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**EMPLOYMENT, MACROECONOMIC
FLUCTUATIONS AND JOB SECURITY**

M Pilar Díaz and Dennis J Snower

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Discussion Paper No. 1430
July 1996

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ABSTRACT

Employment, Macroeconomic Fluctuations and Job Security*

The paper explores the influence of job security provisions on employment and unemployment. We show that this influence depends on the persistence of the macroeconomic fluctuations to which the labour market is exposed, and on employees' bargaining power in wage negotiations. Specifically, costs of firing and hiring reduce employment and stimulate unemployment when the macroeconomic fluctuations are sufficiently prolonged and employees have sufficient bargaining power; but firing and hiring costs can have the opposite effect if the fluctuations are transient and employees are weak. In this way, the paper offers an explanation for Europe's favourable unemployment performance *vis-à-vis* the United States in the 1950s and 1960s (when macroeconomic fluctuations were transient and union strength was moderate), and Europe's relatively unfavourable unemployment performance since the mid-1970s (when fluctuations were prolonged and unions were stronger).

JEL Classification: D8, E3, J2, J3, J6

Keywords: job security, employment, unemployment, wage determination, firing and hiring costs, macroeconomic fluctuations

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NON-TECHNICAL SUMMARY

This paper addresses the important question of how the employment effect of job security provisions depends on the persistence of macroeconomic fluctuations. We characterize macroeconomic fluctuations in terms of how transient or prolonged they are. We call a shock 'transient' when it has a high chance of reversing itself; a 'prolonged' shock has a low chance of doing so. We show that *the more prolonged the macroeconomic fluctuations are, the more contractionary will be the effect of hiring and firing costs on average employment, and the more expansionary will be their effect on average unemployment.*

We also examine how the employment effect of job security provisions depends on the relative bargaining strength of employees and their employers. In this regard, we show that *the greater the employees' bargaining strength relative to their employers, the more contractionary (expansionary) will be the effect of hiring and firing costs on average employment (unemployment).* Put differently, the greater is the employees' bargaining strength, the less prolonged the macroeconomic shocks need to be before job security provisions begin to have a contractionary (expansionary) effect on average employment (unemployment).

We argue that these results can shed light on a famous problem: why has the European unemployment experience been so poor relative to the United States since the mid-1970s, given that it compared so favourably with the United States in the 1950s and 1960s? In the 1950s and 1960s unemployment rates in both regions were historically low, but the average unemployment rate in Europe was significantly below that of the United States. With each of the major recessions since then – in the mid-1970s, the early 1980s, and the early 1990s – unemployment rates rose dramatically in both regions. But whereas the US unemployment rate came back down each time product markets recovered, the European unemployment rate climbed to a higher plateau in the mid-1970s, a yet higher one in the early-1980s, remained high (relative to the 1950s and 1960s) throughout much of the long boom of the mid-1980s, and rose again in the early 1990s.

Most economists agree that this phenomenon is unlikely to have a single explanation. Some, for example, have argued that in many European countries *unemployment benefits and related welfare state entitlements* rose in the late 1960s and throughout much of the 1970s, while they remained relatively stable in the United States. Others have observed that European policy-makers have

relied heavily on *taxes on employers and employees* (such as payroll taxes and unemployment insurance contributions) to finance unemployment benefit payments, whereas US taxes on employment showed little corresponding upward movement.

Another popular argument is that *skill-biased technological change* and *international trade* have increased the demand for skilled labour relative to unskilled labour since the mid-1970s, but that the wage differential between the skilled and the unskilled has widened less in most European countries than in the United States. Alternatively, European labour markets are alleged to be prone to *hysteresis* on account of such factors as union behaviour, insider membership effects, and reduced job search by the long-term unemployed – factors that are less prominent in the United States. This phenomenon is said to have prolonged the effect of the favourable labour market shocks on European unemployment in the 1950s and 1960s, and also prolonged the effect of the unfavourable labour market shocks since the mid-1970s.

In view of the well-known difficulties these explanations have had in providing a full account of the comparatively favourable European labour market performance up to the mid-1970s and the comparatively unfavourable performance since then, this paper provides a different – albeit complementary – hypothesis. It suggests that job security provisions – which have tended to be more generous in Europe than in the United States over the entire post-war period – exert a quite different influence on employment and unemployment when macroeconomic fluctuations are transient than when they are prolonged. Under the relatively tranquil labour market conditions of the early post-war period, the relative stringency of the European provisions may have served to keep the average European unemployment rate low relative to the US rate; but in the presence of the massive, prolonged shocks (in oil and other raw material prices, exchange rates, interest rates, etc.) of the mid-1970s, early-1980s, and early-1990s, the relative stringency of the European provisions may have driven the average European unemployment rate up relative to the US rate.

Along similar lines, the rise in the bargaining strength of European workers over the 1960s and 1970s – a development not matched in the United States – may have imparted a contractionary bias to European job security provisions, particularly once the prolonged labour market shocks made their appearance. Our analysis suggests that, not only do prolonged fluctuations and worker power each individually give job security legislation a contractionary employment bias, but these two effects also complement one another. In other words, the rise in bargaining power of European employees over the 1960s and 1970s may have made European employment more vulnerable to

prolonged labour market shocks since the mid-1970s, and the prolonged labour market shocks may have amplified the adverse effect of workers' bargaining power on employment.

1. Introduction

This paper provides a fresh examination of how job security provisions - firing and hiring costs, in particular - influence employment and unemployment. We focus on both the direct effect of these provisions and their indirect effect via the wage determination process, and we investigate how these effects depend on the persistence of macroeconomic fluctuations and the bargaining power of employees.

Much of the existing literature in this area examines the direct and indirect effects of firing costs in isolation from each other, and pays scant attention to the interplay between them. Nor does it consider the potentially important role of macroeconomic fluctuations in determining the relative magnitudes of these effects. With regard to the direct effect of firing costs on average employment, the insightful analysis of Bentolila and Bertola (1990) shows firing costs to *stimulate* employment: at given real wages, firing costs discourage firing more than they discourage hiring, since firms that fire *must* pay the firing costs *now*, whereas firms that hire *may* pay the firing costs at some point in the *future*. However, Bertola (1990) shows that if the marginal product of labor falls steeply enough as employment rises, then the direct effect may turn negative. Furthermore, Bentolila and Saint-Paul (1994) show that when firms have heterogeneous productivity, so that some firms are firing, while others are hiring, and yet others are simply retaining their incumbents, then firing costs have an *ambiguous* direct effect on employment. The reason is that not only do firing costs give each firm a stronger disincentive to fire than to hire, but they also reduce the number of firms engaged in firing by more than they reduce the number of firms engaged in hiring. The above contributions, along with much of the rest of the literature on the relation between job security and employment, focus on the direct employment effect of firing costs, for given real wages. In Bentolila and Bertola (1990) and Bentolila and Saint Paul (1994) the wage is assumed constant, and thus the indirect effect, via wage determination, is excluded from the analysis.¹ Lindbeck and Snower (1988), on the other

¹Bertola (1990) shows that if newly recruited workers receive their reservation wage, this wage can offset the effect of firing costs on insider wages, thereby eliminating the indirect effect. But this model does not allow for stochastic productivity shocks and thus there is hiring but no firing. The greater is the firing cost, the greater will be the insider wage, and consequently the lower will be the corresponding reservation wage of the entrants, leaving the present value of the firm's wage payments per worker unchanged. Consequently, an increase in the firing cost has no indirect effect (via wages) on hiring. However, it can be shown that when the model is extended to a stochastic framework in which firing is possible, an indirect effect reemerges. The reason is that when an increase in the firing cost raises the insider wage and thereby reduces the entrant reservation wage, the increase in the insider-entrant wage differential stimulates firing and thereby reduces the firm's level of employment.

hand, focus on the the indirect effect and show that it is *negative*: the greater are the labor turnover costs, the greater will be the wages that incumbent employees can achieve in the wage negotiation process, and thus the lower will be firms' labor demand.

This paper takes a different tack. It addresses the important question of how the employment effect of job security provisions depends on the persistence of macroeconomic fluctuations. We characterize macroeconomic fluctuations in terms of how transient or prolonged they are. We call a shock "transient" when it has a high probability of reversing itself; a "prolonged" shock has a low probability of doing so. We show that *the more prolonged are macroeconomic fluctuations, the more contractionary will be the effect of hiring and firing costs on average employment, and the more expansionary will be their effect on average unemployment.*

We also examine how the employment effect of job security provisions depends on the relative bargaining strength of employees and their employers. In this regard, we show that *the greater is the employees' bargaining strength relative to their employers, the more contractionary (expansionary) will be the effect of hiring and firing costs on average employment (unemployment).* Put differently, the greater is the employees' bargaining strength, the less prolonged the macroeconomic shocks need to be before job security provisions begin to have a contractionary (expansionary) effect, on average employment (unemployment).

These results may help shed light on a famous problem: why has the European unemployment experience been so poor relative to the US since the mid-1970s, given that it compared so favorably with the US in the 1950s and 60s? In the 1950s and 60s unemployment rates in both regions were historically low, but the average unemployment rate in Europe was significantly below that of the US. With each of the major recessions since then - in the mid-1970s, the early 1980s, and the early 1990s - unemployment rates rose dramatically in both regions. But whereas the US unemployment rate came back down each time product markets recovered, the European unemployment rate climbed to a higher plateau in the mid-70s, a yet higher one in the early 1980s, remained high (relative to the 50s and 60s) throughout much of the long boom of the mid-80s, and rose again in the early 1990s.

Most economists are agreed that this phenomenon is unlikely to have a single explanation. Some, for example, have argued that in many European countries *unemployment benefits and related welfare state entitlements* rose in the late 60s and throughout much of the 70s, while they remained relatively stable in the US.² Others have observed that

²See, for example, Grubb (1994) and Lindbeck (1995). Since the major increases in European unemployment benefits and welfare state entitlements occurred in the 1960s and 70s, while European unemployment continued its upward course for more than a decade afterwards, extremely long lags in people's responses to policy change are required for

European policy makers have relied heavily on *taxes on employers and employees* (such as payroll taxes and unemployment insurance contributions) to finance unemployment benefit payments, whereas US taxes on employment showed little corresponding upward movement.³ Another popular argument is that *skill-biased technological change* and *international trade* have increased the demand for skilled labor relative to unskilled labor since the mid-1970s, but that the wage differential between the skilled and the unskilled has widened less in most European countries than in the US.⁴ Alternatively, European labor markets are alleged to be prone to *hysteresis* on account of such factors as union behavior, insider membership effects, and reduced job search by the long-term unemployed - factors that are less prominent in the US.⁵ This phenomenon is said to have prolonged the effect of the favorable labor market shocks on European unemployment in the 1950s and 60s, and also prolonged the effect of the unfavorable labor market shocks since the mid-1970s.

In view of the well-known difficulties these explanations have had in providing a full account of the comparatively favorable European labor market performance up to the mid-1970s and the comparatively unfavorable performance since then, this paper provides a different - albeit complementary - hypothesis. It suggests that job security provisions - which have tended to be more generous in Europe than in the US over the entire postwar period - exert a quite different influence on employment and unemployment when macroeconomic fluctuations are transient than when they are prolonged. Under the relatively tranquil labor market conditions of the early postwar period, the relative stringency of the European provisions may have served to keep the average European unemployment rate low relative to the US rate; but in the presence of the massive, prolonged shocks (in oil and other raw material prices, exchange rates, interest rates, etc.) of the mid-1970s, early 80s, and early 90s, the relative stringency of the European provisions may have driven the average European unemployment rate up relative to the US rate.

Along similar lines, the rise in the bargaining strength of European workers over the 60s and 70s - a development not matched in the US - may have imparted a contractionary bias to European job security provisions, particularly once the prolonged

these explanations to be convincing.

³ Thus, as European unemployment rose, this meant that a shrinking share of employers and employees was called upon to support a rising share of unemployed people. See, for example, Drèze, Malinvaud, et al (1994).

⁴ See, for example, Krueger (1995) and Krugman (1994). The European rigidity in wage differentials is attributed to union pressure, wage legislation, minimum wages, and social norms. Nickell and Bell (1996) however argue that the movement of skilled and unskilled unemployment rates in the OECD over the 1990s does not conform to this theory.

⁵ See, for example, Blanchard and Summers (1986).

labor market shocks made their appearance. Our analysis suggests that, not only do prolonged fluctuations and worker power each individually give job security legislation a contractionary employment bias, but these two effects also complement one another. In other words, the rise in bargaining power of European employees over the 60s and 70s may have made European employment more vulnerable to the prolonged labor market shocks since the mid-70s, and the prolonged labor market shocks may have amplified the adverse effect of workers' bargaining power on employment.

Our approach also differs from Lindbeck and Snower (1988, ch.11) who argue that when business cycles are short and shallow, substantial firing costs induce firms to hoard labor in recessions, whereas when the cycles are long and deep, labor is shed in a downturn and firing costs make firms wary of rehiring this labor if the magnitude of the subsequent upturn is uncertain. This paper, by contrast, does not consider labor hoarding and examines the influence of firing costs on employment in the long run - over the average of recessions and booms - rather than this influence in the aftermath of a particular recession.

The paper is organized as follows. Section 2 presents a simple model of employment and wage determination, and in this context Section 3 examines the effect of firing costs on employment in the short and long run. Sections 4 analyzes the employment effect of hiring costs. Finally Section 5 concludes.

2. A Simple Model of Employment and Wage Determination

Consider a labor market with a fixed number of identical firms, each producing a homogeneous output Q by means of a labor input L . For simplicity, let each firm's production function be

$$Q_{\tau} = Z_{\tau} \left(L_{\tau} - \frac{1}{2} b L_{\tau}^2 \right) \quad (1)$$

where b is a positive constant and Z_{τ} is a random variable representing business conditions (e.g. productivity, the level of product demand, etc.). Variations in Z_{τ} generate the recessions and booms that drive the firm's hiring and firing decisions. The evolution of Z_{τ} is described by a two-state Markov chain. In the "good state" $Z_{\tau} = Z^G$ and in the "bad state" $Z_{\tau} = Z^B$, where Z^G and Z^B are positive constants and $Z^G > Z^B$. The probability of remaining in the previous state is P and the probability of changing state is $(1-P)$. When the probability P is small, the economic fluctuations will be called "transient" and when this probability is large, the fluctuations will be termed

"prolonged".⁶

Let the firm be a price taker in the product market.⁷ Let W_τ be the real wage in period τ , F be the firing cost per worker fired (constant through time) and H be the hiring cost per worker hired. When the firm makes its employment decisions in any time period τ , it has perfect information about the prevailing business conditions, Z^i , $i=G,B$, in that period, and it knows the Markov process generating future economic fluctuations.

Thus the firm's employment decisions may be expressed as the outcome of the following profit maximization problem:

$$\text{Maximize}_{L_\tau} E \sum_{\tau=t}^{\infty} \delta^{\tau-t} \left\{ Z_\tau \left[L_\tau - \frac{1}{2} b L_\tau^2 \right] - W_\tau L_\tau - C_\tau \left[L_\tau - L_{\tau-1} \right] \right\} \quad (2)$$

where δ is the firm's discount factor and δ , Z_τ , b , F and H are exogenously given. The first term is the firm's output (or real revenue); the second is its labor cost; and the third is its labor turnover cost, where $C_\tau = H$ when $L_\tau - L_{\tau-1} > 0$ and $C_\tau = -F$ when $L_\tau - L_{\tau-1} < 0$.

For given values of δ , b , F and H , the firm's decision on whether to hire or fire clearly depends on the values of Z^G and Z^B . To avoid trivial results, we will assume that the magnitudes of Z^G and Z^B (relative to the firing and hiring costs F and H) fall within a range of values such that there are three scenarios:⁸

⁶Note that it is particularly straightforward to characterize the persistence of economic fluctuations in this model, since we have assumed that the probability of moving from the good state to the bad state is equal to the probability of moving from the bad state to the good state. In practice, however, booms are usually longer than recessions, so that the probability of remaining in a good state (P^G) exceeds the probability of remaining in a bad state (P^B). Díaz and Snower (1996a) extend the model here to allow for this difference in transition probabilities and show that the relevant qualitative conclusion of our analysis continues to hold. Specifically, they show that when P^G and P^B rise by equal proportional or additive amounts, the employment effect of firing and hiring costs becomes more contractionary.

⁷This assumption involves no substantive loss of generality. Under imperfect competition, the marginal conditions for employment (given below) would have to be restated in terms of marginal revenue products, which may often be expressed as linear transformations of the marginal products. For example, if the price elasticity of product demand (η), the number of firms (Φ), and the conjunctural variations coefficient (v , specifying the response of aggregate output to a change in the firm's output, and thereby measuring the degree of imperfect competition) are all constants, then the marginal revenue product of labor is $e^p(L)$, where $e = v/(\Phi\eta)$ and $f(L)$ is the marginal product of labor.

⁸There are three other possibilities: (1) The value of Z^G and Z^B are sufficiently high (relative to the firing and hiring costs) so that the firm hires new entrants when

(A1) The *firing scenario*: When economic conditions deteriorate (i.e. a good state Z^G is followed by a bad state Z^B), the firm fires some (but not all) of its insiders, leaving it with a workforce of L_{τ}^B .

(A2) The *hiring scenario*: When economic conditions improve (a bad state Z^B is followed by a good state Z^G), the firm hires new entrants, and thus its labor force, L_{τ}^G , is the sum of these entrants and the number of insiders carried forward from the previous period.

(A3) The *retention scenario*: When economic conditions do not change (i.e. a bad state is followed by another bad state, or a good state is followed by another good state), the firm retains its previous workforce. Thus, if the firm encountered a good state in period $\tau-1$ then $L_{\tau-1}^G = L_{\tau}^G$, and if there was a bad state in period $\tau-1$ then $L_{\tau-1}^B = L_{\tau}^B$.

The wage W_{τ} is the outcome of a Nash bargain between the firm and each of its employees. In each bargain, the pair of bargaining partners takes the employment of all other employees as exogenously given, and thus each employee is perceived as the marginal worker in the negotiation process. Assuming that the firm's workforce is sufficiently large, the firm's total workforce may be taken as given when the wage is set.

When the firm makes its employment decision, it therefore knows that this decision will affect the outcome of the wage bargains with its employees, and it can predict this bargaining response.⁹

economic conditions improve, retains the workers if good economic conditions do not change but does not fire in a bad state. In the long-run stationary equilibrium, employment remains constant through time. Since there is no firing under this regime, a change in firing or hiring costs that is sufficiently small to maintain the regime has no effect on employment. (2) The values of Z^G and Z^B are sufficiently low (relative to the firing and hiring costs) so that the firm has no incentive to hire new entrants in a good state. In this regime there is no incentive to hire workers in the first place, and consequently employment is zero. (3) The value of Z^G is sufficiently high and the value of Z^B is sufficiently low (relative to the firing and hiring costs) so that the firm has an incentive to hire new entrants in a good state and to fire all its insiders in a bad state. This case is trivial in that firing costs here have no effect on the firing decision.

⁹Díaz and Snower (1996b) extend the model of this paper by distinguishing between the firm's wage negotiations with its insiders and entrants. Within this framework, it makes no difference to the qualitative conclusions of our analysis whether we assume that employment decisions are made taking the wage repercussions into account, or that wage decisions are made taking the employment repercussions into account.

We assume that as soon as a worker is hired, his job is associated with the firing cost F . Furthermore, assume that all workers have the same productivity in the sense that, for any given level of employment, each worker would have the same marginal product if employed at the firm. Thus we do not need to distinguish between the bargaining positions of incumbent employees and new recruits.¹⁰

We begin by considering the wage bargain and then turn to the employment decision.

2.1 Wage Bargaining

In the Nash bargaining process, the worker's surplus at time t is the difference between the present value of wage payments under bargaining agreement (Y_t^i) and the present value under disagreement (y_t^i); and the firm's surplus is the difference between the present value of profits under agreement (X_t^i) and the present value under disagreement (x_t^i), where $i=G$ in a good state and $i=B$ in a bad state.

Let M_t^i be the present value of current and expected future profits generated by the marginal employee minus that employee's current labor costs; and let $h_t = H$ when the firm is hiring and $h_t = 0$ when it is not hiring. Then the present value of the profit generated by the marginal employee under bargaining agreement is¹¹

$$X_t^i = M_t^i - W_t^i - h_t \tag{3}$$

Under bargaining disagreement, employees are assumed to produce no output and engage in industrial action, which could take such forms as absenteeism, work to rule or even sabotage. The purpose of this action is to impose a cost on the firm, so as to worsen the firm's fall-back position and thereby to increase the negotiated wage. Let us measure the level of the industrial action in terms of this cost. We assume that the action is costless to the workers and that they are able to manipulate it in accordance with their own interests. Then the worker will seek to set the level of this action as high as possible without inducing the firm to fire him. Let the firm's profit from dismissing a worker be $-F-k-h_t$, where F is the firing cost and k (a constant, $k \geq 0$) stands for costs unrelated to hiring and firing.¹² Then the worker will set the level of

¹⁰In other words, when an outsider is hired, he becomes an insider.

¹¹It is convenient to divide the marginal worker's profit in this way since the wage negotiations are about W_t^i , and not about the marginal product or the hiring cost. Current firing costs do not enter this expression because the marginal worker is not fired.

¹²For example, k could be interpreted as the loss to the firm arising from a fall in consumer good-will or a deterioration of unused capital equipment (which, for

the industrial action such that the firm's marginal profit under disagreement is $-F-k-h_t$, for then the firm is indifferent between retaining and replacing the worker.

Thus the firm's profit surplus in period t is

$$X_t^i - x_t^i = (M_t^i - W_t^i) - (-F - k) \quad (4)$$

Under bargaining agreement in period t , the worker receives the present value

$$Y_t^i = W_t^i + E_t^i \sum_{\tau=t+1}^{\infty} \delta^{\tau-t}(W_{\tau}), \quad i=G,B \quad (5)$$

where E_t^i is the expectation at time t , given that the state $i=G,B$ prevails in this time period. Under disagreement, the worker's fall-back position is W^0 , which could be interpreted as financial support from family and friends during a breakdown in the wage negotiations. We assume that such a breakdown, however, has no effect on the worker's future expected wages. Thus the present value of the worker's wage income under bargaining disagreement in period t is

$$y_t^i = W^0 + E_t^i \sum_{\tau=t+1}^{\infty} \delta^{\tau-t}(W_{\tau}), \quad i=G,B \quad (6)$$

Consequently, the worker's bargaining surplus in period t is

$$Y_t^i - y_t^i = W_t^i - W^0 \quad (7)$$

Thus the Nash bargaining problem is

$$\underset{W_t^i}{\text{Maximize}} \Omega = \left(W_t^i - W^0 \right)^{\mu} \left(M_t^i - W_t^i + F + k \right)^{(1-\mu)} \quad (8)$$

Solving, we obtain the negotiated wage:

$$W_t^i = (1-\mu)W^0 + \mu \left(M_t^i + F + k \right) \quad (9)$$

simplicity, are not specified within our model).

Observe that this wage setting equation is quite standard in that the wage depends linearly on the marginal profitability of labor and the firing cost. Other wage determination models with this property would also yield the qualitative conclusions of our analysis.

2.2 The Employment Decision

The firm sets its employment so that the present value of expected profit generated by the marginal employee is zero:

$$M_t^c - W_t^c - C = 0 \quad (10)$$

(See the appendix.) This condition asserts that in a good state (where $C^c = H$), workers are hired until the marginal worker's expected profit is equal to the hiring cost H ; and in a bad state (where $C^b = -F$) workers are fired until the marginal worker's expected profit is equal to the firing cost F .¹³

Substituting $M_t^c = W_t^c + C$ into (9), we find that the equilibrium wage in a good state is

$$W_t^c = W^0 + \frac{\mu}{1-\mu}(H + F + k) \quad (11)$$

and in a bad state it is¹⁴

$$W_t^b = W^0 + \frac{\mu}{1-\mu}k \quad (12)$$

It can be shown that

$$M_t^c = Z^c \left(1 - bL_t^c \right) - \frac{\partial W_t^c}{\partial L_t^c} L_t^c + \delta [PH - (1-P)F] \quad (13)$$

¹³Specifically, in a hiring scenario, the condition $M_t^c - W_t^c - H = 0$ implies that a positive number of people is hired, whereas in the retention scenario (after a good state) this condition is satisfied at zero hiring. Similarly, in the firing scenario, the condition $M_t^c - W_t^c + F = 0$ implies that a positive number of people is fired, where in the retention scenario (after a bad state) it is satisfied at zero firing.

¹⁴This wage does not depend on the hiring and firing costs, because (i) in a bad state there is no hiring and (ii) the marginal profitability of the firm's workforce is $-F$, its fall-back position is $-F - k$, and thus its profit surplus is $(-F + k + F) = k$.

(see the appendix), i.e. the marginal profitability of labor in a good state (excluding the current labor costs) is equal to the sum of the following terms:

(i) The marginal product of labor in a good state (the first right-hand term): $\partial Q/\partial L_t^G = Z^G(1 - bL_t^G)$.

(ii) The effect of the firm's employment decision on its current wage payments (the second right-hand term), where

$$\frac{\partial W_t^G}{\partial L_t^G} L_t^G = \mu \frac{\partial M_t^G}{\partial L_t^G} L_t^G = -\frac{\mu}{1+\mu} Z^G b L_t^G \quad (14)$$

by (9) and (13). Thus any increase in employment reduces the bargained wage, which further raises employment (and *mutatis mutandis* for any reduction in employment).

(iii) the future expected marginal profitability of labor: with probability P the current good state continues in the next period, in which case the marginal worker's profitability will be equal to the hiring cost H (as in the current period); and with probability $(1-P)$ a bad state occurs, in which case the marginal worker is fired and the firm then bears the firing cost F .

Substituting (11), (13) and (14) into (10), we obtain the marginal condition for hiring (in a good state):

$$Z^G(1 - bL_t^G) - \left[W^0 + \frac{\mu}{1-\mu}(F+H+k) - \frac{\mu}{1+\mu} Z^G b L_t^G \right] + \delta[PH - (1-P)F] = H \quad (15)$$

i.e. the marginal product of labor minus the marginal wage cost plus the marginal future profitability is equal to the current hiring cost.

Similarly, in a bad state,

$$M_t^B = Z^B(1 - bL_t^B) - \frac{\partial W_t^B}{\partial L_t^B} L_t^B + \delta[-PF + (1-P)H] \quad (16)$$

and the marginal condition for firing (when there is a bad state) is

$$Z^B(1 - bL_t^B) - \left[W^0 + \frac{\mu}{1-\mu}k - \frac{\mu}{1+\mu} Z^B b L_t^B \right] + \delta[-PF + (1-P)H] = -F \quad (17)$$

by equations (10), (12) and (16), i.e. the marginal profitability of the firm's workforce is equal to the firing cost. (The interpretation of the left-hand terms is analogous to that for the good state.)

Conditions (15) and (17) imply that employment in the three scenarios is

$$\text{Hiring scenario: } L_t^G = (1+\mu) \frac{Z_t^G \left[W^0 + \frac{\mu}{1-\mu} (F+H+k) \right] - H + \delta PH - \delta(1-P)F}{Z_t^G b} \quad (18a)$$

$$\text{Firing scenario: } L_t^B = (1+\mu) \frac{Z_t^B \left[W^0 + \frac{\mu}{1-\mu} k \right] + F - \delta PF + \delta(1-P)H}{Z_t^B b} \quad (18b)$$

$$\text{Retention scenario: } L_t^G = L_{t-1}^G \text{ and } L_t^B = L_{t-1}^B \quad (18c)$$

Equations (11), (12), (18a), (18b), and (18c) describe the equilibrium wage and employment in the good and bad states. In the next section we analyze how firing costs affect employment.

3. Employment, Firing Costs and Economic Fluctuations

As noted in Section 1, firing costs affect employment both directly and indirectly via wage determination.¹⁵ Each of these effects may be evaluated (a) in the short run: $(\partial L^G/\partial F)$ and $(\partial L^B/\partial F)$, i.e. the employment effect of firing costs in period t , given the state $i = G, B$ in that period, and (b) the long run: $\partial E(L)/\partial F$, where¹⁶

$$E(L) = \frac{1}{2} (L^G + L^B) \quad (19)$$

i.e. the expected effect of firing costs on average employment, as t approaches

¹⁵Since the labor market equilibrium is stationary through time, we henceforth drop the time subscript.

¹⁶The reason is that the long-run probabilities of being in the good and bad states are $\pi^i = \frac{(1-P)}{2(1-P)} = \frac{1}{2}$, $i=B, G$. Note that when the Markov process Z_t goes to infinity ($\tau \rightarrow \infty$), the limiting probability does not depend on the initial state.

infinity.

3.1 The Short Run Effect of Firing Costs

In the *good state*, the employment effect of firing costs is

$$\frac{\partial L^G}{\partial F} = -(1+\mu) \left[\frac{\partial(1-P)}{Z^G b} + \frac{\mu/(1-\mu)}{Z^G b} \right] < 0 \quad (20)$$

by equation (18a). Here the first term in square brackets ($-\delta(1-P)/Z^G b$) is the *direct effect* of firing costs on employment (illustrated by the horizontal arrow in Figure 1): in the good state, the firm faces a probability $(1-P)$ that it will fall into a bad state and have to pay firing costs;¹⁷ thereby firing costs discourage hiring.

Firing costs also affect employment indirectly via wage determination. The second term in square brackets is the "fall-back effect" (illustrated by the arrow pointing downward in Figure 1): an increase in firing costs reduces the firm's fall-back position in wage bargaining and thereby leads to a higher negotiated wage.¹⁸ The term $(1+\mu)$ is the "feedback effect" (pictured by the right-hand loop in Figure 1): when firing costs reduce employment, they thereby raise the marginal product of labor which, in turn, raises the wage and reduces employment further (by the wage equation (9) and equation (15)).

Observe that both the direct and indirect effects operate in the same direction. The relative magnitude of these effects depends crucially on two parameters:¹⁹

- (i) The greater is the worker's bargaining power (μ), the larger will be the indirect effect (comprising the fall-back effect and the feedback effect).
- (ii) The more prolonged are the economic fluctuations (i.e. the greater is P), the smaller the effect of firing costs on employment. Specifically,

$$\frac{\partial^2 L^G}{\partial F \partial P} = (1+\mu) \frac{\delta}{Z^G b} > 0 \quad (21)$$

¹⁷In equation (14), an increase in the firing cost F reduces the future profitability of the marginal worker (in the third left-hand term) and thus reduces the profit-maximizing level of employment.

¹⁸By equation (11), $(\partial W^G/\partial F) = \mu/(1-\mu)$.

¹⁹It also depends on productivity Z^G , as discussed later.

i.e. the smaller is the probability of moving from the good state to a bad one, the smaller the influence of firing costs on current hiring.

In the *bad state*, the employment effect of firing costs is

$$\frac{\partial L^B}{\partial F} = (1+\mu) \left[\frac{1 - \delta P}{Z^B b} \right] > 0 \quad (22)$$

by equation (18a). The term in square brackets is the direct effect of firing costs on employment: at any given wage, firing costs discourage firing (for the more costly it currently is to fire workers, the more of them will currently be retained).²⁰

The indirect effect consists entirely of the feedback effect $(1+\mu)$. Firing costs have no fall-back effect on the wage ($\partial W^B/\partial F = 0$), since an increase in F reduces the firm's fall-back position and also increases the marginal product of labor by the same amount, and thus the firm's profit surplus in wage negotiations remains unaffected.

Thus the overall effect of firing costs on employment in the bad state is positive: These costs discourage firing, and this direct effect is amplified through the feedback effect.²¹

Observe that, as in the good state, an increase in the workers' bargaining power (μ) augments the indirect effect and thus makes employment more responsive to firing costs. On the other hand, the greater is P (more prolonged are the economic fluctuations), the smaller will be the effect of firing costs on employment. Specifically, the greater the probability of remaining in the bad state, the less effective firing costs become in discouraging firing:

$$\frac{\partial^2 L^B}{\partial F \partial P} = -(1+\mu) \frac{\delta}{Z^B b} < 0 \quad (23)$$

by equation (22).

3.2 The Long Run Effect of Firing Costs

²⁰This effect is partially offset by the fact that an increase in current firing costs reduces the future marginal profitability of workers if the bad state continues. (In equation (17), workers are fired until their expected marginal profitability equals the (negative) cost of firing.)

²¹It reduces the marginal product of labor and thus leads to a fall in the negotiated wage, which raises employment further.

Given the short-run employment effects of firing costs in the good state (equation (20)) and the bad state (equation 22), the long-run effect is

$$\frac{\partial E(L)}{\partial F} = \frac{1}{2} \left[\frac{\partial L^G}{\partial F} + \frac{\partial L^B}{\partial F} \right] = \frac{1}{2}(1+\mu) \left[-\frac{\delta(1-P) + \mu/(1-\mu)}{Z^G b} + \frac{1-\delta P}{Z^B b} \right] \quad (24)$$

which may be decomposed into the direct and indirect effects of firing costs:

$$\frac{\partial E(L)}{\partial F} = \frac{1}{2}(1+\mu) \left[\left[-\frac{\delta(1-P)}{Z^G b} + \frac{1-\delta P}{Z^B b} \right] - \left[\frac{1}{Z^G b} \frac{\mu}{1-\mu} \right] \right] \quad (24b)$$

The first term in square brackets is the sum of the direct effect of firing costs in the good and bad states, respectively. As in Bentolila and Bertola, this direct effect is positive: for any given real wage, a rise in the firing cost discourages firing by more than it discourages hiring.²² The second term in brackets is the fall-back effect. The feedback effect amplifies the resultant of the direct effect and the fall-back effect.

Consequently, whether firing costs stimulate or reduce employment in the long run depends on the relative magnitudes of the positive direct effect and the negative fall-back effect, as shown in Figure 1. If the direct effect (from the F box to the L box in the figure) dominates the fall-back effect (from the F box via the W box to the L box), then firing costs raise employment, and this influence is then magnified through the feedback effect. On the other hand, if the fall-back effect dominates the direct effect, then firing costs have a contractionary influence on long-run employment.

The relative magnitude of the direct effect and the fall-back effect can be shown to depend on the workers' bargaining power and the persistence (P) of the economic fluctuations.

The greater is the workers' bargaining power (μ), the greater will be the fall-back effect, since this bargaining power determines the degree to which they are able to exploit the firm's fall-back position in wage negotiations. The direct effect, however, remains unchanged, while the feedback effect is augmented. By equation (24), the

²²There are two reasons for this. First, in a bad state the firm faces certain firing costs at present, whereas in a good state it faces the uncertain prospect (with probability $1-P$) of firing costs in the future (discounted by δ). Second, employment is more responsive to firing costs in a bad state than in a good state since productivity Z^B in the bad state is lower than productivity Z^G in the good state.

workers' bargaining power (μ) influences the effect of firing costs on long-term employment in the following way:

$$\frac{\partial^2 E(L)}{\partial F \partial \mu} = \frac{1}{1+\mu} \frac{\partial E(L)}{\partial F} - \frac{1}{2} \frac{1}{Z^c b} \frac{(1+\mu)}{(1-\mu)^2} \quad (25)$$

where the first right-hand term represents the augmented feedback effect and the second right-hand term denotes the augmented fall-back effect. It can be shown that, for plausible parameter values, this expression is negative, i.e. the greater is the workers' bargaining power, the more contractionary is the effect of firing costs on long-term employment.

To see this, observe that $\partial^2 E(L)/\partial F \partial \mu$ is positive only when $\partial E(L)/\partial F$ is sufficiently positive. In particular, substituting (24b) into (25), we find that $\partial^2 E(L)/\partial F \partial \mu > 0$ when

$$\frac{Z^c}{Z^b} > \frac{\delta(1-P) + (1+\mu)/(1-\mu)}{1 - \delta P} \quad (26)$$

Recalling that in practice output and productivity rarely if ever fluctuate by more than 30% between recession and boom, it is apparent condition (26) only holds when Z^c is implausibly large relative to Z^b . Specifically, observe that the right-hand term is an increasing function of P and μ . Setting these parameters very conservatively at $P = \mu = 0$, we find that when $\delta = 0.9$, condition (26) holds only when $Z^c/Z^b > 1.9$.

Furthermore, if the workers' bargaining power μ is sufficiently large:

$$\mu > \mu^* = \frac{Z^c(1-\delta P) - Z^b\delta(1-P)}{Z^c(1-\delta P) - Z^b\delta(1-P) + Z^b} \quad (27)$$

then an increase in firing costs reduce long-term employment.²³

From equation (24) we find that the more prolonged are the economic fluctuations (i.e. the greater is the probability P of remaining in the previous state), the more contractionary will be the effect of firing costs on employment:

$$\frac{\partial^2 E(L)}{\partial F \partial P} = \frac{\delta}{b} (1+\mu) \left(\frac{1}{Z^c} - \frac{1}{Z^b} \right) < 0 \quad (28)$$

²³If the inequality goes the other way, firing costs stimulate long-term employment.

as illustrated in Figure 2. To see this, observe that the only way in which a change in the probability P influences the firm's employment decision - as well as the effect of the firing cost on this employment decision - is via its influence on the employees' marginal expected future profit:²⁴

- In a good state, the marginal expected future profit is $\delta[PH - (1-P)F]$ (by equation (15)), since the marginal profitability of labor is equal to H in a future good state and $-F$ in a future bad state. A unit rise in the firing cost thus has a contractionary effect on the marginal expected future profit by $-\delta(1-P)$. As P rises, the probability of remaining in a good state rises; hence the probability that the firm will have to pay the firing cost falls, and this weakens the contractionary effect of the firing cost - by the factor δ .

- In a bad state, the marginal expected future profit is $\delta[-PF + (1-P)H]$ (by equation (17)), since the marginal profitability of labor is equal to $-F$ in a future bad state and H in a good state. A unit rise in the firing cost thus has a contractionary effect on the marginal expected future profit by $-\delta P$. As P rises, the probability of remaining in a bad state rises and this strengthens the contractionary effect of firing costs - again by the factor δ .

In short, a rise in P weakens the contractionary effect of the firing cost on the marginal expected future profit in a good state by the same amount as it strengthens this contractionary effect in a bad state. Now observe that since the firm hires or fires workers up to the point at which the present value of the marginal profitability of labor is zero, any change in the marginal expected future profit is met by an opposite change in the current marginal product of labor (amplified by the feedback effect). Consequently, a rise in P weakens the expansionary effect of the firing cost on the current marginal product of labor in a good state by the same amount as it strengthens this expansionary effect in a bad state.

Furthermore, since the marginal product of labor (amplified by the feedback effect) in a good state is $(Z^G(1 - (b/(1+\mu))L^G))$ and in a bad state is $(Z^B(1 - (b/(1+\mu))L^B))$, employment is less responsive to the marginal product of labor in a good state than in a bad state. This is what we would expect in practice: since labor productivity, at any given level of employment, is higher in a good state than in a bad state, a given change in the marginal product of labor can be achieved by a smaller adjustment of employment in a good state than in a bad state. By implication, a rise in the probability P weakens the expansionary effect of the firing cost on employment in a good state by less than it strengthens the contractionary effect in a bad state.

²⁴The reason is that the firm knows whether there is a good or bad state in the current period when making its current employment decision.

Consequently, a rise in P reduces long-run employment.²⁵

When the probability P is greater than a particular critical value

$$P > P^* = \frac{Z^G - \delta Z^B - \frac{\mu}{1-\mu} Z^B}{\delta(Z^G - Z^B)} \quad (29)$$

then, for any given bargaining power parameter μ , productivities Z^G and Z^B , and discount factor δ , firing costs reduce the long-run employment level. Conversely, when $P < P^*$, firing cost stimulate employment in the long run, as illustrated in Figure 2.

Furthermore, when μ rises from μ_1 to μ_2 in Figure 2, the smaller is the value of $(\partial E(L)/\partial F)$ for any given value of P . Expressed differently, the greater is the employees' bargaining power, the less prolonged the macroeconomic fluctuations need to be before the firing cost has a contractionary effect on average employment.

Equation (28) also implies that workers' bargaining power (μ) and the durability of economic fluctuations (P) have complementary effects on the influence of firing costs on employment. The greater is the workers' bargaining power μ , the more is the direct effect of firing costs amplified through the feedback effect, and thus the more contractionary is the bias that persistence parameter P imparts to the employment effect of firing costs.

4. Employment, Hiring Costs and Economic Fluctuations

The short- and long-run employment effect of hiring costs is qualitatively similar to that of firing costs (analyzed in Section 3). Once again, hiring costs have a direct and an indirect effect (via wage formation) on employment, and the relative magnitude of these effects depends on workers' bargaining power and on the durability of economic fluctuations.

4.1 The Short Run Effect of Hiring Costs

²⁵This result can be shown to hold for a broad family of production functions in which macroeconomic productivity shocks enter multiplicatively. The only circumstances under which employment may be more responsive to the marginal product of labor in a good state than in a bad state are when the marginal product of labor diminishes at a sufficiently declining rate (i.e. the third derivative of output with respect to labor is sufficiently positive). But even then, as Díaz and Snower (1996b) show, a rise in P still imparts a contractionary bias to the effect of firing costs on employment, provided that the firing costs are sufficiently large.

In the good state, the employment effect of hiring costs is

$$\frac{\partial L^G}{\partial H} = -(1+\mu) \left[\frac{1 - \delta P}{Z^G b} + \frac{\mu/(1-\mu)}{Z^G b} \right] < 0 \quad (30)$$

by equation (18a). By the direct effect $-(1-\delta P)/Z^G b$ (from the H box to the L box in Figure 3)), hiring costs discourage hiring and thereby reduce employment, at any given real wage.²⁶ The second term in square brackets is the "profitability effect" (from the H box to the L box via the W box in Figure 3): an increase in the hiring cost H induces the firm to increase the marginal product of labor by the same amount and thereby increases the firm's profit surplus in the wage negotiations. The greater the profit surplus, the higher will be the wage.²⁷ The feedback effect (illustrated by the right-hand loop in Figure 3) is given by term $(1+\mu)$, which amplifies the employment effect of hiring costs.

Observe that both the direct and indirect effects operate in the same direction. The indirect effect depends positively on the workers' bargaining power (μ). Moreover, the more prolonged are the economic fluctuations, the weaker the effect of hiring costs on employment:

$$\frac{\partial^2 L^G}{\partial H \partial P} = (1+\mu) \frac{\delta}{Z^G b} > 0 \quad (31)$$

i.e. the greater is the probability of remaining in the good state, the smaller the influence of hiring costs on current hiring.

In the bad state, the employment effect of hiring costs is

$$\frac{\partial L^B}{\partial H} = (1+\mu) \left[\frac{\delta(1-P)}{Z^B b} \right] > 0 \quad (32)$$

by equation (18b). The direct effect (in square brackets) indicates that hiring costs discourage firing (the more costly it is to hire workers in the future, the more of them will currently be retained). The indirect effect consists entirely of the feedback effect $(1+\mu)$. Hiring costs do not influence the equilibrium wage in a bad state because

²⁶In equation (15), an increase in the hiring cost H reduces the profitability of the marginal worker.

²⁷By the wage equation (11), observe that $(\partial W^G/\partial H) = \mu/(1-\mu)$.

the firm is not hiring: $(\partial W^B/\partial H) = 0$.

Thus the overall effect of hiring costs on employment in the bad state is positive: These costs discourage firing, and thereby raise employment; this in turn is amplified via the feedback effect.²⁸

Observe that, as in the good state, an increase in the workers' bargaining power (μ) augments the indirect effect and thus makes employment more responsive to hiring costs. On the other hand, the greater is P (more prolonged are the economic fluctuations), the smaller will be the effect of hiring costs on employment. Specifically, the greater the probability of remaining in the bad state, the less effective hiring costs become in discouraging firing:

$$\frac{\partial^2 L^B}{\partial H \partial P} = -(1+\mu) \frac{\delta}{Z^B b} < 0 \quad (33)$$

by equation (32).

4.2 The Long Run Effect of Hiring Costs

The long-run effect of hiring costs on employment is

$$\frac{\partial E(L)}{\partial H} = \frac{1}{2} \left[\frac{\partial L^G}{\partial H} + \frac{\partial L^B}{\partial H} \right] = \frac{1}{2}(1+\mu) \left[-\frac{1 - \delta P + \mu/(1-\mu)}{Z^G b} + \frac{\delta(1-P)}{Z^B b} \right] \quad (34)$$

which may be expressed as

$$\frac{\partial E(L)}{\partial H} = \frac{1}{2}(1+\mu) \left[\left[-\frac{1 - \delta P}{Z^G b} + \frac{\delta(1-P)}{Z^B b} \right] - \left[\frac{1}{Z^G b} \frac{\mu}{1-\mu} \right] \right] \quad (34b)$$

Here the first term is the sum of the direct effect of hiring costs in the good and bad states, by equations (30) and (32): hiring costs H discourage both hiring and firing. The relative magnitude of each effect is ambiguous and depends on the difference between Z^G and Z^B . For Z^G and Z^B sufficiently close, the negative effect of H on the hiring decision dominates and long-run employment decreases with hiring costs. However, for Z^G

²⁸i.e. it reduces the marginal product of labor and thus leads to a fall in the negotiated wage, which raises employment further.

sufficiently larger than Z^B ,²⁹ the reduction of firing in bad times may offset the reduction of hiring in good times, and the direct effect of hiring costs on long-run employment may be positive.

The second term in equation (34b) describes the profitability effect. Since $(\partial W^G/\partial H) = \mu/(1-\mu)$ in the good state and $(\partial W^B/\partial H) = 0$ in the bad state, the profitability effect is negative. The feedback effect (the term $(1+\mu)$) amplifies the effect of hiring costs on employment.

Hiring costs raise long-run employment only if the direct effect is positive and dominates the profitability effect, as shown in Figure 3. Otherwise, hiring costs reduce long-run employment. The sign and magnitude of the influence of hiring costs on long-run employment depends, besides on the difference between Z^G and Z^B (which determines if the direct effect is positive or negative), on the workers' bargaining power and the durability of economic fluctuations.

The greater is the workers' bargaining power (μ), the greater will be the profitability effect $(\partial W^G/\partial H) = \mu/(1-\mu)$ and the feedback effect, while the direct effect remains unchanged. From equation (34) we find that the influence of μ on the effect of hiring costs on long-term employment is

$$\frac{\partial^2 E(L)}{\partial H \partial \mu} = \frac{1}{1+\mu} \frac{\partial E(L)}{\partial H} - \frac{1}{2} \frac{1}{Z^G b} \frac{(1+\mu)}{(1-\mu)^2} \quad (35)$$

where the first right-hand term represents the augmented feedback effect and the second right-hand term represents the augmented fall-back effect. As in the case of firing costs, for plausible parameter values, this expression is negative, i.e. the greater is the workers' bargaining power, the more contractionary is the effect of hiring costs on long-term employment.³⁰ Moreover, if the workers' bargaining power μ is sufficiently large such that the following condition is satisfied:

²⁹Recall that since $Z^G > Z^B$, employment in a bad state is more responsive to a change in hiring costs than employment in a good state. By equation (34), we find that $\partial^2 E(L)/\partial H \partial \mu > 0$ when

$$\frac{Z^G}{Z^B} > \frac{1 - \delta P + (1+\mu)/(1-\mu)}{\delta(1-P)}$$

For $P = \mu = 0$, and $\delta = 0.9$, this condition holds when $Z^G/Z^B > 2/0.9$.

$$\mu > \mu^* = \frac{Z^G \delta(1-P) - Z^B(1-\delta P)}{Z^G \delta(1-P) - Z^B(1-\delta P) + Z^B} \quad (36)$$

then the profitability effect compensates the direct effect and long-term employment decreases with H .

Furthermore, as in the case of firing costs, the more prolonged are the economic fluctuations, the more contractionary will be the effect of hiring costs on employment. Specifically, by equation (34),

$$\frac{\partial^2 E(L)}{\partial H \partial P} = \frac{\delta}{b} (1+\mu) \left(\frac{1}{Z^G} - \frac{1}{Z^B} \right) < 0 \quad (37)$$

The probability P influences the direct effect, and this influence is magnified through the feedback effect (the term $(1+\mu)$). Notice that equation (37) is identical to the influence of P on the employment effect of firing costs (equation (28)). The underlying intuition is similar: an increase in P weakens the direct effect in both good and bad times. Since employment is more responsive to hiring costs in good times than in bad times, the former effect dominates and the influence of P on the employment effect of hiring costs is negative.

In particular, when P is greater than a critical value P^* ,

$$P > P^* = \frac{\delta Z^G - \frac{\mu}{1-\mu} Z^B - Z^B}{\delta(Z^G - Z^B)} \quad (38)$$

hiring costs reduce the long-run employment level, for given μ , δ and Z^G and Z^B . (When $P < P^*$, hiring costs raise long-run employment.)³⁰

As in the case of firing costs, equation (37) shows that the workers' bargaining power and the durability of economic fluctuations have complementary influences on the long-run employment effect of hiring costs.

5. Conclusions

The theme of this paper is that job security provisions can have quite different employment effects when labor market shocks are prolonged and employees have much

³¹Observe that the greater is μ , the smaller is P^* . Also observe that, for $Z^B > \delta Z^G(1-\mu)$, P is always greater than P^* .

bargaining power than when the shocks are transient and employees are weak. This theme suggests that under the relatively tranquil labor market conditions of the 1950s and 60s, when macroeconomic fluctuations were transient and workers had comparatively limited bargaining strength, Europe's tight job security provisions may have done little harm to European employment - and may even have stimulated it - but once the fluctuations became prolonged and workers became more powerful, this legislation may have come to acquire a much more adverse employment effect.

Needless to say, there are many other reasons why European unemployment appears to have trended upwards over the past two decades while US unemployment has remained essentially trendless. Our explanation differs from the rest not only in its focus on the interplay between macroeconomic fluctuations and the wage-employment determination process, but also in its implicit prognosis for the future. Whereas many policy makers believe that European unemployment is doomed to remain high as long as its welfare state entitlement remain generous and job security provisions remain stringent, our analysis suggests that one potentially important reason for the European unemployment problem has been the succession of prolonged macroeconomic shocks since the mid-1970s. Should these shocks become more transient once again, then European job security legislation may play a different role in labor market activity.

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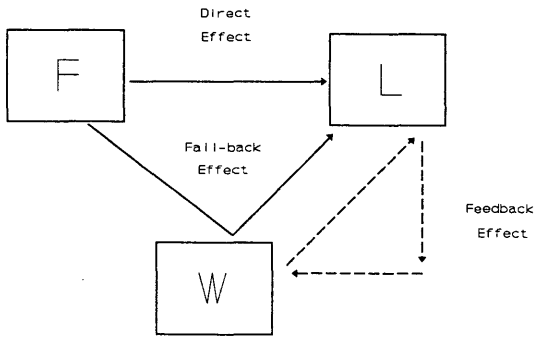


Figure 1: The Effect of Firing Costs on Employment

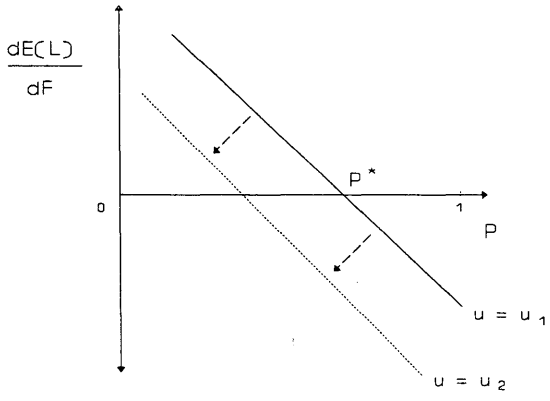


Figure 2

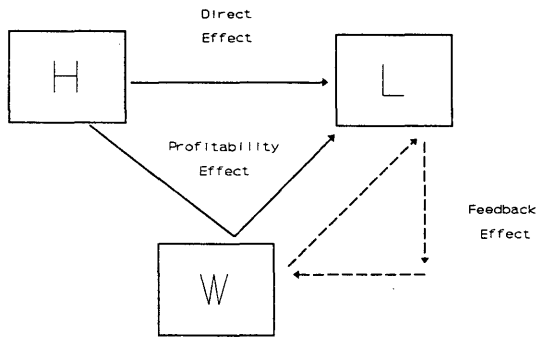


Figure 3: The Effect of Hiring Costs on Employment

Appendix: The dynamic optimization problem:

The firm's problem is

$$V(L_t^i) = \text{Max} \left\{ Z^i \left[L_t^i - \frac{1}{2} b L_t^{i2} \right] - \left[(1-\mu) W^0 + \mu (M_t^i + F + k) \right] L_t^i - C^i \left[L_t^i - L_{t-1}^i \right] + \delta EV(L_{t+1}^i) \right\} \quad (\text{A1})$$

Given the assumptions about the evolution of the random variable Z, $EV(L_{t+1}^i)$ equals

$$EV(L_{t+1}^i) = P \left[V(L_{t+1}^i) \right] + (1-P) \left[V(L_{t+1}^j) \right], \quad i, j = G, B, \quad i \neq j \quad (\text{A2})$$

i.e. with probability P the firm remains in state Z^i and obtains the maximum profit $V(L_{t+1}^i)$ and with probability $(1-P)$ it changes state and obtains the maximum profit $V(L_{t+1}^j)$.

The first order condition is

$$M_t^i - \left[(1-\mu) W^0 + \mu (M_t^i + F + k) \right] - C^i = 0 \quad (\text{A3})$$

where

$$M_t^i = Z^i \left[1 - b L_t^i \right] - \mu \frac{\partial M_t^i}{\partial L_t^i} L_t^i + \delta P \frac{\partial V(L_{t+1}^i)}{\partial L_t^i} + \delta (1-P) \frac{\partial V(L_{t+1}^j)}{\partial L_t^i} \quad (\text{A4})$$

(i) Solving for $\frac{\partial V(L_{t+1}^i)}{\partial L_t^i}$:

Observe that $V(L_t^i) = V(L_{t+1}^i)$: if economic conditions do not change, the firm faces the same decision in period t and $t+1$. Therefore, the optimal employment decision is the same in both periods and the firm will retain its L_t^i workers in period $t+1$. Thus, the marginal profit in period $t+1$ is equal to C^i :

$$\frac{\partial V(L_{t+1}^i)}{\partial L_t^i} = C^i \quad (\text{A5})$$

(i) Solving for $\frac{\partial V(L_{t+1})}{\partial L_t^i}$:

L_{t+1}^i does not depend on L_t^i . Thus, by equation (A1), the only channel through which $V(L_{t+1}^i)$ depends on L_t^i is through $-C^i(L_{t+1}^i, L_t^i)$. Therefore,

$$\frac{\partial V(L_{t+1}^i)}{\partial L_t^i} = C^i \quad (\text{A6})$$

(iii) Solving for $\frac{\partial M_t^i}{\partial L_t^i}$:

By equations (A4)-(A6),

$$M_t^i = Z^i \left(1 - bL_t^i \right) - \mu \frac{\partial M_t^i}{\partial L_t^i} L_t^i + \delta P C^i + \delta(1-P)C^i \quad (\text{A7})$$

thus,

$$\frac{\partial M_t^i}{\partial L_t^i} = \frac{Z^i b}{1+\mu} \quad (\text{A8})$$

because $\frac{\partial^2 M_t^i}{\partial L_t^{i2}} = 0$.

By equations (A3), (A7) and (A8), the first order conditions in good and bad times are

$$\left[Z^G \left(1 - bL_t^G \right) + \frac{\mu}{1+\mu} Z^G bL_t^G \right] - \left[W^0 + \frac{\mu}{1-\mu} (F + H + k) \right] - H + \delta P H - \delta(1-P)F = 0 \quad (\text{A9})$$

$$\left[Z^B \left(1 - bL_t^B \right) + \frac{\mu}{1+\mu} Z^B bL_t^B \right] - \left[W^0 + \frac{\mu}{1-\mu} k \right] + F - \delta P F + \delta(1-P)H = 0 \quad (\text{A10})$$