an off-campus location, you may be required to first logon via your library web site to access JSTOR. Please visit your library's website or contact a librarian to learn about options for remote access to JSTOR.*

### **[Footnotes]**

#### <sup>20</sup> **Wages and Employment under Uncertain Demand**

Martin Neil Baily

*The Review of Economic Studies*, Vol. 41, No. 1. (Jan., 1974), pp. 37-50.

Stable URL:

<http://links.jstor.org/sici?sici=0034-6527%28197401%2941%3A1%3C37%3AWAEUUD%3E2.0.CO%3B2-4>

#### <sup>23</sup> **Specification of the Labour Input in the Aggregate Production Function**

M. S. Feldstein

*The Review of Economic Studies*, Vol. 34, No. 4. (Oct., 1967), pp. 375-386.

Stable URL:

<http://links.jstor.org/sici?sici=0034-6527%28196710%2934%3A4%3C375%3ASOTLII%3E2.0.CO%3B2-J>

### **References**

#### **Wages and Employment under Uncertain Demand**

Martin Neil Baily

*The Review of Economic Studies*, Vol. 41, No. 1. (Jan., 1974), pp. 37-50.

Stable URL:

<http://links.jstor.org/sici?sici=0034-6527%28197401%2941%3A1%3C37%3AWAEUUD%3E2.0.CO%3B2-4>

**NOTE:** *The reference numbering from the original has been maintained in this citation list.*

<http://www.jstor.org>

## LINKED CITATIONS

- Page 2 of 2 -



### **Specification of the Labour Input in the Aggregate Production Function**

M. S. Feldstein

*The Review of Economic Studies*, Vol. 34, No. 4. (Oct., 1967), pp. 375-386.

Stable URL:

<http://links.jstor.org/sici?sici=0034-6527%28196710%2934%3A4%3C375%3ASOTLII%3E2.0.CO%3B2-J>

**NOTE:** *The reference numbering from the original has been maintained in this citation list.*