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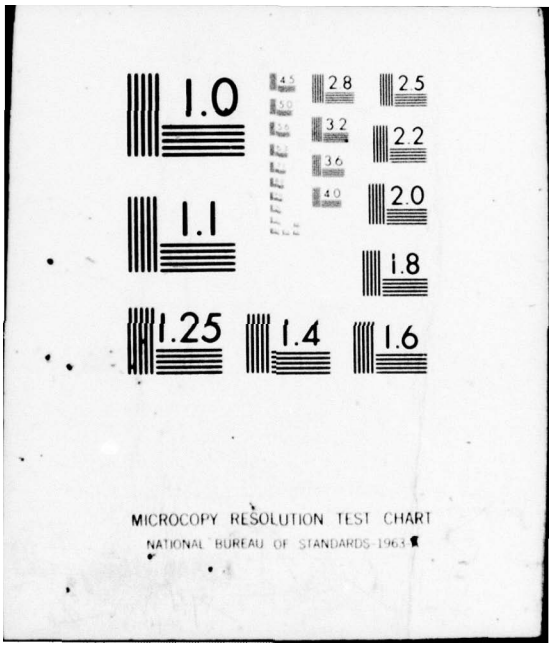
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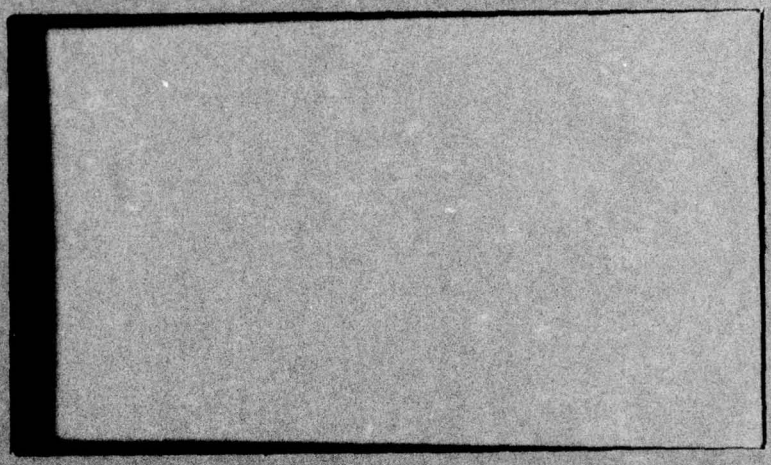

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FIXED WAGES, LAYOFFS, UNEMPLOYMENT COMPENSATION, AND WELFARE

by

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Introduction

The downward inflexibility of wages has long been used as an explanation of unemployment. Although Keynes himself went to length to deny that flexibility of money wages is itself sufficient to restore full employment, [1] the inability of the classical system to establish the correct relative values is central to Keynesian economics. At the most elementary level this rigidity is accepted as an economic fact of life, ultimately attributable to institutional constraints on the free movements of wages and prices: monopolies, labor unions, minimum wage laws, administered pricing policies, and the like. Rigid prices are assumed as an adequate discription of modern economies; there is no need to look further. In the works of Clower, Leijonhufvud and other disequilibrium theorists, it is argued that the slow diffusion of information about current opportunities allows prices at any instant of time to differ substantially from those which would produce a full employment equilibrium. The assumption of perfectly rigid prices is just one extreme of the spectrum of possible price adjustments, but gives the flavor of the Keynesian income constrained process. At the other end is the classical full employment assumption of infinitely fast price changes. Wages and prices are not rigid in an absolute sense, but such a gross simplification is necessary for a comparative statics explanation of Keynes' theory, the familiar IS-LM apparatus.

More recently, Baily (1974), Azariadis (1975), and Gordon (1975) have suggested that real wages are stable over time as the necessary outcome of microeconomic optimizing behavior in a competive labor market, even in a neoclassical environment which allows prices to instantly adjust to their

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We want to thank Kenneth Arrow, Martin Feldstein, Frank Hahn, Steven Shavell, Eytan Sheshinski and Joseph Stiglitz for their criticism and suggestions.

market clearing values. Workers, who are assumed to be risk averse, insure themselves against the possibility of future wage reductions by accepting a lower initial wage. Firms, by way of superior access to capital markets and more efficient sharing of risks, are assumed to be relatively more tolerant of risk,and hence can profitably supply such insurance.[2)] This argument assumes that the opportunities for spreading the risk of wage reductions outside of the employment contract are limited; no insurance is available. Such contingent contracts need not, of course, be written or explicit. A firm acquires a reputation which affects its attractiveness to potential employees. This reputation includes not only the firm's history of wage reductions, but the firm's policy of layoffs, recalls and overtime. The question that naturally arises is that of policy and welfare. Are such implicit contingent contracts socially desirable?

In this paper we employ a simple general equilibrium model to analyze the effects of alternative employment contracts. We show that significant external effects generated by such contracts preclude the competitive outcome from responding efficiently to unexpected changes in product demand. Stated simply, the efficient allocation of risk implies that the wage an employee receives in any period need not correspond to his marginal product. Thus the allocation of labor across industries at some point in time may be non-optimal. Generally there is too little labor mobility and output response to demand shifts.

Our results hinge crucially on two assumptions. First, job changes are costly to the individual. These costs include the expenses involved in searching for a new job, costs of relocating, and perhaps the psychic costs of working in a new environment. Such costs are in addition to the expenses borne by the firm in hiring and training the new worker. Thus for a firm to hire away a currently employed worker, it must offer a wage high enough to compensate for these additional expenses. The second assumption recognizes

that firms are limited in their ability to discriminate between old and new workers, and, generally, must pay the former at least as much as the latter. Thus the firm must raise the wages of old workers as well, if it desires to expand employment by attracting people who already are employed. This confers an element of monopsony power to the firm in the short run when it seeks to expand in response to favorable demand shifts, even though over longer time periods the steady flow of new labor force participants allows the firm to take the supply of labor as perfectly elastic.

There is no unemployment in our model. Employees and employers both expect that, once terminated from a job, they can instantly find a new job in the other industry at the prevailing wage, incurring a cost, denoted by c, in the process. These expectations are in fact fulfilled; in the jargon of the "new macroeconomics", they are "rational". However, a more realistic interpretation of the cost of transfer might reasonably include the time lost in locating a new job; the cost of "frictional unemployment". The substantive conclusions would not be affected.

We first analyze a situation where firms are prohibited from laying off employees. We demonstrate that a policy of flexible wages in one industry increases the desirability of wage flexibility in other industries. Thus, if firms are prohibited from dismissing employees and must rely solely on wage reductions to induce separations, two possible outcomes may exist. In one, wages are rigid and there is neither labor mobility nor output changes in response to shifts in demand. In the other, wages are flexible and labor flows to its most productive use. The fixed wage situation spreads risk efficiently, but allocates labor non-optimally. In the flexible wage equilibria it is just the opposite. Both are full equilibria in the usual sense that a firm takes the prices of outputs, the wage agreements of the other firms, and the utility level it must offer to attract workers as data. Thus, there is a

tradeoff between the proper allocation of risk over time, and efficient allocation of resources at each instant of time.

If firms may offer contracts with the possibility of future terminations, then layoffs will be utilized exclusively to induce separations. This result, first suggested by Baily and others, merely requires employees to be risk averse to make a strategy of wage reductions unprofitable for the firm. The number of layoffs is less than what might be considered optimal. We demonstrate that unemployment insurance with less than complete experience rating lowers the cost of layoffs to the firm and encourages labor mobility. In the context of the model, a properly designed unemployment insurance program will yield a fully efficient allocation.

The Model

We consider a two period world with uncertain second period demand. There are two firms, each of which manufactures a specific good.[3] The capital stock is fixed over both periods, so, in each firm, output equals the square root of labor input. Firms offer prospective employees contracts which specify a certain first period wage and, contingent upon demand contitions, a second period wage coupled with a probability of employment during the second period. A firm takes as given the wage contract offered by the other firm, the price of its output, and the utility level if must offer to employees.[4] It chooses an employment contract and labor demand to maximize expected profit. Uncertainty is generated by a random parameter in people's utility functions, which is symmetric between the two goods.[5]

Each person has a utility function equal, in each period, to $\tilde{\alpha} \log x + (1-\tilde{\alpha}) \log y$.[6] Total utility is the sum of the utility levels of the two periods. During the first period, $\tilde{\alpha}$ is known to be 1/2. During the second period $\tilde{\alpha}$ will equal $(1/2 + \varepsilon)$ or $(1/2 - \varepsilon)$, each with probability of 1/2. For

simplicity there is no transfer of wealth between periods. If during the second period an employee changes jobs, he incurs a monetary cost c.[6] Each worker supplies a unit of labor inelastically each period, and there is one unit of aggregate labor.

We shall carry out the analysis from the point of view of one of the firms. We shall denote by p the first period price of its output, by p_h the second period price when demand for that output is high and by p_ℓ when low. The corresponding prices for the other firm are, by symmetry p, p_ℓ and p_h, respectively. We shall let ℓ denote the labor employed by the firm.

The Case with no Layoffs

We first analyze the case where the possibility of layoffs during the second period is not open to firms. Firms are, however, allowed to adjust wages to demand conditions. Why may a firm find it profitable to offer a wage contract with variable second period wages? Clearly, since workers are risk averse and the firm must provide them with a given utility level, wage variations increase expected costs. On the other hand, a firm may want to encourage separations via wage reductions in response to weak demand, and similarly, raise wages to attract additional workers when demand is strong. We observe that in order to affect voluntary labor mobility, wage rates must differ across industries by an amount at least as great as the cost of transfer, c.

It is clear that a firm's choice between variable and fixed second period wages depends on the parameters of the production and utility functions--no general statement can be made. What is important to observe, however, is that a firm's decision is not independent of the choice of its competitor. Labor mobility depends on the difference between the wages offered by the two firms. As a result, the variability in wages that a firm must offer to induce labor mobility increases as the variability in the wage contract offered by

its competitor decreases. It is this interdependence between firms' decisions that raises the possibility of multiple equilibria. Furthermore, there is a clear distinction between the individual rationality of an outcome, and its social rationality. Labor mobility may be unprofitable from the point of view of each firm individually, while desirable from the point of view of society as a whole, including the firms. Finally, the multiplicity of equilibria and the distinction between individual and social rationality do not depend on workers' risk aversion. As will be argued later, they can occur even in the case of risk neutral labor.

We shall now consider explicitly the model presented in the previous section and demonstrate the points made above by choosing appropriate values for the parameters involved.

First, let us suppose that both firms offer a wage of 1 in each period, independent of demand conditions, and know that second period employment can neither be augmented or curtailed. Expected profits of each firm are given by $[p + \frac{1}{2}(p_h+p_\ell)] \sqrt{\ell} - 2\ell$. The firm chooses input ℓ to maximize expected profits, and so each firm demands labor equal to $\frac{1}{16}[p + \frac{1}{2}(p_h+p_\ell)]^2$. By symmetry, each firm must demand half the aggregate labor supply. Equilibrium in the second period goods' market requires that $\frac{p_\ell}{p_h} = \frac{\alpha}{1-\alpha}$ where $\alpha = \frac{1}{2}-\varepsilon$. Hence, for the labor and goods' markets to clear, $p = \sqrt{2}$, $p_h = 2\sqrt{2}\ (1-\alpha)$, $p_\ell = 2\sqrt{2}\ \alpha$, and each firm employs $\frac{1}{2}$ units of labor to produce $\frac{1}{\sqrt{2}}$ units of output. In this situation, expected profits are 1 for each firm.

To prove that this is a Nash Equilibrium, we must demonstrate that a firm, taking prices as well as the wage contract offered by its competitor as given, cannot increase its expected profits by offering an alternative wage contract. There are three possibilities open to the firm other than the fixed wage-constant employment contract, and they all involve variable second period

wages. The firm may want to increase labor employed during high demand, and decrease it during low demand; it may want to decrease labor employed when demand is low, but keep it at its first period level when demand is high; finally it may want to increase labor employed when demand is high, but keep it at its first period level when demand is low.

Let us consider the first alternative. The firms must offer a wage of 1+c to attract workers under strong demand and 1-c to induce separations under weak demand.[7] First period wage, w, must be sufficient to guarantee employees the same level of utility as the other firm offers; i.e.

$$\log w + \tfrac{1}{2}\log (1-c) + \tfrac{1}{2}\log (1+c) = \log 1 + \log 1 = 0 \quad .$$

Hence $w = (1-c^2)^{-\frac{1}{2}}$, which is greater than 1. Under this strategy, it is optimal to select labor demand in each period myopically. First period employment is $\frac{1}{2}(\frac{p^2}{w^2})$ or $\frac{1-c^2}{2}$. Second period employment is $\frac{2(1-\alpha)^2}{(1+c)^2}$ when demand is high and $\frac{2\alpha^2}{(1-c)^2}$ when demand is low. Expected profits are given by

$\frac{\sqrt{1-c^2}}{2} + \frac{(1-\alpha)^2}{1+c} + \frac{\alpha^2}{1-c}$, which must be less than the profits which accrue to the firm under fixed wages (i.e. 1) for the latter to be an equilibrium. That this is indeed possible can be seen by taking α to be .45 and c to be .15. For these values of the parameters, each firm can increase expected second period profits by switching from a constant employment policy to a policy of upward as well as downward variable employment policy. However, the increased first period labor cost associated with such a policy suppresses first period profits by a greater amount, and hence renders variable wages unprofitable.

To complete the argument that a fixed wage and employment policy is a Nash equilibrium, we must show that, for the same values of the parameters, it is not profitable for the firms to follow a policy of increasing labor demand when demand is high, while maintaining the first period employment level when

demand is low. To follow such a policy, a firm must offer a wage w during the first period, w_h when demand is high, and (1-c) when demand is low. Since workers are not risk lovers, $w_h = w$; and since the contract must offer a utility of 0, $w = (1-c)^{-\frac{1}{3}}$, which is greater than 1. Low demand labor demand will be chosen myopically. Labor demanded during the first period, which is also the labor employed during high demand, can be computed to be $[\frac{2p+p_h}{6w}]^2$. At that level of employment, however, the marginal value product of labor during low demand is $\frac{p_\ell}{2\sqrt{\ell}} = \frac{2\sqrt{2}\ \alpha\ 6(1-c)^{-\frac{1}{3}}}{2[2p + p_h]}$ (or $\approx .92$), which is greater than 1-c (or =.85).

But then, for these values of the parameters (i.e. $\alpha = .45$, $c = .15$), the firm is going to maintain a constant level of employment, and hence it has no incentive to offer a contract with wage variability. By an analogous argument we can exclude the possibility of a contract involving variable wages and only increased employment during high demand.

For the values $\alpha = .45$, $c = .15$ the constant wage employment contract is a Nash equilibrium.

Suppose now that each firm offers a wage of 1 in the initial period, and in the second period, $1 + \frac{c}{2}$ when demand is high and $1 - \frac{c}{2}$ when demand is low. Then, in the second period, each firm decides on labor demand after observing the price for its output. The high demand firm chooses to employ $\frac{p_h^2}{4(1+\frac{c}{2})^2}$ and the low demand firm $\frac{p_\ell^2}{4(1-\frac{c}{2})^2}$. Full employment requires that $\frac{p_h^2}{4(1+\frac{c}{2})^2} + \frac{p_\ell^2}{4(1-\frac{c}{2})^2}$ be equal to 1. Equilibrium in the second period goods market implies $(\frac{p_h}{p_\ell})^2 = (\frac{1-\alpha}{\alpha})(\frac{1+\frac{c}{2}}{1-\frac{c}{2}})$, so that $p_h^2 = \frac{4(1-\alpha)(1-\frac{c^2}{4})(1+\frac{c}{2})}{1 + c(\alpha - \frac{1}{2})}$ and $p_\ell^2 = \frac{4\alpha(1-\frac{c^2}{4})(1-\frac{c}{2})}{1 + c(\alpha - \frac{1}{2})}$. Firms' expected profits when offering a variable wage contract are $\frac{1}{2}(1-\frac{c^2}{4})(\frac{1}{1+c(\alpha-\frac{1}{2})})$ in the second period. The first period is identical to the previous situation of fixed wages; each firm earns $\frac{1}{2}$ in period 1.

To demonstrate that this configuration is also a Nash equilibrium for the same values of the parameters, we must show that no alternative wage contract yields higher expected profits. The firm has three alternatives to consider. It may want to have a constant employment level, independent of demand conditions; it may want to increase employment in response to strong demand but keep it at its first period level otherwise; finally, it may want to decrease employment in case of weak demand, but keep it at its first period level otherwise.

Let us consider the first alternative. If a firm offered w in each period and maintained constant employment, it could earn $\frac{1}{2w}$ in the first period and $\frac{\frac{1}{2}(p_h+p_\ell)^2}{4w}$ in the second, where w yields the same utility as the variable wage; i.e.

$2 \log w = \log 1 + \frac{1}{2} \log (1+\frac{c}{2}) + \frac{1}{2} \log (1-\frac{c}{2})$, so that $w = (1-\frac{c^2}{4})^{\frac{1}{4}}$,

which is less than 1. For the variable wage policy to be an equilibirum, it must yield higher expected profits for the firms than the policy of fixed wages; that is, $\frac{1}{2} + \frac{1}{2}\frac{1-\frac{c^2}{4}}{1+c(\alpha-\frac{1}{2})}$ must be greater than $(1-\frac{c^2}{4})^{-\frac{1}{4}} (\frac{1}{2}+\frac{\frac{1}{2}(p_h+p_\ell)^2}{4})$.

For the values $\alpha = .45$ and $c = .15$, this is indeed the case.

The second alternative involves the firm's decreasing its second period labor employment when demand is low, but maintaining an employment level equal to that of the first period when demand is high. The firms must offer a wage w during the first period, w_h when demand is high, and $(1-\frac{c}{2})$ when demand is low. Since workers are not risk lovers, w_h will be equal to w, which, in turn, must satisfy the equation $\frac{3}{2} \log w = \log 1 + \frac{1}{2} \log (1+\frac{c}{2})$; i.e. $w = (1+\frac{c}{2})^{\frac{1}{3}}$. Optimal first employment is given by $\left[\frac{2p+p_h}{6w}\right]^2$. But then, during low demand, the marginal value product of labor is $\frac{p_\ell}{2\sqrt{\ell}}$ (or $\approx .909$)

which is less than $1 - \frac{c}{2}$ (or = .925). Hence, the firm will not find it profitable to decrease its labor dorce during low demand. As a result, it can do better by offering a fixed wage fixed employment compared to to the fully flexible employment policy. By an analogous argument, we can exclude the possibility of a contract involving only increased employment during high demand.

For the values $\alpha = .45$, $c = .15$, the fully variable employment contract is a Nash equilibrium.

Although the example chosen requires employees to be risk averse, and this, generally, increases the range of parameters for which this phenomenon occurs, it is not by itself responsible. To see this, let us examine a situation in which both firms initially have fixed wages, and demand shifts are such that the price of the good in high demand exceeds that of the low demand good by an amount between c and 2c. Since, at a common level of employment, the marginal value product of a worker is proportional to the price of the output, it is possible to improve resource allocation (raise GNP) by transferring the marginal worker. But since his wage in the low demand industry exceeds his marginal value product, he may not profitably be hired away, since at the prevailing prices his product in the high demand industry is less than $1 + c$.

Having demonstrated the existence of two distinct equilibria, one would like to analyze how they compare from the point of view of the expected utility they provide. There are two aspects to be considered. One is whether, at equilibrium, the difference between the marginal value products of the workers in the two firms is equal to the cost of transfer, c.[9] The other is whether workers are insured against variability in the wage they receive. A situation of variable wages allocates labor so that the difference in productivity is exactly equal to the cost of transfer. This is easily

observed since wages differ by c, and each firm is at its most preferred labor supply, where the wage is equal to the marginal product. However, this is achieved at the expense of exposing workers to risk, which could conceivably be insured against. It is clear that if the cost of transferring is small, the loss from not insuring (being of the order of c^2) is negligible compared tothe costs of misallocation of labor.[9] If workers are risk neutral, no such ambiguity arises, variable wages are clearly superior. Furthermore, firms expected profits are higher in the variable wage regime.

Layoffs

Risk aversion on behalf of employees is sufficient to rule out wage reductions to induce separations. This is easily explained. Suppose a firm were to dismiss the same number of employees as wage reductions accomplish. The newly terminated employees would be no worse off and the remaining workers would not suffer a wage reduction. Since workers are risk averse, they would be willing to forego an amount in the first period greater than the expected gain in second period income. Firms could offer the same level of utility and increase expected profits by insuring workers against the possibility of wage reductions.

Similarly, each firm will find labor costs lowest if it indemnifies workers against the costs of being terminated. Severance pay and supplementary unemployment benefits are common examples. Firms and workers both believe that workers can find another job at the prevailing wage after incurring the transfer expense, c. The firms pay workers 1 in each period employed, and a severance pay of c if layed off. Because this policy exposes a worker to no risk, it is the cheapest way for a firm to offer the competitively determined level of utility. Each firm maximizes expected profits by choosing the appropriate labor input in the first period, and the number of workers

terminated under conditions of weak demand. It takes the layoff policy of the other firm as given and is happy to employ the newly layed off when its own demand is strong, paying the common wage equal to one.

Depending on the magnitude of the shift in demand, two situations may exist. If the change in demand is great enough so that some workers are layed off, the marginal value product of a worker in the weak demand industry is equal to 1-c. Since it is optimal to pay a severance pay of c to workers who are terminated, the marginal cost of a worker who is employed by the firm in the first period is equal to the difference between what he receives if he is employed (1) and what he receives if terminated (c), or 1-c. Since profit maximization implies that workers are hired in the initial period up to the point where expected marginal product equals the wage, the worker's marginal product under strong demand must be equal to 1+c (his first period wage, 1, exactly equals his first period marginal product). Thus, if attention is confined to symmetric equilibria, where each firm has the same employment policy, the difference in productivity between the marginal worker in the two industries is equal to 2c. Since it costs only c to transfer the marginal worker, it is clear that resource allocation could be improved if the marginal worker were transferred from the weak demand industry to the strong demand industry. In this situation it is plain that it would not be profitable for the firm with strong demand to increase wages to attract new employees. It would have to offer at least 1+c to encourage job transfers, at which point the new worker becomes a matter of indifference. However, it would have to raise the wages for all old workers to accomplish this. Risk aversion implies that such an uncertain rise in future wages is valued at less than its expected value, so that expected labor costs necessarily rise under this policy, rendering it unprofitable.

If the demand shifts are small, the competitive outcome may entail no

layoffs or job transfers, even though some labor mobility would be desirable. Consider a change in tastes such that when output is maintained at first period levels the marginal product of a worker in the low demand industry is greater than 1-c, but less than $1 - \frac{c}{2}$. Since the expected marginal product of a worker must equal his wage, the marginal product of a worker in the high demand industry is between $1 + \frac{c}{2}$ and $1 + c$. Thus, there is no incentive for the low demand industry to terminate workers, because the marginal product of a worker exceeds his marginal cost, 1-c. But the difference in productivity between the marginal worker in the two industries is greater than the cost of transfer, so welfare could be improved if some workers were transferred and suitably compensated.

Thus, the layoff equilibrium results in a less efficient allocation of labor than does variable wages. Workers, however, are insured against the possibility of wage reductions, so that there is an efficient allocation of risk. The layoff equilibrium is superior to the outcome under fixed wages, if some workers are in fact dismissed, as there is some labor mobility in the former, and in both there is an efficient allocation of risk.

Unemployment Insurance

Several writers (Baily (1972), Feldstein (1973), Azariadis (1975)) have pointed out that the current poor method of experience rating implies a very large subsidy to layoffs. By experience rating it is meant that employers pay the actuarially fair value of the benefits accruing to their terminated employees, so that firms realize that they ultimately bear the costs of terminations when making layoff decisions. The current analysis suggests that such a subsidy may be desirable since it encourages labor mobility.

Compulsory full experience rating insurance would have no effect in our model. Each firm would find it optimal to offer the benefits of such insurance

on its own initiative, since any policy which exposes workers to risk is dominated by some certain income package. In the context of the model, however, if firms are required to pay only half the cost of such employment benefits labor will be allocated in the most efficient manner. Firms will dismiss workers when demand is low up to the point where their marginal product is equal to their marginal cost $1 - \frac{c}{2}$, since $\frac{c}{2}$ must be paid in the form of higher unemployment insurance premiums if a worker is terminated. Since the marginal worker is hired at the point where his expected product equals his wage, the product under favorable demand must equal $1 + \frac{c}{2}$. So the difference in productivity is exactly c,as efficiency requires. This is clearly a full optimum, since no worker is exposed to wage uncertainty. The insurance commission will make a loss, which must be covered by some means. This models the current situation where general tax revenue is sometimes used to finance unemployment benefits.

The fifty percent rule is meant to be illustrative. It rests crucially on the symmetry of production functions and the probability distribution of demand shifts between the two industries. In more complicated situations, there is no guarantee that a full optimum may be achieved by a policy which treats all firms identically. Nevertheless, the case for full experience rating is tenuous. In general, layoffs should be subsidized.

Conclusion

In the context of the model, the only competitive outcome involves firms offering fixed wage contracts with the possibility of layoffs. The outcome is suboptimal in that labor is misallocated between the two industries. If labor were not risk averse, this outcome would still be possible. However, it would also be possible in this case to have another equilibrium in which wages varied in response to demand. If this occurred, it would be efficient.

Our model suggests that wage flexibility in one industry compliments wage flexibility in other industries. Recently, Hall (1975) has argued that the presence of a large non-entrepreneurial sector of the economy marked by rigid wages reduces the flexibility of wages in the residual competitive, profit maximizing sector. Our findings support this "spill-over of rigidity", as Hall terms it, at least in situations of unexpected demand changes between these two sectors (as opposed to the more macro-economic concept of shifts in the aggregate level of demand).

The downward inflexibility of wages is quite robust. This result, put forward by several earlier writers, merely requires that firms be less risk averse than their employees. The upward inflexibility of wages is an implication of our model. However, it is possible to conceive of more complicated situations where firms find it profitable to raise wages to attract additional workers. It is an interesting conjecture that this is responsible for an inflationary bias as the economy continually responds to demand shifts. However, such an implication is beyond the scope of the simple two period, non-monetary, model we have presented.

Perhaps the weakest ground upon which such analysis rests is the assumption of relative risk neutrality on behalf of firms. Two explanations for this have been advanced. The first argues that entrepreneurs are self selected on the basis of their tolerance of (or actual preference for) risk. The other recognizes that the opportunities for diversification of risk are greater in the capital market than in the labor market. This argument is valid so long as the risks are not systematic, and unexpected changes do not affect all firms equally. It is these types of risk for which our model is relevant, such as shifts in preferences. For unexpected changes in the level of aggregate demand, which more or less affects all firms equally, only the first explanation is operative. The validity of this assumption is an empirical matter.

Although our model is quite specific, some conclusions appear to be of more general validity. Declining firms find it profitable to employ more workers than immediate considerations would imply. Expanding firms are frustrated in their quest for more labor by such forms of labor contracts whereby workers may receive more than their product. Thus, a competitive economy might be less efficient in allocating labor during periods of fluctuating demand than during periods of relatively more stable demand.

FOOTNOTES

1) (9) p. 267.

2) This argument requires that workers and firms have identical probability distributions concerning the states of nature.

3) The number of firms in each industry is not important. For simplicity it is assumed to be 1.

4) It is assumed here that the firm knows the workers' utility function as well as their expectations concerning the second period states of nature. A weakening of this assumption would complicate the analysis without altering the results.

5) This symmetry justifies the assumption of firms' risk neutrality, which is not otherwise apparent. Since one firm's high demand corresponds to the other firm's weak demand, the returns are perfectly negatively correlated. Thus, an efficient capital market will value such returns as equal to their expectations.

6) It is well known that such preferences imply an indirect utility function which is logarithmic in wealth, independent of prices. As a result, we may ignore portfolio-theoretic considerations from entering the worker's decision problem.

7) It is assumed that c is divided between the two goods in the same ratio as any other income. Alternatively c can be modelled as a utility cost without altering the analysis in any significant way.

8) It is clear that the firm will never find it optimal to offer either strictly more than $1 + c$ or strictly less than $1 - c$ to attract or get rid of labor, respectively.

9) Inefficient allocation of labor affects the workers' expected utility through higher variability of prices.

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In a general equilibrium model with uncertain second period demand, incomplete markets, and costly labor mobility, we analyze the feasibility and optimality of alternative employment contracts. For the case where layoffs are prohibited, we demonstrate that both the fixed wage--constant employment contract, as well as the flexible wage--variable employment contract are equilibria in firm behavior, while the latter is preferable from society's point of view. In the case with layoffs, we show that the competitive mechanism leads to a less than optimal number of layoffs, and we demonstrate that unemployment insurance with less than complete experience rating lowers the cost of layoffs to the firm and encourages labor mobility. In the context of the model, a properly designed unemployment insurance program yields a fully efficient allocation.

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