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THE DEMAND FOR WORKERS AND HOURS AND THE EFFECTS OF JOB SECURITY POLICIES: THEORY AND EVIDENCE

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ABSTRACT

There has been a wide variety of research on worker-hours substitution and the effects of various costs on the speed and extent to which labor demand adjusts. Much of this literature, though, confuses various types of fixed costs and fails to provide a guide for identifying how changes in labor-cost structures affect static relative demands for workers and hours and the paths by which they adjust. This study presents a typology of labor cost structures and examines how they affect these and other aspects of labor demand. Some of the many recently adopted changes in labor-market policies in OECD countries are pigeonholed by their effects on labor costs.

A review of the evidence indicates clearly that there is some slight substitution between workers and hours along a constant effective-labor isoquant. The evidence is clear that employers adjust the demand for hours more rapidly than that for workers, and that both adjust fairly rapidly. It also shows that a major effect of cost-increasing policies designed to induce substitution from hours to workers is a reduction in the total amount of worker-hours demanded. Original analysis demonstrates that lags in the adjustment of employment in response to changes in demand lengthened in most OECD countries during the 1970s.

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I. Introduction

Since the 1960s there has been a rapid spread of what can collectively be called job-security policies. Some put restrictions on employers' behavior before workers are displaced, some provide income security to workers after displacement, and still others offer special treatment of specific groups of workers when permanent layoffs are contemplated. They are also diverse in origin: Some are negotiated between unions and management, while others are imposed by government.

My purpose here is to provide the background for examining how these policies affect labor demand. Reference is made to specific examples, but presenting the details of the array of specific policies is left to others.[1] The nature of labor costs is discussed and linked to employers' optimizing behavior in the face of differing cost structures. Both the static demand for labor --- the amount of employment and hours generated on average --- and fluctuations in employment and hours --- labor-market dynamics --- are discussed. The outcome is a guide to the qualitative effects of current and proposed policies on the demand for labor. An examination of empirical results on the effects of structures of labor costs on employment (most of which are unfortunately general rather than linked to specific policies) then suggests the potential quantitative impacts of the various policies.

II. The Nature of Labor Demand and Labor Costs

In this section I categorize labor costs facing employers and examine their impacts on the level of and changes in profit-maximizing labor inputs. I ignore the effects of differences in

average labor costs among groups of workers, as I have analyzed and summarized evidence on them elsewhere (Hamermesh, 1986).

A. Fixed Employment Costs

The simplest example of a labor-cost structure is a fixed cost per worker, V, that the employer must pay each time period no matter how many hours a particular worker's services are utilized or how much the worker's hourly labor cost is. Examples of such costs include employer-provided health insurance (life insurance too in some cases); clerical costs of maintaining payroll and other records on the worker; and, in the United States, the (relatively low level of) taxes that finance unemployment insurance benefits.[2]

Following Rosen (1978), assume that the total cost of labor is W(H)EH+VE, where W is the hourly wage rate, expressed as a function of hours per worker, and H is the average hours worked per employee. Then the marginal cost of a worker is WH+V; the cost of an extra hour of labor is approximately EW[1+p], where E is total employment, and p is the elasticity of the wage rate with respect to hours. Under certain simplifying assumptions p is the premium rate for overtime work. (I assume overtime is worked, but that it constitutes a small fraction of total hours.) Assume that production is characterized by:

(1) $Q = F(K, G(E,H))$,

where K is the typical firm's capital input. I assume here that employment-hours substitution is separable from capital-labor substitution, which may or may not be correct.[3]

Consider the effect of an increase in V if W remains constant. Labor costs per worker rise, so that the cost of a given number of

worker-hours rises. This increase has three separate effects. First, and most obviously, the scale effect reduces employers' labor demand by the product of the labor-demand elasticity and the percentage increase in total labor costs for a given employment level. One impact of this increase is thus a decline in EH, total worker-hours demanded.

The second impact is a substitution effect on the firm's relative demand for employees and hours. The relative price of these two labor inputs, $[WH+V]/[EW(1+p)]$, rises, inducing substitution away from employment and toward hours. As long as some substitution is possible, the imposed change will induce employers to lengthen workweeks by adding overtime hours and reducing employment to achieve a given rate of output. At a given wage rate and a constant premium for overtime work, increased fixed costs of employing a worker cause a decrease in the employment-hours ratio.

The third effect is more subtle and arises from the heterogeneity of labor inputs. Assume for analytical simplicity that there are only two types of labor, working H_1 and H_2 hours respectively, and that the firm uses E_1 and E_2 employees in each category. Total labor costs are then:

(2) $$\Sigma[W_i(H_i)H_i + V_i]E_i,$$

where the subscript i refers to the particular group of labor. Assume that production is characterized by:

(1') $$Q = F(K, G(E_1,H_1,E_2,H_2)),$$

so that labor inputs are still assumed to be separable from capital. If fixed costs of employment increase by the same nominal amount, the relative prices of employment and hours of the two types of

worker change in proportion only if $V_1=V_2$, $p_1=p_2$, $W_1=W_2$, and their employment and hours are the same, i.e., if the two groups of workers are functionally identical, so that the case is uninteresting.

In general, a constant nominal increase in the fixed cost of employment represents a greater percentage increase in the price of worker-hours of low- than of high-wage employees, and a greater increase in the price of employment relative to hours among low- than among high-skilled workers. If all six pairs of employment-hours combinations are p-substitutes, and labor is separable from capital, a constant nominal increase in V_1 and V_2 will induce substitution away from low-skilled worker-hours and toward high-skilled labor (in addition to the substitution away from labor generally and toward capital). Moreover, within each group of workers there will be substitution toward greater hours per worker, with greater substitution toward more hours per low-skilled employee.

Under different assumptions about the nature of production this conclusion does not necessarily stand up. For example, suppose hours of each type of worker must be the same (H_1 and H_2 are perfect p-complements), perhaps because a plant must operate for a shift of a given duration. We will still observe a relative decrease in total worker-hours of low-skilled employees, because there will be a relative decline in employment of low-skilled workers; but hours per worker will change identically for both groups.

When the assumption of separability of capital from labor in (1') is relaxed, it becomes difficult to draw general conclusions about the effects of changes in fixed costs. One might, for

example, imagine that machine-tenders must work in shifts of fixed duration, while hours per worker of other employees are not complementary with the intensity of capital utilization. In that case a rise in the fixed costs of employing machine-tenders will reduce their employment, but it will also reduce the rate of utilization of capital and could increase the ratio of employment to hours among other workers, depending on the relevant substitution elasticities. Clearly, once one disaggregates labor and abandons capital-labor separability, very little can be concluded a priori.

A large array of policies can be viewed as mixing imposed changes in hourly labor costs and fixed employment costs.[4] Increases in payroll tax rates to finance taxes on which there is a ceiling on earnings, and increases in the ceiling at a constant tax rate, raise the cost of employment if the ceiling is low, and have no effect on the cost of an additional hour. They are both equivalent to increases in fixed employment costs. If the ceiling is higher the effect of these changes on the relative size of fixed and variable employment costs may differ.

Reductions in the standard workweek (that require penalty rates on hours beyond the normal week) raise the fixed cost of employment, since the cost of an additional worker is raised by the penalty times the reduction in the normal workweek; but the cost of an additional hour also increases for employees who had been working marginally less than the previous standard week. The net impact depends on the distribution of hours per worker before the change was imposed. Changes in the penalty rate for overtime pay, and restrictions on the amount of overtime that may be used, are

other examples. In each case the impacts of the pure policy on labor-labor and employment-hours substitution will be attenuated because the marginal cost of an additional hour is raised; but, to the extent that the fixed-cost component of the change dominates, the ratio of employment to hours and the mix of workers employed will change in the directions indicated above. However, the potentially ambiguous effect of mixed policies underscores the importance of analyzing the specifics of each proposed change.

B. Costs of Changing Employment

A variety of natural and imposed labor costs accompanies gross changes in a firm's employment. Costs of searching for and processing new employees, including advertising costs and part of the overhead costs of maintaining a personnel department; initial training costs (those that must be incurred to make the employee minimally productive in the firm), to the extent the employer shares in these costs; and payroll costs that accompany layoffs, including higher payroll taxes or direct payments, are some examples.[5]

Most of the analysis of the cost of adjusting employment has assumed that the average cost increases the larger is the change in employment. The assumption is embodied in Figure 1A in the positive slope of CK.[6] That average costs are increasing is usually rationalized by pointing to an ever-greater disruption of the firm's operations as the change in employment increases. Consider a standard downward-sloping labor-demand schedule, D_1 (shown in Figure 1B), with the firm confronted by an imposed increase in the hourly cost of labor, from W_0 to W_1. We deal here with a decrease in equilibrium employment; a rise in employment can be handled mutatis

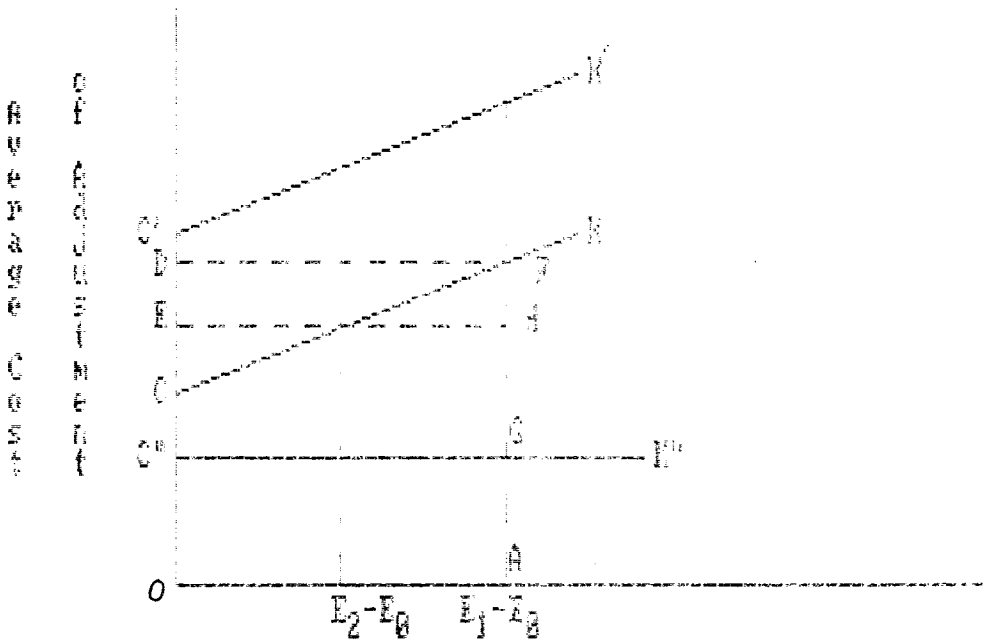


Figure 1A

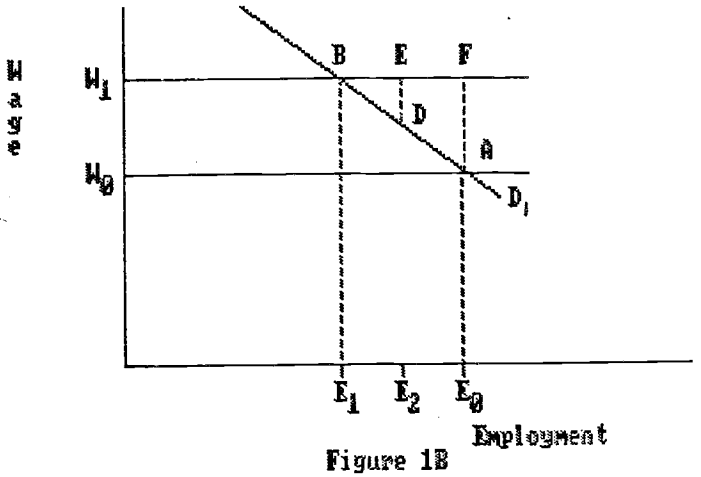


Figure 1B

mutandis with a similar analysis. In the absence of adjustment costs employment would fall from E_0 to E_1. With these costs, though, an immediate drop in employment engenders costs equal to OAFD in Figure 1A: Making the entire adjustment at once leads to very large transactions costs. The profit-maximizing firm can do better than this, for example, by making half the adjustment in the first time period, and the other half in the next. While the firm sacrifices profits in the amount DBE in Figure 1B when it is away from its new static profit-maximizing position, this loss is more than offset by the saving in adjustment costs. These latter are only OAHE --- two times the per-period cost of making the adjustment. The firm saves EHFD of adjustment costs, a larger amount than the DBE of static profits that it foregoes.

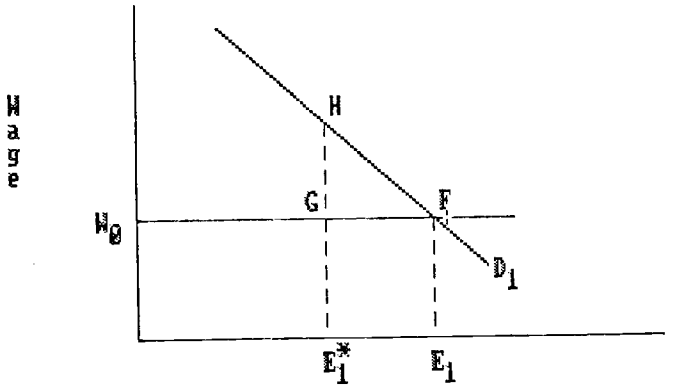
Increasing average costs of adjustment thus lead firms to spread out changes in employment when a permanent change in wages is imposed. In general, the adjustment takes forever, with employment approaching the new static equilibrium asymptotically (see the Appendix). The bulk of attention to these costs has been focussed on their effects on the timing of adjustment. Consider now how the timing is affected when average costs increase, for example by an upward shift from CK to C'K'. Even though the average cost of a particular adjustment is greater, the gain to spreading the costs over two periods is still the difference between the rectangle EHFD and the triangle DBE. Only if the line CK becomes steeper --- average costs rise more rapidly with larger adjustments than before --- will the rate of adjustment to a new equilibrium be slower.

Consider how the firm behaves if the average cost is

independent of the size of the adjustment. Except for the possibility of increasing disruption to operations as the size of the employment change increases, independence appears to be a good characterization of the nature of adjustment costs, especially given the absence of any evidence on this issue. In this case the line CK in Figure 1A becomes horizontal at C"K". There is no saving of adjustment costs if the cut in employment is spread over two periods, and the firm loses profits in the amount DBE for one period. With the average cost independent of the size of the adjustment, the firm changes to its new profit-maximizing employment level in one jump <u>if it changes employment</u> (Rothschild, 1971).

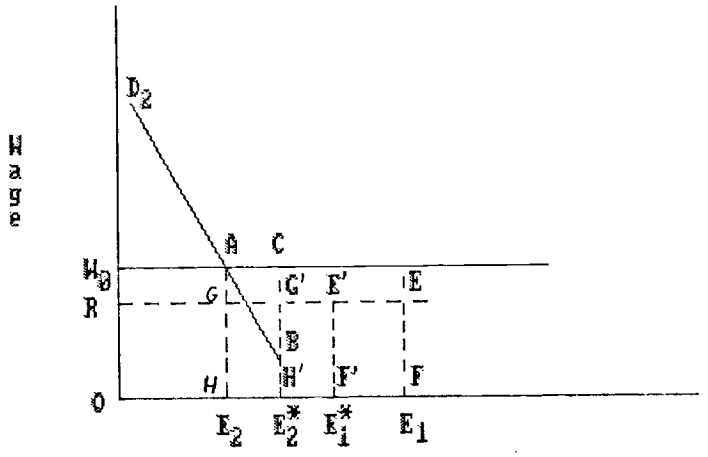
The firm may not, though, vary employment at all. Assume that the rise in W is permanent. If the total cost of the change, the area OAC"G, exceeds the present value of the gain in profits from making the change, the triangle ABF divided by the discount rate, the firm will hold employment at E_o. More generally, the greater are the total costs of adjustment, the stickier employment will be in response to shocks to product demand or wages. Adjustments may be spread out or concentrated in one period; but, as shown in the Appendix, regardless of the slope of the average cost as the size of the adjustment changes, an increase in the cost of making the adjustment reduces the variation in employment in response to a given demand shock.

The presence of adjustment costs changes the average level of employment in each time period (see Nickell, 1978). Consider a two-period case, in which period 1 is characterized by high product demand, shown in Figure 2A by the labor-demand schedule D_1, while in



Employment in Period 1

Figure 2A



Employment in Period 2

Figure 2B

period 2 labor demand is reduced to D_2, shown in Figure 2B. The wage rate is constant at W_0, and there are adjustment costs of OR per worker discharged. If there were no such costs, the firm would set employment at E_1 and E_2 in periods 1 and 2 respectively. If it does so in the presence of these costs, it incurs additional costs of EFGH. The firm could make higher profits over the cycle if it reduced its first-period employment and raised its second-period employment. Indeed, it should set

employment at levels E_1^* and E_2^* such that the sum of the triangles FGH in Figure 2A and ABC in Figure 2B is just equal to the rectangle E'F'G'H' in Figure 2B. Adjustment costs thus lead to smoothing of fluctuations in factor demand over the cycle.

Adjustment costs, like any other factor cost, also reduce the average factor input. More generally, adjustment costs reduce average employment by a greater amount: 1) The greater the per-worker cost is; 2) The greater the firm's rate of time preference; and 3) The greater the firm's elasticity of demand for labor. If adjustment costs differ among workers, the firm will also substitute labor of one type for that of another. If, for example, the average cost over an entire business cycle of employing older workers rises due to an increase in the cost of laying them off, their employment will fall relative to that of younger workers (unless their supply is perfectly inelastic and relative wages are flexible).

In the standard analysis exposited above, asymmetries between hiring and discharge costs were ignored, so that increases and decreases in employment were treated identically.[7] It should be clear from the list of the sources of adjustment costs that there is

no reason to expect the cost of a hire to be the same as that of a discharge. The total costs of the change, or the variation of average cost with the size of the change, need not be the same for hires and discharges. The costs of searching for and processing new workers are entirely different from layoff costs. This distinction suggests that the elasticity of employment with respect to a particular demand shock and the length of the lag in the response to that shock will vary with its direction.

C. Indirect and Potential Costs of Adjustment

A third variety of nonwage costs that affect firms' behavior differently from wages and fringes are costs imposed by regulation of the process of adjusting employment. In some senses these are similar to the costs discussed above. I distinguish them here because they relate to less aggregated problems of adjustment, such as who may be laid off, what information must be provided to employees, etc. Consider first regulations on the order in which workers are laid off. Included in such regulations are collectively-bargained requirements that layoffs be made according to inverse seniority, and legal restrictions on layoffs of more senior workers. These regulations will not impose any cost on the firm if the wage paid to each worker exactly reflects his/her productivity. In that case the firm can abide by the regulations at no cost, for it would be indifferent about the order of layoffs in their absence.

The more likely case is that wages increase with tenure:

$$(3) \qquad W = F(TN), \quad F' > 0, \; F'' < 0,$$

where W is the wage rate and TN is the worker's seniority. The

positive relationship may be due to shared investment in firm-specific training (Becker, 1964) or be part of some long-term implicit contract between the worker and the firm (Lazear, 1981). Assume also that productivity rises with tenure:

(4) $\pi = G(TN)$, $G' > 0$,

where π is the worker's productivity per period, and that F-G increases monotonically with TN. We assume more senior workers earn a wage above their current productivity as part of some optimal long-term implicit contract, perhaps because this wage-productivity relationship induces higher lifetime output by workers. Alternatively, the excess of wages over productivity among more senior workers might be "explained" by custom.

Assuming now that there are no other costs of layoff or of hiring, how will the employer behave in the presence of fluctuations in product demand? The regulation of layoffs by inverse seniority obviously imposes an adjustment cost on the firm. However, the average cost is decreasing with the size of the adjustment: A small adjustment requires that the least senior worker, whose productivity exceeds the wage by the greatest amount, be laid off. That first layoff is quite costly. As more layoffs are made in a particular time period, the cost per layoff declines, as more senior workers, for whom $W-\pi$ is greater, become subject to layoff. With a declining average cost of adjustment, it pays the firm to concentrate in one period all the layoffs it intends to make in response to expected changes in product demand. As in Section B above, though, the imposition of adjustment costs makes the employer less likely to change employment in response to a particular shift

in product demand, and reduces the size of adjustments that do occur. These costs also represent an increase in total cost per worker, leading firms to reduce average employment over the cycle.

If wages do not equal productivity, the imposition of this regulation will lead to changes in relative employment by seniority. In the short run the work force will clearly become more senior; but with the regulation the cost of employing more senior workers rises relative to that of more junior workers, especially in those firms whose product demand is more variable. This change in relative costs leads employers to undertake policies, such as a flattening of the wage-tenure profile, that eventually change the quit-tenure relationship and raise the ratio of junior to senior employees.[8] Even if no layoffs ever occur, the possibility of layoffs being conducted under inverse seniority, coupled with the systematic departure of wage rates from productivity, induces employers to seek a less senior work force.

This point applies equally well to other restrictions on layoffs that differ by seniority. If restrictions are imposed on laying off more senior workers, employers will seek to substitute junior for senior workers by changing wage structures to alter the quit-tenure relationship. Conversely, if junior workers are protected, employers will try to steepen wage-tenure profiles and induce senior workers to remain on the job longer. Any restriction on severing members of a particular group of employees will lead employers to hire other groups of workers in preference to them.[9]

A second potential cost of adjustment is the requirement that information about planned changes in labor demand be made public.

The extent of employers' opposition to such a requirement suggests it would reduce profits. One can view required prenotification as an increase in labor costs; alternatively, it might be viewed as a fixed cost of employing any labor. Under either view one can infer that it would reduce the aggregate amount of labor demanded over the business cycle. It would do this in existing plants and, perhaps more important, inhibit the formation of new capital that is p- complementary with the types of labor being protected.

Its potential effects are more complex than this, however. Workers' earlier awareness that their jobs are in jeopardy will lead them to change any decisions that affect the extent to which they are tied to their current employers. Investment in firm-specific training will be reduced, so that the stock of firm-specific human capital will be smaller than otherwise at the time the layoff occurs (Hamermesh, 1987). The reduced investment will increase workers' likelihood of quitting, for the discrepancy between their current wage and their alternative wages elsewhere will be reduced. To the extent that workers do not anticipate layoffs or plant closings well, requirements of openness about them will induce a more rapid reallocation of labor to expanding industries. However, those workers with the greatest past investment in training specific to the firm (and to the industry, if the entire industry is endangered) may act on the information by seeking governmental protection for their employers; with greater specific investment, public requirements of notification are more likely to lead to increased voice rather than more rapid exit.

The potential improvement in overall economic efficiency

produced by publicity about impending layoffs comes at a cost to the declining firm and perhaps to those workers who remain with that firm. With employees bearing a reduced share of firm-specific investment, the firm's profits will decline still more rapidly than in the absence of the requirement, assuming the government does not try to protect the firm. Also if, as I assumed above, the difference between wages and productivity rises with tenure, the firm will be left with an increasingly older stock of workers as the date of layoff or plant closing approaches. Under the assumptions we have made this will lower profits still further and hasten the reduction in employers' demand for labor and the date at which the layoffs occur or the plant closes.

D. Partial Coverage

The discussion has assumed that each particular job-security policy applies uniformly to all workers and firms. (This assumption has been implicit in our use of a typical firm as the focus of analysis.) In reality, though, the policies do not apply equally to all employees in a firm, all firms in an industry or all industries in the economy. Most are characterized by partial coverage, which changes their impact on the economy and allows room for their net effects to be less than their gross effects on the firms to which they apply directly.

Consider, for example, a policy that increases adjustment costs in a particular sector of the economy. All the effects we discussed in Section II.B. above apply in that sector. However, employees who are not working in this sector because of the increased labor cost will find work in the uncovered sector, if real

wages in that sector can fall to absorb the increased supply. The policy of partial coverage thus leads to a reduction in the size of the covered sector and an expansion in the uncovered sector. This kind of two-tier policy gives employers a continuing incentive to substitute unprotected for protected workers and to contract services out to firms in the unprotected sector.

Partial coverage also affects the propensity of covered workers to quit their protected jobs. Since these jobs must be rationed (because of the supply of uncovered workers seeking them), incumbents are less likely to quit, for the alternative is a lower-paying, insecure job in the uncovered sector. Obversely, those in the uncovered sector have an increased probability of quitting, for the lower wage rates there combine with the attraction of protected jobs to induce more turnover. The economy-wide impact on turnover of job-security policies involving partial coverage is unclear.

III. Analysis of Job Security Provisions

In this section I pigeonhole a variety of policies that have been undertaken to promote job security. While the set examined is by no means exhaustive, it is sufficiently representative to provide indications of how other policies might be categorized in light of the theoretical discussion. I discuss the policies in the order in which the various types of costs were considered in Section II.

A. Policies Affecting Fixed Costs

In the United Kingdom and the FRG a number of industries have collectively negotiated a guaranteed periodic payment (Gennard, 1979, pp. 43, 51). Such a policy converts an hourly, variable cost into a fixed cost exactly like those we discussed in Section II.A.

As such, it will reduce employers' demand for new workers even further below what it would have been, reduce the total number of employees, but raise hours worked by those remaining employed. In the long run, insofar as labor becomes more of a fixed cost, the policy will be a barrier to new firms entering the industry.

In 1975 British Steel negotiated an agreement to limit overtime work. This restriction is analogous to an increased penalty rate for overtime work, except that the penalty is infinite after some amount of overtime hours used. (If the ban were total, the overtime penalty would be infinite for even the first hour of overtime work.) Assuming the limit is effective (the firm would otherwise have used more overtime), this policy offsets fixed employment costs and induces firms to substitute workers for hours.

Shorter workweeks have been introduced in several countries recently. Thus France changed the standard workweek to 39 hours in 1982. The effect of such changes is unclear; it depends, as we saw in Section II.A., on the distribution of current employees by the amount of hours worked per week. Many governments offer subsidies to short-time work, as in Japan, where only reductions of entire days are subsidized, or in the FRG, France and Italy, where reductions in hours generally are encouraged (Gennard, 1985). Such policies lower the price of workers relative to hours and provide an incentive to substitute additional workers for longer workweeks.

B. Policies Affecting Adjustment Costs

The 1965 Redundancy Payments Act in the United Kingdom offered workers lump-sum payments if they were involuntarily severed through no fault of their own, payments that were in some cases "topped up"

by collectively-negotiated plans (Gennard, 1979, pp. 41, 66). Such provisions represent adjustment costs in which the average cost is probably constant. If so, the policy will inhibit layoffs, but will ensure that any layoffs that do occur are lumped together. In addition, the imposition of redundancy pay will inhibit employers from expanding employment when product demand rises, and will result in lower employment on average. Most redundancy payments, e.g., those created through collective negotiation in some German industries (Gennard, 1979, p. 64), increase with years of service. If the more senior workers are no more productive than junior workers, the ratio of their cost to their productivity relative to that of junior workers rises. This will induce employers to substitute toward more junior workers.

The United Kingdom's Temporary Employment Subsidy provided fixed payments to employers who agreed to forego laying off employees who would otherwise have been discharged (Gennard, 1979, p. 31); Sweden offers training subsidies linked to workers' wage rates to employers who forego layoffs (McKersie-Sengenberger, 1983). These policies subsidize retention of workers, and thus implicitly raise the relative cost of adjustment. As such, firms are less likely to vary employment over the cycle. However, because labor costs are subsidized, employment expands beyond what it otherwise would have been in those firms that qualify for the subsidy. In that sense, the policy can be viewed as a cost reduction in declining industries.

These policies are aimed particularly at collective layoffs. A host of specific policies designed to protect against unfair

dismissals of individuals has arisen in Western Europe. Most (Gennard, 1985) define fair dismissal in terms only of a worker's conduct and provide for appeals to courts or labor tribunals. To some extent these policies do raise the cost of workers relative to hours, and thus tend to reduce employment-hours ratios. They are, though, explicitly related to adjustment, and as such they induce the effects that we noted in Section II.B.

In the past several years there has been some loosening of the policies that have raised adjustment costs, both on collective layoffs and individual dismissals. For example, the FRG in 1985 increased the fraction of the work force scheduled for layoff before the provisions of protective legislation become effective and exempted new firms from the legislation entirely. Spain in 1980 reduced the amount of redundancy payments required to be awarded to workers laid off because of economic factors (Gennard, 1985). There has also been a general loosening of the restrictions on individual dismissals to allow the invocation of economic necessity as a justification for such layoffs. All these changes reduce the impacts we noted above: They make adjustments more likely than under the more rigid legislation, and they increase average employment in the sectors covered by the legislation.

C. Policies That Produce Indirect Costs

Layoff by inverse seniority characterizes most collective agreements in the United States and the United Kingdom. In the FRG, France and Italy legislation requires that length of service and personal circumstances be included among the considerations governing the order of layoffs. The effect of these provisions on

employment fluctuations is, as I showed in Section II, unclear *a priori*. Assume, however, that they impose costs on the employer because they impose a different ordering from the (private) cost-minimizing ordering that the employer would choose. If so, they induce all the short- and long-run effects on employment, wage structures and mobility that were discussed in Section II.C. Most important in terms of aggregate employment, they reduce cyclical fluctuations, and also reduce average levels of employment.

Limits or bans on hiring have been introduced through collective negotiations in the German steel industry and elsewhere (Gennard, 1979, pp. 63, 72). Assuming that employers would hire workers into some jobs while discharging them from others, such a ban represents an additional adjustment cost. It will reduce employment fluctuations while raising labor costs, thus reducing the average amount of labor demanded.

Prenotification of impending plant closings or major layoffs must be provided to governments and/or employee representatives in a number of OECD countries. In the United Kingdom, Italy and the FRG prenotification must be given to certain workers even in cases of impending individual dismissals. All such requirements operate as indicated in Section II: They affect the speed with which adjustments take place, the willingness of firms to invest in new capital equipment and of workers and firms to invest in training, and the mobility patterns of workers in the affected firms.

D. The Partial Coverage of Job-Security Legislation

A wide variety of *restrictions* in the various provisions of job-security legislation make that legislation conform to the model

of partial coverage that was outlined in Section II.D. For example: 1) Canada is considering requiring that part-time employees (those working more than 20 hours per week) be covered by pensions (effectively decreasing problems that arise from partial coverage of protective legislation);[19] 2) Exemptions from job-security legislation exist for workers and firms that do not meet various criteria (Gennard, 1985). Thus in the United Kingdom claims of unfair dismissal are not allowed for employees with less than two years of seniority. The seniority requirement is even more stringent for part-time employees. In Italy some of the legislation excludes employers of fewer than 35 workers, while in the FRG employers of fewer than 5 workers are excluded from employment protection legislation generally; 3) In Germany and Italy prenotification requirements are much more stringent for white- than for blue-collar workers.

To the extent that employers can substitute part- for full-time workers exemptions will result in an expansion of the part-time work force. Similarly, they should favor the relative expansion of smaller enterprises, especially in those sectors in which economies of scale do not exist or are not very substantial. Indeed, to the extent that substitution by employers and consumers is possible, exemptions from the panoply of job-security legislation may have created the beginning of two-tier societies, one with rigid job-security requirements covering high-paid, senior, full-time workers in large firms, the other more flexible, with part-time, low-paid, insecure workers in small businesses. The high-paid tier will contract because of the imposed rigidity, while the low-paid tier will expand.

IV. Evidence on the Effects of Labor Costs

A. Fixed Costs and Employment-Hours Substitution

The most important empirical issue to be addressed is whether employers' production functions allow for substitution in the long run between employment and hours per worker. To the extent such substitution is possible, policies that produce relative increases in fixed employment costs bias employers toward reducing employment and increasing hours. There are two strands of literature that bear on this issue. The first examines employment-hours trade-offs in the context of standard labor-demand equations without actually attempting to measure relative fixed and variable costs. While it cannot, therefore, provide direct evidence on the effect of changes in labor-cost structures on the mix of employment and hours, it can inform us whether an increase in the use of hours decreases or increases the demand for workers at a fixed level of output. The second strand tries to measure cost structures and, in most cases, to examine how they affect employers' demands for overtime.

Recent evidence from standard labor-demand equations on this issue is quite mixed. For U.S. manufacturing, 1963-1981:II, Rossana (1983) estimates a model of the demand for hours as a function of employment levels, measures of output and orders, and real wages.[11] This type of model is inspired, as are similar models discussed in this Section, by Nadiri-Rosen (1969). The estimates suggest that for each 10-percent long-run increase in employment there is a 1.5 percent drop in hours per worker. Similar equations in Rossana (1985) estimated using monthly U.S. data for 1959-1982:6 over six two-digit SIC industries find no significant effect of the stock of

employees on the demand for hours. Somewhat perplexing, though, since they imply an asymmetry, equations describing employment demand for the same industries mostly show a small but significant positive effect of hours per worker on the demand for workers. However, since the hours and employment equations were not estimated jointly, this asymmetry may be a result of the estimation technique (or perhaps of a specification having little grounding in microeconomic theory). Yamamoto (1982) finds negative effects of employment on hours per worker, and vice-versa, using quarterly data for Japanese manufacturing from 1970-1978. However, the sample period is quite short, so it is unclear whether these really represent long-run relationships.

One study on U.S. data using similar models, but decomposing output changes into permanent and transitory components, estimates the size of an hours-employment trade-off using data on overtime hours (Crawford, 1979). For manufacturing 1958-1976 (monthly), it finds a small but significant positive relationship between employment levels and the demand for hours. Comparing this result to those cited above, it seems quite clear that this approach provides little evidence of a long-run trade-off between employment and normal hours, i.e., of whether hours and employment are substitutes or complements. This may be because such a trade-off truly does not exist: Evidence for the very long run suggests hours per week are determined mainly by workers' preferences, not by production technology (see Hamermesh-Rees, 1984). However, insofar as these studies do not even attempt to measure the relative costs of hours and workers, their lack of evidence is not too critical.

Several studies of the demand for overtime hours have attempted to divide employment costs into fixed and variable components. Their choice of data allows for much greater variability in the underlying marginal costs of employment and hours, and thus at least makes it possible to measure the extent of substitution of employment for hours. The three analyses for the U.S. summarized in Ehrenberg-Schumann (1982) and that study itself all suggest that higher fixed costs of employment do reduce the long-run employment-hours ratio. In all these studies, though, the trade-offs are quite small: A one-third increase in the relative cost of an hour of overtime would produce no more than a 4 percent decline in the ratio of overtime to other hours. A somewhat larger effect is produced for West Germany using time-series data, 1964-1983, by Konig-Pohlmeier (1986).

Using annual data, 1951-1981, for West Germany, Hart-Kawasaki (1986) decompose payments to labor, particularly payroll taxes, into fixed and variable measures and examine their effects on employment and hours. Their model treats hours, employment and the capital stock as jointly determined by their lagged values, fixed and variable payroll taxes, output, nonwage fixed and variable labor costs, and capital costs. The authors find surprisingly that a cut in the payroll-tax ceiling in a tax structure with a high ceiling relative to the average wage level increases employment and reduces hours per worker. They attribute this perverse result to their use of a model that includes both capital and labor. Hart-Kawasaki (1986) also produce the expected finding that decreased variable payroll taxes reduce the employment/hours ratio.

While the evidence seems fairly clear that an increase in the fixed costs of employment induces only slight substitution away from workers and toward hours, holding total worker-hours constant, that does not mean the negative employment effects of job-security policies that impose fixed employment costs are small. Elsewhere (Hamermesh, 1986) I have summarized an immense body of evidence on the elasticity of labor demand with respect to labor costs. The overwhelming bulk of studies that use modern estimation techniques finds that the net (including all adjustments among firms) long-run constant-output labor-demand elasticity characterizing broad aggregates of industries is between .1 and .5. The total elasticity, which allows for scale effects, is larger still. That being the case, policies that increase the fixed costs of employment may reduce the employment-hours ratio only slightly, but can effect substantial reductions in the total amount of worker-hours employed.

B. Adjustment Costs and Lagged Labor Demand

There is a huge mass of empirical evidence demonstrating that the demand for workers and hours lags behind output. Moreover, the lags in the adjustment of employment are greater than those in the adjustment of hours per worker. Hamermesh (1976) summarizes a large number of early studies demonstrating this fact. More recent evidence corroborates this conclusion in more carefully specified models. Using a model like that of Nadiri-Rosen (1969), but decomposing changes in product demand into expected and unexpected components, Topel (1982) suggests a similar conclusion based on data for 1958-1975 for six U.S. manufacturing industries. For the automobile industry Chang (1983) demonstrates this both for the

United States and for the state of Michigan.

The average length of the lags of employment and hours behind output changes is not so closely determined as are their relative lengths. However, the evidence summarized in Hamermesh (1976) suggests that nearly all the adjustment is completed within one year. Recent studies of the FRG and France (Bucher, 1984) using similar techniques produce similar results. Early studies on aggregate U.S. data (Sargent, 1978, and Meese, 1980) that paid close attention to the structure of expectations and its implications for error terms in the estimating equations found very long lags of employment behind output (average length over one year). These may well be artifacts of the estimating procedure rather than reversals of previous evidence. More recently Shapiro (1986) has employed a dynamic expectational model of the adjustment of production labor, nonproduction labor and capital that suggests that adjustment lags for workers exceed those for hours per worker, and that the lags are not very long. It seems safe to conclude that the lags in adjusting labor inputs are fairly short.

Theoretical work underlying the estimation of lagged factor adjustment rests on the theory of adjustment costs, in most cases on an increasing average cost. Whether empirical results stem from these costs has not been demonstrated. However, Morrison-Berndt (1981) use annual U.S. data for 1952-1971 to show that the adjustment of nonproduction worker employment to changes in output demand is much slower than that of production workers. Assuming that adjustment costs are quadratic, Shapiro (1986) infers that they are substantial for adjustments of nonproduction worker labor, but

quite small for adjustments of production workers. Similar findings are reported for the British engineering sector for 1963-1978 by Nissim (1984).[12] Also, de Pelsmacker (1984) finds the same qualitative results for Belgian auto plants from 1976 through 1982.

Assuming that the lags arise from adjustment costs, there is some evidence that these costs are asymmetric. Hamermesh (1969) demonstrates for a group of three- and four-digit SIC U.S. manufacturing industries that the lag of layoffs behind output changes is shorter than that of new hires behind output changes. Inferentially, the average cost of increasing employment rises more rapidly than that of employment declines. What this finding implies about potential asymmetries in the effects of job-security policies is unclear without a specification of how those policies affect adjustment costs.

The short-run effects of specific policies have received very little serious empirical attention. Nickell (1979) examined British manufacturing data, 1955-1976, and found that the lag in employment rose during this period, while the lag in hours declined. He attributed these changes to the increased requirements of job-security policies. More recently Nickell (1982) showed that between 1967 and 1977 an increase in the use of unfair dismissal legislation caused a reduction in both hiring and flows from employment, with the latter dominating (so that the net effect was a reduction in unemployment). For the United States Hamermesh (1978) showed that expansion of the unemployment insurance program, which is financed by what is essentially a fixed tax, produced at least some short-run substitution away from employment and toward increased hours per

worker. Implicitly the UI system increased the speed of adjustment of employment to changes in product demand.

As a further test of some of these ideas, I examine dynamic employment-output and hours-output relations in twelve OECD countries. The purpose of this exercise is to extend and verify Nickell's (1979) examination of these relationships for the U.K. I concentrate on determining whether and how the rate of adjustment to changes in product demand changed in the 1970s from what it had been earlier. We have seen that many countries adopted policies during the 1970s that were designed to slow the adjustment of employment to output shocks. At the same time, though, we know that large increases occurred the price of energy, which is a p-substitute for labor. These changes may also have altered the lag structure in employment-output and hours-output relations (though there is no a priori reason to believe this happened). All we can test, therefore, is whether or not changes in lag structures occurred.

For each country with available data an integrated vector-autoregression model was estimated for the manufacturing sector:

$$(5) \qquad Y_t = aY_{t-1} + \Sigma b_i Q_{t-i} + ct + \epsilon,$$

where a, b_i and c are parameters; Y is the dependent variable (in logarithms); Q is the logarithm of output; t is a time trend, and ϵ is a disturbance term. The dependent variable Y is either employment or total hours worked. For all countries the "early" time period ended in 1973:III and the "late" time period began with 1973:IV. This break point is chosen to coincide with the first oil shock. Obviously the timing of the impacts of job-security policies differs in different countries, and it would be more appropriate to

search for structural changes in each country separately. Failing that, we follow standard practice and use the oil shock to demarcate the point at which the structure may have changed. For most countries the initial observation in the early period is 1961:I, and the final observation in the late time period is 1985:II.[13]

The results of estimating equation (5) are shown in Table 1. In addition to the usual coefficients and t-statistics, the table also shows: The chi-square statistic on the likelihood-ratio test for including the vector of four terms in θ_{t-i}, i=0,...,3; Durbin's (1970) h-statistic, distributed n(0,1); and the estimated average lag of adjustment of the dependent variable to an output shock. For the six large countries the estimates are fairly satisfactory, though there is some tendency for the h-statistic to reject the null hypothesis of no serial correlation in the employment equations. The average lag of employment adjustment in the six large countries exceeds that of hours adjustment in eleven out of the twelve pairs of equations estimated. Among the six smaller countries the estimates are either less precise (Greece and Finland) or imply lags of ridiculous length (Ireland).

Recognizing that the application of a common specification to data from a large number of economies will produce some anomalies, it is still worthwhile examining common trends in the results. The numbers without parentheses in Table 2 (from which Ireland is excluded because the estimated lags made no sense) are totals including only the six large countries, while those in parentheses include all eleven countries. Considering only the employment-output equations (the last line of the table), there is a tendency

Table 1

Employment and Hours Equations, 12 OECD Countries
Most 1961:I-1973:III and 1973:IV-1985:II [a]/

	Pre-1973:IV		Post-1973:III	
	Employment	Hours	Employment	Hours
		CANADA		
E(-1) or EH(-1)	.735 (11.59)	.740 (9.45)	.708 (6.49)	.711 (6.54)
$\sum_{0}^{3} Q_{t-i}$	.304 (57.33)	.319 (50.28)	.240 (22.78)	.262 (31.35)
t	-.0034 (-4.53)	-.0038 (-3.40)	-.0017 (-3.09)	-.0019 (-2.93)
$\bar{R}^2$	.996	.992	.905	.927
h	.95	.55	1.16	1.56
Average lag	1.43	1.10	.99	.84
		FRANCE		
E(-1) or EH(-1)	.923 (18.95)	.807 (9.67)	.817 (10.55)	.645 (4.73)
$\sum_{0}^{3} Q_{t-i}$	.119 (13.72)	.084 (4.99)	.063 (16.38)	.178 (21.25)
t	-.0016 (-3.15)	-.0013 (-1.23)	-.0013 (-2.66)	-.0033 (-2.66)
$\bar{R}^2$	.909	.710	.995	.995
h	2.78	.92	.17	.07
Average lag	8.07	3.44	1.93	1.37

Table 1 (cont'd.)

Employment and Hours Equations, 12 OECD Countries
Most 1961:I-1973:III and 1973:IV-1985:II [a]/

	Pre-1973:IV		Post-1973:III	
	Employment	Hours	Employment	Hours
	FEDERAL REPUBLIC OF GERMANY			
E(-1) or EH(-1)	.744 (10.32)	.678 (7.25)	.881 (35.92)	.483 (3.93)
$\sum_{0}^{3} Q_{t-i}$	.262 (65.60)	.582 (30.48)	.135 (98.20)	.284 (38.22)
t	-.0027 (-4.27)	-.0021 (-3.33)	-.0007 (-5.47)	-.0065 (-3.90)
$\bar{R}^2$	.983	.977	.999	.918
h	1.29	.53	2.25	.21
Average lag	1.55	1.17	3.52	1.34
	JAPAN			
E(-1) or EH(-1)	.909 (76.86)	.935 (23.72)	.985 (49.43)	.910 (15.83)
$\sum_{0}^{3} Q_{t-i}$	.091 (99.81)	.067 (-2.70)	.045 (54.15)	.041 (33.54)
t	-.0024 (-10.72)	-.0020 (-2.70)	-.0003 (-2.64)	-.0003 (-.78)
$\bar{R}^2$	.999	.993	.993	.945
h	.75	3.26	2.07	1.60
Average lag	4.86	6.29	31.20	4.13

Table 1 (cont'd.)

Employment and Hours Equations, 12 OECD Countries
Most 1961:I-1973:III and 1973:IV-1985:II [a/]

	Pre-1973:IV		Post-1973:III	
	Employment	Hours	Employment	Hours
		UNITED KINGDOM		
E(-1) or EH(-1)	.687 (6.92)	.527 (3.80)	.898 (30.86)	.793 (10.32)
$\sum_{0}^{3} Q_{t-i}$	.258 (23.60)	.449 (26.13)	.164 (42.58)	.280 (31.48)
t	-.0025 (-3.81)	-.0046 (-3.55)	-.0024 (-4.48)	-.0026 (-2.89)
$\bar{R}^2$	.960	.944	.997	.986
h	1.39	1.86	2.60	.70
Average lag	2.58	1.11	3.58	1.11
		UNITED STATES		
E(-1) or EH(-1)	.889 (15.54)	.667 (6.23)	.983 (23.32)	.932 (13.61)
$\sum_{0}^{3} Q_{t-i}$	.122 (98.33)	.319 (85.27)	.065 (98.04)	.075 (91.02)
t	-.0012 (-3.09)	-.0029 (-3.20)	-.0005 (-2.57)	-.0005 (-1.51)
$\bar{R}^2$	.997	.994	.982	.971
h	.99	1.65	.57	1.08
Average lag	2.97	.49	27.50	5.80

Table 1 (cont'd.)

Employment and Hours Equations, 12 OECD Countries
Most 1961:I-1973:III and 1973:IV-1985:II [a]/

	Pre-1973:IV		Post-1973:III	
	Employment	Hours	Employment	Hours
		GREECE		
E(-1) or EH(-1)	.150 (.91)	.148 (.83)	.185 (1.20)	-.087 (-.62)
$\sum_{0}^{3} Q_{t-i}$	.670 (19.26)	.443 (10.09)	.475 (21.55)	.622 (18.48)
t	-.0095 (-2.54)	-.0040 (-.97)	.0008 (1.70)	-.0020 (-4.28)
$\bar{R}^2$	.915	.900	.907	.768
h	b	b	b	1.46
Average lag	.87	.24	1.09	1.33
		IRELAND		
E(-1) or EH(-1)	.656 (6.94)	.386 (2.86)	1.068 (24.64)	.995 (15.07)
$\sum_{0}^{3} Q_{t-i}$	.334 (21.70)	.483 (14.88)	.070 (23.21)	.048 (10.51)
t	-.0032 (-2.82)	-.0047 (-2.21)	-.0008 (-3.17)	-.0007 (-1.42)
$\bar{R}^2$	.989	.937	.952	.892
h	2.68	1.70	.48	1.14
Average lag	2.23	1.49	-9.05	98.82

Table 1 (cont'd.)

Employment and Hours Equations, 12 OECD Countries
Most 1961:I-1973:III and 1973:IV-1985:II [a/]

	Pre-1973:IV Employment	Post-1973:III Employment
	AUSTRIA	
E(-1) or EH(-1)	.802 (12.94)	.488 (3.58)
$\sum_{0}^{3} Q_{t-i}$	.282 (20.41)	.334 (32.35)
t	-.0036 (-3.86)	-.0037 (-3.71)
$\bar{R}^2$	.964	.982
h	.011	2.78
Average lag	3.51	1.51
	FINLAND	
E(-1) or EH(-1)	.122 (.81)	.193 (1.37)
$\sum_{0}^{3} Q_{t-i}$ [1]	.269 (4.92)	.538 (20.63)
t	-.0014 (-.61)	-.0043 (-4.07)
$\bar{R}^2$	.792	.531
h	b	.60
Average lag	.72	2.16

Table 1 (cont'd.)

Employment and Hours Equations, 12 OECD Countries
Most 1961:I-1973:III and 1973:IV-1985:II [a]/

	Pre-1973:IV Employment	Post-1973:III Employment
	NETHERLANDS	
E(-1) or EH(-1)	.866 (17.13)	.653 (6.37)
$\sum_{0}^{3} Q_{t-i}$	.131 (12.35)	.206 (19.43)
t	-.0025 (-2.78)	-.0031 (-3.69)
$\bar{R}^2$	.953	.995
h	.166	.952
Average lag	2.79	2.94
	NORWAY	
E(-1) or EH(-1)	.409 (2.80)	.560 (4.62)
$\sum_{0}^{3} Q_{t-i}$	.053 (3.75)	.413 (8.32)
t	.0010 (.93)	-.0010 (-2.17)
$\bar{R}^2$	.944	.802
h	.69	.77
Average lag	.19	2.58

[a]/ t-statistics in parentheses, except $\chi^2(4)$ beneath the sum of coefficients on the ΣQ_{t-i}. ($\chi^2_{.05}(4) = 9.488$; $\chi^2_{.01}(4) = 13.277$)

[b]/ $1-n\hat{V}(b) < 0$.

for the average lag of employment adjustment to have lengthened in the 1970s. (The probability of observing an increased lag in at least eight of eleven countries is only .11 if the population probability is .5.) However, considering the 2x2 contingency table for the seven countries for which both employment and hours equations are estimated, Nickell's result that employment lags have lengthened, but hours lags have shortened, does not hold up. This diversity of changes in the average length of adjustment lags is observed in only two of the seven countries.

The results of this exercise are consistent with the hypothesis that changes in job-security policy have induced slower adjustment of employment changes to shocks to output demand. They are not consistent with the additional claim that the same policy changes have encouraged employers to adjust more rapidly along the margin of hours per worker. Whether we have demonstrated anything more than a correlation of the growth of job-security policies with increases in employment lags remains for other studies that examine the effects of specific job-security policies on particular economies and industries (for example, Houseman, 1986).

C. Indirect Costs

Whether policies that alter employers' behavior in retaining workers increase labor costs depends on whether the wage-seniority relationship arises out of a seniority-productivity relationship.[14] Evidence on this issue is still sparse and deserves a more thorough review than is possible here. The first empirical analysis (Medoff-Abraham, 1980) suggested that there is little relationship between productivity and seniority. However, more recent evidence on

Table 2

Comparison of Average Duration of Adjustment Lag
(Number of Countries) [a]/

	Employment		Total
	Early > Late	Early < Late	
Hours: Early > Late	2	2	4
Hours: Early < Late		2 (3)	2 (3)
No hours equation	(1)	(3)	
TOTAL	2 (3)	4(8)	

[a]/ Excludes Ireland

samples of fairly junior workers (Bishop-Stephenson, 1982, and Brown, 1983) suggests that productivity increases with seniority at least over the initial years of an employment relation; and evidence on a sample that allows a direct measure of productivity (Maranto-Rodgers, 1984) indicates that seniority and productivity are positively related. The best conclusion at this point is that there is a positive relation between seniority and productivity, but that it may not be so strong as the wage-seniority relation.

There is remarkably little evidence on the employment effects of specific policies that attempt to prevent layoffs by changing indirect costs. Metcalf (1984) used cross-section British data on industries to show that the Temporary Employment Subsidy succeeded in reducing permanent layoffs. (His results also showed that short-time compensation increased layoffs, a result that is hard to credit.) As we saw in Section IV.B., Nickell (1982) demonstrated a similar effect of unfair dismissal legislation in the U.K. The difficulties with broad-brush empirical work that uses gross measures in aggregate time-series equations to estimate the effects of complex policies are by now well known. It seems clear that serious evaluation of policies that affect indirect costs will require both more detailed specification of the programs' parameters and use of more disaggregated data. At this point we simply have very little information on the employment effects of anti-layoff programs that operate by affecting costs indirectly.

If markets worked well, in the sense that information was good, there would be little need for many of the programs restricting employers' rights to lay off workers. For example, if

workers know that a permanent layoff is impending, they will reduce investment in firm-specific capital to the point where its value will be zero when the layoff occurs. The evidence (Hamermesh, 1987) indicates, however, that substantial firm-specific investment still takes place immediately before the layoff, implying that workers' information about impending layoffs is not very good. This in turn suggests that requiring prenotification of layoffs can prevent useless investment in firm-specific capital, and can aid adjustment by encouraging workers to substitute general training that will make subsequent job search easier. Indeed, evidence for a particular labor market (Folbre et al, 1984) and for a nationwide sample of workers (Addison-Portugal, 1986) indicates that prenotification does reduce the costs of dislocation.

D. Partial Coverage--Substitution of Unprotected for Protected Workers

There have been no studies of whether protective legislation covering only part of a economy has induced a relative expansion of the uncovered sector. However, some impressionistic evidence does exist, and there have been a few studies that allow us to infer the extent to which substitution between the types of workers who are protected and unprotected is possible. All the evidence suggests that partial coverage produces substantial substitution away from employment in the covered sector. Gennard (1985) argues that protective legislation and, more important, increased nonwage costs have resulted in an expansion of the sectors of the British economy and the kinds of employment that are not covered by the legislation and not so heavily subject to nonwage costs. Similarly, in the FRG he notes that firms have been spurred by employment regulation to

use more subcontracting and more part-time labor.

Owen (1979) uses cross-section data for the United States in 1973 to estimate the degree of substitution between full- and part-time workers. He finds that changes in their relative wages have large effects on relative demand. This suggests, though it does not demonstrate, that policies that increase the relative costs of employing full-time workers can produce large reductions in their employment, and large increases in the demand for part-timers. Disney-Szyszczak (1984) show that part-time employment in the U.K. was sharply affected when legislation expanded employment protection for part-time workers.[15]

V. Conclusions

The major purpose of this discussion has been to analyze how job-security policies affect labor costs. Simple time-series or cross-section regressions that include the existence or magnitude of expenditures under a particular program cannot yield any useful information about its effects: Those depend in a complex way on how the program affects costs; and, as we have seen, the paths through which costs may be changed are quite diverse. They include possible effects on the employment-hours ratio, on employment adjustment, and on the level of total labor input through their effects on average labor costs.

The evidence suggests there is a short-run trade-off between employment and hours per worker, but that in the long run policies that affect the structure, as opposed to the level, of labor costs have only a slight impact on employment. They do, however, affect the magnitude of adjustments in employment in response to changes in

product demand. When average labor costs are changed by job-security policies, average levels of employment demand will change through the standard routes of capital-labor substitution and scale effects. Not all job-security policies impose costs that reduce total labor demand: To the extent that policies provide information that functions as a public good (such as prenotification of impending layoffs), they may increase labor-market efficiency. However, the role of job-security policies in reducing total worker-hours, should not be ignored: Studies that are relevant to assessing the impact of job-security policies on the mix of employment and hours are not conclusive, but those that allow us infer their effects on total worker-hours are.

The discussion in Section IV makes it apparent how little we know about how job-security programs in general affect labor costs, and what the impacts of particular policies have been. The few studies of job-security policies that were enacted in the industrialized countries during the 1970s and early 1980s do suggest they achieved their aims, but at the expense of reducing total worker-hours in protected employment. Better evidence is provided by studies of the impact of labor costs more generally: These suggest that the policies could have produced some short-run increase in employment. Given the lengths of lags in adjustment, though, the evidence indicates that it is unlikely they induced a substitution of employment for hours that lasted beyond several years. Moreover, to the extent that they raised labor costs, as most did, they contributed to a decline in total worker-hours through the elasticity of demand for labor services.

The discussion of the theory of labor costs and the evidence on it imply that job-security policies can induce a temporary substitution of employment for hours, and can permanently mitigate short-run employment fluctuations --- both decreases and increases in employment. They accomplish this at the cost of reducing the equilibrium level of labor input and of output. They thus offer an industrialized economy a choice between greater employment stability (with fewer total hours worked on average) and greater employment fluctuations (with more total hours worked on average). Moreover, to the extent they cover only part of the labor market, they help create a two-tier labor market consisting of secure jobs in a declining sector and insecure jobs in an expanding sector.

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FOOTNOTES

1. See, for example, Gennard (1979) and (1985).

2. Though this last statement is not quite correct, the low ceiling on the taxable base under this program makes this component of payroll costs function essentially as a fixed cost per worker.

3. Evidence (Hamermesh, 1986) on the separability of capital from labor subgroups suggests, though, that this assumption is not right, though it is unknown whether the evidence generalizes to employment-hours substitution.

4. Hart (1984) analyzes a wide variety of these combinations.

5. In this section I usually ignore general-equilibrium impacts of these payments that work through labor supply to the firm.

6. This exposition is based on Hamermesh-Rees (1984).

7. However, the original analysis of this problem (Holt et al, 1960) did examine these asymmetries.

8. See, for example, Mincer-Jovanovic (1981) or Mitchell (1982) for evidence of a negative effect of tenure on the quit probability, other things equal.

9. As we discuss in Section II.D. below, this is a general implication of the partial coverage of protective legislation.

10. See Wall Street Journal, April 22, 1986, page 1.

11. This equation has little basis in economic theory, because it ignores fixed labor costs (or assumes implicitly that they are constant over time, which is clearly incorrect) and because it includes as independent variables both employment and output.

12. However, Nissim also has the strange result that the lag of skilled-worker employment behind changes in skilled workers' wages is shorter than the adjustment lag of unskilled employment behind changes in unskilled wages. This result is inconsistent with the findings on lags behind output in the same study.

13. The exceptions are: France, with the late time period ending in 1984:IV; Greece and the United Kingdom, with the early period beginning in 1963:I; the Netherlands, with the late period ending in 1985:I; and Norway, for which observations for 1971:I-1972:III are excluded because of missing data.

14. Despite one recent argument to the contrary (Altonji-Shakotko, 1985), we assume that the wage-seniority relationship is not merely an artifact resulting from incorrectly analyzed data.

15. Because the study lacks a satisfactory relative price variable and uses interaction terms without the matching main-effect variables, the results in Disney-Szyszczak (1984) are less reliable than those in many of the other studies discussed in this survey.

APPENDIX

Let the firm maximize:

$$(1) \quad \int_0^\infty [F(L) - wL - C(\dot{L})]\, e^{-rt} dt \ ,$$

where L = labor input, w = cost per unit of labor services, r is the firm's discount rate, $C(\dot{L})$ is the adjustment cost, and I have assumed labor is the only input in a production function F, with $F' > 0$, $F'' < 0$. Assume that the marginal cost of adjustment can be increasing and in particular that C is quadratic:

$$(2) \quad C(\dot{L}) = a\dot{L} + b\dot{L}^2 \ , \quad a > 0, \ b \geq 0 \ .$$

(The marginal cost of adjustment is then $2b\dot{L} + a$.) The Euler equation describing the firm's profit-maximizing path is:

$$(3) \quad 2b\ddot{L} - 2br\dot{L} + F'(L) - w - ra = 0 \ ,$$

where $\ddot{L}$ denotes d^2L/dt^2.

If $b > 0$, the steady state is described by $\dot{L} = \ddot{L} = 0$ and L^* such that:

$$(4) \quad F'(L^*) = w + ra.$$

(This is the standard marginal-productivity condition for labor demand, with the user-cost of adjustment added.) Assume that the firm has $L = L_0^*$ at $t = 0$, and that w increases. The new equilibrium is shown as L^* in Figure

A.1. The line along which $\ddot{L} = 0$ is negatively sloped, for as L increases in (3), F'(L) decreases, as must $\dot{L}$. The adjustment path from L_0^* to L^* is indicated by the arrow. A similar analysis applies if the firm begins at L_1^*, and is then shocked at t = 0 by a wage decrease.

If b = 0, the marginal cost of adjustment is constant in $\dot{L}$, and (4) holds for all t. Thus any change in w causes the firm to adjust instantaneously to the new L^* that satisfies (4). That this is true when b = 0, but adjustment is slow when b > 0, shows that a more rapid increase in the marginal cost as $\dot{L}$ increases reduces the rate of adjustment. A higher marginal cost of adjustment--a--reduces L^*, as does a higher discount rate. Employment on average is lower where adjustment costs are greater.

That greater adjustment costs reduce employment fluctuations when shocks occur can be seen by assuming the firm is in equilibrium at t = 0, given w_0, and that w changes temporarily to w_1 for some known period of time, T. The maximand (1) becomes:

$$(1') \quad \int_0^T [F(L) - w_1 - a\dot{L} - b\ddot{L}]\, e^{-rt} dt + \int_T^\infty [F(L) - w_0 - a\dot{L} - b\ddot{L}]\, e^{-rt}.$$

Since the firm's adjustment is slower when b is greater, the shock to w will result in a smaller movement away from L_0^* by t = T than if b were smaller. If b = 0 the firm will choose either to maintain $L = L_0^*$ for all t, or to jump to L_1^* at t = 0, then jump back to L_0^* at t = T. With constant marginal adjustment costs the fluctuation will be the same size <u>if it occurs</u>; but the employer's willingness to vary L at all decreases as a is larger.

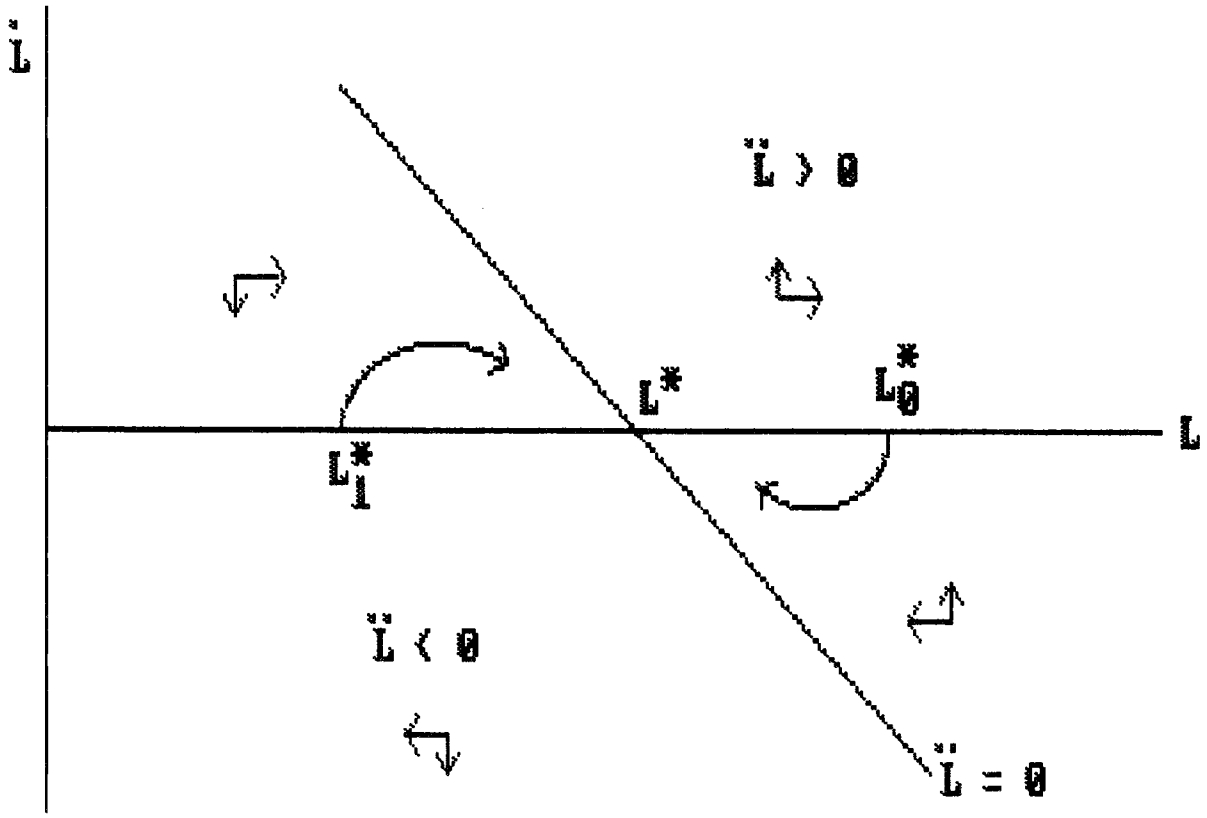

Figure A.1 Phase Diagram of Employment Adjustment