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THE EFFECTS OF FIXED-TERM EMPLOYMENT ON WAGES: THEORY AND EVIDENCE FROM SPAIN*

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In this paper, we analyze the effects of fixed-term employment on wages, when both permanent employees, who are entitled to severance payments in case of dismissal, and fixed-term workers, who do not enjoy as much job security as permanent workers, are hired. We identify two channels through which these effects arise. First, since collective bargaining determines wage rates and permanent workers have more bargaining power than fixed-term employees, the use of fixed-term employment contracts may produce higher bargained wages. Second, there may be wage discrimination agains fixed-term workers, so that, in effect, they receive lower earnings. We present empirical evidence for the Spanish case. It shows that wage rates increases are higher in those sectors with higher proportions of fixed-term employees and that fixed-term employees earn lower wages than permanent employees (after controlling for observable personal and job characteristics).

1. Introduction

Across most continental Western European countries, there are job security regulations which apply to employment contracts whose duration is indefinite. Most of these regulations take the form of severance payment in case of dismissal and are thought to restrict hiring. In some countries (Spain is «the example»), the use of fixed-term (temporary) employment contracts have been advocated as an alternative to reducing firing costs. Fixed-term employment contracts entail lower job security because of two reasons:

1. Fixed-term workers are entitled to a severance payment in case of dismissal that is significantly lower than the severance payment that dismissed permanent workers receive. Even, occasionally, the former is nil.

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2. There are some legal provisions protecting permanent workers that do not cover fixed-term workers. For instance, a dismissed permanent worker can sue the employer and obtain significantly higher severance payments if the court declares the dismissal «unfair». Dismissed fixed-term workers have no rights to sue.

These differences in pecuniary and non pecuniary firing costs among workers employed under different employment contracts introduces a peculiar two-tier system in employment relations.

It is often argued that the possibility of entering into fixed-term employment arrangements has been the basic cause of the increase in employment that took place in Spain between 1985 and 1991. After a law reform liberalising the use of fixed-term contract at the end of 1984, aggregate employment increased at an average annual rate over 3%. Simultaneously, the proportion of fixed-term employment soared from about 10% to over 30% [1]. This argument sustains that permanent contracts discourage hiring of new workers because of two reasons:

1. When workers are homogeneous, the expected wage of a newly hired worker includes the expected firing cost, which is much higher for permanent workers than for fixed-term workers (as already mentioned), and

2. When workers are heterogeneous and their abilities are unknown, the probability of hiring a low ability worker is an important component of the expected probability of a future dismissal. Thus, when employers perceive the average ability of prospective workers to be low, the significance of firing costs for the hiring decision increases.

We do not pursue the issue of the employment effects of fixed-term contracts further in this paper [2]. Instead, we focus on the (less investigated) wage effects of a two-tier employment contract system where workers differ in terms of tenure and, therefore, in job security (as happens when workers may be hired either under permanent or fixed-term contracts with no restrictions). There are two reasons why fixed-term employment has

[1] See Segura *et al.* (1991) and Jimeno and Toharia (1992a), chapter 4, for further details in the evolution and incidence of fixed-term employment in Spain.

[2] However, the effects of firing costs on the firm's hiring decision is a controversial issue. They have been analyzed by different authors within the literature of labour demand under linear adjustment costs. It is obvious that firing costs affect the variability of employment over the business cycle but they are not necessarily decisive regarding hiring and the long-run aggregate level of employment. Bentolila and Bertola (1990) present a model of firing costs where severance payments have only a small effect on hiring and, thus, the effects of firing costs on long-run average employment are small too. On the contrary, Saint-Paul (1992) shows that the existence of firing costs combined with a low and procyclical workers' rate of voluntary quits may cause «a high unemployment trap» (proving Blanchard and Summers' (1988) conjecture). Bentolila and Saint-Paul (1992a) show that a rise in

effects on wages. First, since collective bargaining determines wage rates and permanent workers have more bargaining power than fixed-term employees, the outcomes of this wage determination process will not be invariant to the tenure of employment contracts. After all, standard collective bargaining models teach us that bargained wages depend on workers' «survival probability» (their probability of being employed) at each wage level. The distinction between permanent and workers under fixed-term contracts also involves, *de facto*, a ranking regarding dismissals, since the latter type of worker will be fired first after excessive wage increases. Therefore, the existence of fixed-term workers affects the «survival probability» of permanent workers. The second reason for the effects of fixed-term contracts on wages is the possibility of wage discrimination, namely, wages being dependent upon the contractual status of the worker. For instance, wage discrimination against fixed-term workers would imply lower average wages as the proportion of fixed-term workers increases. In Spain, this possibility does not exist, *de iure*, because the law forbids collective bargaining agreements specifying different wage rates for permanent and fixed-term employees. However, there are fewer legal provisions protecting workers under fixed-term contracts. This implies that, *de facto*, fixed-term employees might feel obliged to accept lower wages [3]. Whether this is the case, is an empirical question that we address below.

The structure of this paper is as follows. In section 2, we present a collective bargaining model of wage determination to derive the effects of the coexistence of permanent and fixed-term employees on collective bargaining and, hence, on bargained wages. We show that, under plausible assumptions, bargained wages are higher, the higher the proportion of fixed-term employees. Section 3 contains some empirical evidence on wage rates increases and fixed-term employment that show a positive correlation among then. It also presents wage earnings equations that suggest the existence of wage discrimination against fixed-term employees. On average and after controlling for observable personal and job characteristics, they earn about 10% less than permanent employees. Finally, section 4 concludes.

firing costs reduces both the firm's marginal propensities to hire and fire, so that average steady-state labour demand normally decreases with firing costs, when these are small, but will increase when they are high enough. With another model specially designed to analyze the macroeconomic implications of fixed-term employment, Bentolila and Saint-Paul (1992b) estimate that this type of contracts contributed to increase employment by one and half per cent during a period of three years (in Spain after 1984).

[3] It is conceivable that fixed-term workers should ask for higher (and not accept lower) wages than permanent workers since their job security is much lower. However, when labour supply is rationed (as indicates an unemployment rate close to 19%), employers can impose the type of the contract and the corresponding pay as a «take-or-leave-it» offer.

2. The effects of fixed-term employment on collective bargaining

We now present a simple collective bargaining model with both permanent and fixed-term workers. Employers hire workers under either permanent or fixed-term contracts to produce according to the following production function:

$$Y = N^{\alpha}, \quad 0<\alpha<1, \quad N=[N_p^{\sigma} + (1-m)N_t^{\sigma}]^{\frac{1}{\sigma}}, \; 0 \leq \sigma \leq 1 \qquad [1]$$

where Y is production, N is labour input (N_p being the number of permanent workers and N_t being the number of fixed-term workers) and m stands for likely efficiency effects of contract tenure on workers' productivity[4]. For simplicity, we will assume that the product demand function faced by firms has a constant price-elasticity, $\eta > 1$ ($Y=P^{-\eta}$). Wages of permanent and fixed-term workers are, respectively, w_p and w_t. For ease in notation, we will also assume that firing fixed-term workers can be done at no cost. On the other hand, firing permanent workers requires a severance payment, s. The firing probability of a permanent worker $f(s,\phi)$, is decreasing in both the severance payment and the number of fixed-term workers employed per each permanent worker, $\phi = N_t/N_p$. (Thus, the proportion of fixed-term workers is $N_t/(N_t+N_p) = \phi(1+\phi)^{-1}$).

The main feature of this production function, which is chosen for analytical convenience, is, obviously, the constant elasticity of substitution between permanent and fixed-term workers (given by $(1-\sigma)^{-1}$). Thus, when σ is equal to one, permanent and fixed-term workers are perfect substitutes. When σ is equal to zero, the elasticity of substitution is equal to one (as in Dolado and Bentolila (1992)). Therefore, despite its simplicity, this technological assumption does not exclude interesting possibilities on the marginal rate of substitution of different types of workers. The marginal rate of substitution of permanent workers by fixed-term workers is:

$$MRS = \frac{\phi^{1-\sigma}}{1-m} \qquad [2]$$

We first obtain the corresponding demand functions of permanent and fixed-term workers. Employers chose the number of permanent and fixed-term workers to minimize expected cost, that is

$$\begin{array}{ll} \min & N_p[w_p + sf(s,\phi)] + N_t w_t \\ N_p, N_t & \\ s.t. & Y=[N_p^{\sigma} + (1-m)N_t^{\sigma}]^{\frac{\alpha}{\sigma}} \end{array} \qquad [3]$$

where the expected cost of hiring a permanent worker includes the expected severance payment in case of dismissal. By including expected severance

[4] As wages may have efficiency effects, other aspects of the employment contract, specially the contract tenure, may also affect the choice of effort by workers. Jimeno and Toharia (1992b, 1993) argue that it is very likely that fixed-term employment contracts have negative effects on productivity so that $m > 0$.

payments into the cost of permanent workers and by making dependent these payments on the number of fixed-term workers per each permanent worker, we explicitly consider the effects of fixed-term employment on severance payments and, therefore, on total labour costs.

It is straightforward to show that the first-order condition for the solution of the cost minimization problem, as long as $\sigma < 1$, can be written as follows

$$\phi = \left[(1-m)\frac{w_p + sf(s,\phi) - sf_\phi(s,\phi)\phi}{w_t + sf_\phi(s,\phi)}\right]^{\frac{1}{1-\sigma}} \equiv \psi(\phi,.) \qquad [4]$$

The ratio within brackets is the relative expected cost of hiring a permanent worker respect to that of hiring a fixed-term worker. Hiring a fixed-term worker reduces the firing probability of a permanent worker. Therefore, the net cost of hiring a fixed-term worker is lower than the wage of the newly hired fixed-term worker. Similarly, hiring a permanent worker increases expected severance payments. Thus, the net cost of hiring a permanent worker is higher than the wage of the newly hired permanent worker plus previous expected severance payments. Equation [4] can be easily represented as in Figure 1. When fixed-term workers and permanent workers are not perfect substitutes ($\sigma < 1$), the right-hand-side of equation [4] is either decreasing or increasing in ϕ depending on the sign of $f_{\phi\phi}$ (it is decreasing when this sign is positive, the most likely case). Figure 1 gives the number of fixed-term workers per each permanent worker, ϕ, as the intersection of $\psi(\phi,.)$ (the right-hand-side of equation [4]) and the 45 degree line. When permanent workers and fixed-term workers are perfect substitutes ($\sigma = 1$), employers hire only that type of workers with lower expected unit costs since the solution of the cost minimization problem is a corner solution with the proportion of fixed-term workers being either zero or one, depending on

$$w_p + sf(s,0) \lesseqgtr \frac{w_t}{1-m} \qquad [5]$$

From equation [4], it can be shown that the proportion of fixed-term workers is increasing in the wage of permanent workers (keeping the wages of fixed-term workers constant), the probability of firing a permanent worker, the elasticity of substitution between permanent and fixed-term workers and, for plausible parameter values, the severance payment. It is decreasing in the efficiency effects of fixed-term employment contracts (m) and in the extent to which the probability of firing a permanent worker changes with the number of fixed-term workers per each permanent worker (f_ϕ)[5]. Figure 1 shows the

[5] The proportion of fixed-term employment is either increasing or decreasing with respect to severance payments depending on the values of the first-derivative of the firing probability respect to s (f_s) and the second-cross-derivative of this same function ($f_{s\phi}$). A sufficient (but not necessary) condition for the proportion of fixed-term employment being increasing in the severance payment is that $sf_{s\phi}/f_\phi > -1$, what occurs when $f_{s\phi}$ is positive (the most likely case).

plausible effects of an increase of the severance payment in the number of fixed-term workers per each permanent worker. Such increase shifts the $\psi(\phi,.)$ locus towards the right so that the number of fixed-term workers per each permanent worker, ϕ, increases. It can be also shown that, both when there is no wage discrimination and when the wage of fixed-term workers is a constant fraction of the wage of permanent workers ($\Lambda w_p = w_t$, $\Lambda \leq 1$), a permanent workers' wages raise shifts the $\psi(\phi,.)$ locus towards the left, so that the proportion of fixed-term workers is *lower*, the *higher* the wage[6]. The intuition for this result is the following: the expected cost of fixed-term workers (including the effect of hiring a fixed-term worker on the severance payments to permanent workers) relative to that of permanent workers (including a similar term) increases when permanent workers' wages are raised, and, hence, the proportion of fixed-term workers is reduced. Thus, how wages of fixed-term workers are determined affects the relationship between permanent workers' wages and the proportion of fixed-term workers. If the wage of fixed-term workers is independent of the wage of permanent workers, this proportion is increasing in the wage of permanent workers. On the contrary, if the wage of fixed-term workers is a constant fraction of the wage of permanent workers, then the proportion of fixed-term workers is decreasing in the wage of permanent workers. This result may have important implications for the determination of wages under collective bargaining, as we show below.

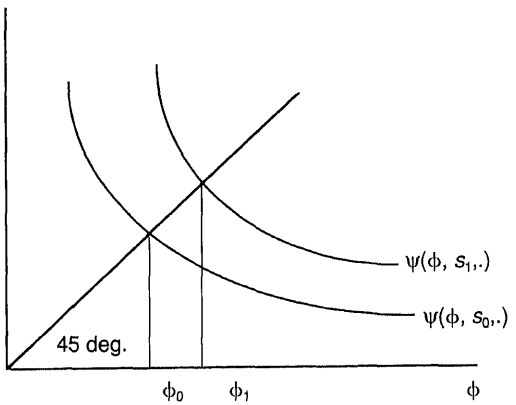

Figure 1

It must also be noticed that the proportion of fixed-term workers does not depend on the scale of production, that is, the total amount of the labour input, N(this is because the production function is homogeneous of degree

[6] In Spain, the law forbids discrimination in wage rates, so this case seems relevant. However, as we shall see in section 3, there is some evidence indicating that fixed-term workers receive lower earnings. This evidence does not imply, nevertheless, that wages of permanent and fixed-term workers are independently determined.

one in the number of permanent and fixed-term workers). This implies that the profit maximization problem can be solved in two steps. After solving the cost minimization problem, we can define a wage index $w(\phi)$ and write down the profit function as follows[7].

$$\Pi = \mathcal{N}^{\alpha k} - w(\phi)\mathcal{N}, \quad k = 1 - \frac{1}{\eta} \qquad [6]$$

and from the first-order-condition for profit maximization we get the optimal labour input that is given by:

$$\mathcal{N} = \left(\frac{w(\phi)}{\alpha k}\right)^{\frac{1}{\alpha k - 1}} \qquad [7]$$

Then, using the definition of the labour input, the demand functions of permanent and fixed-term workers are:

$$\mathcal{N}_p = [1 + (1-m)\phi^{\sigma}]^{-\frac{1}{\sigma}} \left(\frac{w(\phi)}{\alpha k}\right)^{\frac{1}{\alpha k - 1}} \qquad [8]$$

$$\mathcal{N}_t = [1 - m + \phi^{-\sigma}]^{-\frac{1}{\sigma}} \left(\frac{w(\phi)}{\alpha k}\right)^{\frac{1}{\alpha k - 1}} \qquad [9]$$

The wage-elasticity of the demand of permanent workers plays an important role in the determination of wages under collective bargaining. This elasticity is equal to:

$$\frac{\partial \mathcal{N}_p}{\partial w_p} \cdot \frac{w_p}{\mathcal{N}_p} = \frac{1}{\alpha k - 1} \cdot \frac{\partial w(\phi)}{\partial w_p} \cdot \frac{w_p}{w(\phi)} - \frac{(1-m)\phi^{\sigma}}{1 + (1-m)\phi_{\sigma}} \cdot \frac{\partial \phi}{\partial w_p} \cdot \frac{w_p}{\phi} \qquad [10]$$

It obviously depends on the proportion of fixed-term workers and how this proportion changes with permanent workers' wages. In this regard, two cases with extremely different implications arise:

1. If the wage of fixed-term workers is independently determined of permanent workers' wages (as if, for instance, the former wage is given by the reservation wage of fixed-term workers), then the proportion of fixed-term workers is increasing in the wage of permanent workers and, hence, the second term of equation [10] is negative.

   Therefore, disregarding (by now) the composition effect that appears through the wage index (first-term of the right-hand-side of equation [10]), a raise in the wage of permanent workers reduces hiring of this type of workers by more when fixed-term employment are feasible than when they are not feasible.

[7] The derivation of the wage index can be found in the appendix.

2. Alternatively, it is conceivable that either wage discrimination is not feasible and both type of workers receive the same wage or that, by some reasons, the wage of fixed-term workers is a constant fraction of the wage of permanent workers. In these cases, the proportion of fixed-term workers is decreasing in the wage of permanent workers, the second term of the right-hand-side of equation [10] is positive and, neglecting the composition effect, the wage-elasticity of the demand of permanent workers is lower when fixed-term workers are hired than when they are not hired.

After having derived the labour demand functions, we can now turn to wage determination. We suppose that collective bargaining between employers and workers's representatives determines wages. Employers are free to choose employment levels and their distribution by contract status (they enjoy the so-called «right-to-manage»). We also follow the standard practice of representing collective bargaining using a static Nash-maximand. In this maximand, we take the utility function of the workers to be their expected rents over alternative rents and the utility function of the firm to be its profit function.

For comparison purposes, we first derive bargained wages when there is no employment under fixed-term contracts ($\phi=0$). In this case, wages are the solution to the following maximization problem:

$$\max_{w_p} \quad [N_p(w_p + sf(s,0) - w_A)]^{\beta}\Pi \qquad [11]$$

$$\text{where } N_p = \left(\frac{w_p + sf(s,0)}{\alpha k}\right)^{\frac{1}{\alpha k-1}} \text{ and } \Pi = N_p^{\alpha k} - [w_p + sf(s,0)]N_p$$

β being a measure of workers' bargaining power. We normalize the reservation payoff to the firm to zero. Workers' alternative rents are denoted by w_A. The corresponding first-order condition is:

$$\beta \frac{\partial N_p}{\partial w_p} \cdot \frac{w_p+sf(s,0)}{N_p} + \frac{\beta[w_p+sf(s,0)]}{w_p+sf(s,0)-w_A} + \frac{\partial \Pi}{\partial w_p} \cdot \frac{w_p+sf}{\Pi} = 0 \qquad [12]$$

Evaluating equation [10] at $\phi = 0$, we get that the first-term of equation [12] is equal to $\beta(\alpha k\text{-}1)$. By the properties of these labour demand and profit functions the third term of equation [12] is equal to $-\alpha k/(\alpha k\text{-}1)$ (see the appendix). Hence, equation [12] reduces to:

$$M(w_p,.) \equiv \frac{w_p+sf(s,0)}{w_p+sf(s,0)-w_A} = \frac{\beta+\alpha k}{\beta(1-\alpha k)} \qquad [13]$$

Thus, the resulting markup of workers' expected rents over alternative rents ($M^{-1}(w_p,.)$) is increasing in workers' bargaining power. It is decreasing in product market power (k) and in the firm's labour intensity (α). Furthermore, the resulting wage is increasing in the alternative rents and decreasing in the expected severance payments. (The latter is because expected severance payments are part of the rents to be captured by

workers. Since they are indifferent between achieving the appropriate rents through wages or through severance payments, when the latter falls, the former gets raised). Graphically, Figure 2 represents equation [13]. The left-hand-side of this equation is decreasing in the wage while the right-hand-side is a constant. The resulting wage is determined by the intersection of the $M(w,.)$ locus and the horizontal line which represents the right-hand-side of equation [13]. Any changes in the relevant variables that shift the locus $M(w,.)$ towards the right and those changes that shift the referred horizontal line downwards, increase the wage.

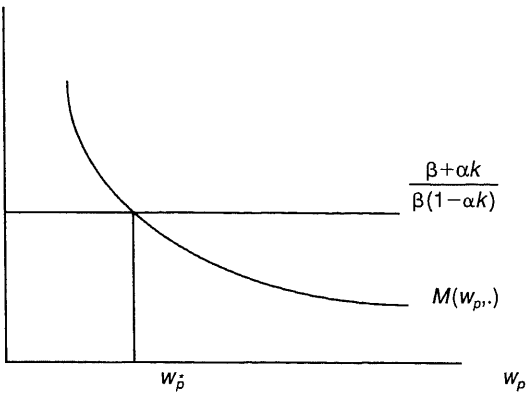

Figure 2

Now, we introduce fixed-term employment contracts, again. We will assume that workers' representatives in collective bargaining only care about the utility of permanent workers. In Spain, these worker representatives are elected by vote. Both permanent and fixed-term workers can vote and can be elected (with only minor restrictions on the seniority of those who can be elected). However, in practice, most workers' representatives belong to some union (see Jimeno (1992)). This suggests that they pursue the interest of unionized workers that are more likely to be permanent than fixed-term employees. Furthermore, permanent workers are usually a majority and, *de facto*, enjoy more institutional recognition, so that it is very likely that they control the decisions of the workers' representatives in the corresponding work council. For these reasons, we keep the expected rents of permanent workers over the expected alternative rents as the utility function of workers at collective bargaining[8]. Thus, when fixed-term employment contracts are introduced, the resulting wage is the solution to the following maximization program

$$\max_{w_t} \ [N_p(w_p + sf(s,\phi) - w_A)]^{\beta}\Pi \qquad [14]$$

$$\text{where } N_p = N[1+(1-m)\phi^{\sigma}]^{-\frac{1}{\sigma}} \text{ and } \Pi = N^{\alpha k} - w(\phi)N$$

[8] Dolado and Bentolila (1992) cannot reject the hypothesis that fixed-term workers are disregarded in collective bargaining.

and ϕ is given by equation [4]. The corresponding first-order-condition is:

$$\beta \frac{\partial N_p}{\partial w_p} \cdot \frac{w_p}{N_p} + \beta[1 + sf_\phi(s,\phi)] \cdot \frac{\partial \phi}{\partial w_p} \cdot \frac{w_p}{w_p + sf(s,\phi) - w_A} + \frac{\partial \Pi}{\partial w_p} \cdot \frac{w_p}{\Pi} = 0 \quad [15]$$

which using equation [10] and the properties of the profit function, as before, it yields:

$$\frac{\beta + \alpha k}{\alpha k - 1} \cdot \frac{\partial w(\phi)}{\partial w_p} \cdot \frac{w_p}{w(\phi)} - \frac{\beta(1-m)\phi^\sigma}{1+(1-m)\phi^\sigma} \cdot \frac{\partial \phi}{\partial w_p} \cdot \frac{w_p}{\phi} + \\ + \beta\left[1 + sf_\phi(s,\phi)\frac{\partial \phi}{\partial w_p}\right] \frac{w_p}{w_p + sf(s,\phi) - w_A} = 0 \quad [16]$$

and, after some manipulations, the (inverse of) the markup of permanent workers', rents over alternative rents is equal to:

$$M'(w_p,.) \equiv \frac{w_p + sf(s,\phi)}{w_p + sf(s,\phi) - w_A} = \left[1 + sf_\phi(s,\phi)\frac{\partial \phi}{\partial w_p}\right]^{-1} \cdot \\ \cdot \left[\frac{\beta + \alpha k}{\beta(1-\alpha k)} \cdot \frac{\partial w(\phi)}{\partial w_p} \cdot \frac{w_p + sf(s,\phi)}{w(\phi)} + \frac{(1-m)\phi^\sigma}{1+(1-m)\phi^\sigma} \cdot \frac{\partial \phi}{\partial w_p} \cdot \frac{w_p + sf(s,\phi)}{\phi}\right] \quad [17]$$

Comparing equations [13] and [17] we observe several differences in the determinants of the markup of permanent workers' rents over alternative rents when fixed-term employment is feasible:

1. The term of the left-hand-side of equation [17] is the same term in the left-hand-side of equation [13] but evaluated at some ϕ, possibly greater than zero. Since $M(w_p,.)$ is increasing in ϕ, if we represent the $M'(w_p,.)$ locus in Figure 3, other things equal, this locus will be to the right of the $M(w_p,.)$ locus, and the resulting wage will be higher (as long as the proportion of fixed-term workers is strictly positive). The intuition for this is the following. As fixed-term workers are employed, permanent workers are less likely to be fired. Therefore, they will get smaller rents from severance payments and to achieve a similar markup of expected rents over alternative rents, wages must be raised. We may call this the *compensation effect* of fixed-term employment on wage rates. Since expected severance payments are a minor part of expected workers' rents, this effect will plausibly be of small size.

2. Second, the markup of permanent workers' wages over alternative rents now depends on the derivative of the proportion of fixed-term workers with respect to the wage of permanent workers. In the case in which the wage of fixed-term workers is not related to the wage of permanent workers, this sign is positive. Thus, other things equal, the right-hand-side of equation [17] will be larger than that of equation [13] (because of two reasons: 1) the first term of the right-hand-side of equation [17] will be higher than one, and 2) the second term within the second

bracket of the right-hand-side is positive). As a result, the horizontal line in Figure 2 will tilt upwards and the wage of permanent workers will be lower. Alternatively, either when all workers receive the same wage or when the wage of fixed-term workers is a constant fraction of the wage of permanent workers, the proportion of fixed-term workers is decreasing in the wage of permanent workers. Therefore, the right-hand-side of equation [17] will be smaller than that of equation [13] and the wage of permanent workers will be higher. This is similar to what Dolado and Bentolila (1992) have called the *buffer effect*. When the job security of permanent workers increases after hiring of fixed-term workers, the bargained wage also increases.

3. There is also a *composition effect* that has an opposite sign to the previous effects described above. When wages of permanent and fixed-term workers are not related (ϕ is increasing in w_p), the elasticity of the wage index with respect to the wage of permanent workers is less than one (since the wage index is decreasing in ϕ). Thus, in this case, this effect (that appears through the first-term within the second bracket in equation [17]) increases permanent workers' wages. Alternatively, when wages of permanent and fixed-term workers are related (ϕ is decreasing in w_p), the elasticity of the wage index with respect to the wage of permanent workers is higher than one and this decreases bargained wages.

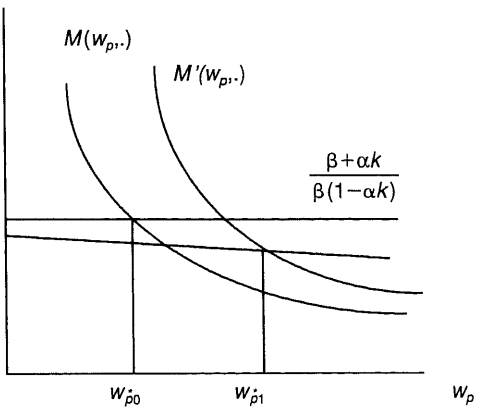

Figure 3

As conclusion, the total effect of fixed-term employment on bargained wages depends crucially on how fixed-term workers' wages are determined. Spanish legislation on collective bargaining forbids wage discrimination and recognizes work councils' right to monitor employment contracts. Consequently, we believe that the wage of fixed-term workers is bound to be related to the wages of permanent workers and that there is a buffer effect of fixed-term employment on bargained wages. Figure 3 represents

the result of fixed-term employment on wages rates in this case. The M'(w,.) locus is towards the right of the M(w,.) locus (because of the compensation effect) and the horizontal line representing the right-hand-side of equation [17] tilts downwards (because we are assuming that the buffer effect dominates the composition effect). The result is that permanent workers' bargained wages will be higher when fixed-term contracts are introduced than when firms cannot hire fixed-term employees.

3. Some Empirical Evidence on the Effects of Fixed-Term Employment on Wages

In Spain, real wage growth (both bargained wage growth and average earnings growth) was low during the eighties up to 1987 when bargained wages growth in real terms jumped (see Jimeno (1992)). Although there are several plausible causes of this increase, our bargaining model in section 2 predicts that the surge in fixed-term employment can be part of the explanation of bargained wages growing in real terms at an unusual rate[9]. We now present some evidence that suggests that this prediction should be taken seriously.

We construct a sample of 44 industrial sectors (manufacturing and non manufacturing, at roughly 2 SIC-digits level of aggregation covering the 1987-91 period by combining data from the Labour Survey and from the Ministry of Employment Statistical Office in charge of producing collective bargaining statistics[10]. Tables 1 and 2 show correlations between bargained wage growth and the proportion of fixed-term employment (in the previous year and in first differences). (In Table 1 we considered bargained wage growth at all collective agreements, both at the industry and at the firm level[11]. In Table 2, only firm agreements are included). The correlations between bargained wage growth and fixed-term employment (in levels and in differences) are generally positive (although the rank-correlations are not always significant). Regressing bargained wage growth on the change in the current proportion of fixed-term workers, on this proportion in the previous year and on some temporal dummies, we obtain the results presented in Table 3. These results show that both increases in the proportion of fixed-term employment and in previous fixed-term employment raise bargained wage growth. Performing the same regression only for firm agreements yields similar conclusion, as results in Table 4 shows. These results cannot be directly interpreted as proof of the existence of a buffer effect of fixed-

[9] Jimeno (1992) argues that income policies based upon wage agreements at the national level among several trade unions and employer associations are also part of the explanation. Form 1978 up to 1986, such incomes policies were in effect. After 1987, no agreement of this type has been reached.

[10] This latter statistical source contains bargained wage growth, but not bargained wage levels.

[11] Collective bargaining in Spain takes place at two levels: industry and firms. For more information on the characteristics of Spanish collective bargaining, see Jimeno (1992).

term employment on wages (in the terms that we described in section 2). However, they suggest that there are grounds to believe that fixed-term employment affects collective bargaining. In fact, with more appropriate data (a panel of firms for the 1985-88 period), Dolado and Bentolila (1992) find that a one percentage point increase in the proportion of fixed-term workers raises the growth rate of permanent workers' wages by one-third of a percentage point.

TABLE 1
Wage rate increase (total) at collective bargaining and fixed-term employment

	Correlation	Rank-Correlacion	Correlation	Rank-Correlation
	(with % fixed-term workers in the previous year		(with difference in % fixed-term workers respect to the previous year)	
1988	.837	.156	.886	.065
1989	.869	.008	.731	−.013
1990	.902	.238	.645	.034
1991	.904	.237	.735	.135

TABLE 2
Wage rate increase at collective bargaining at the firm level and fixed-term employment

	Correlation	Rank-Correlation	Correlation	Rank-Correlation
	(with % fixed-term workers in the previous year		(with difference in % fixed-term workers respect to the previous year)	
1988	.845	.098	.878	.006
1989	.853	.001	.718	−.016
1990	.914	.471	.649	.034
1991	.898	.123	.750	.078

Note: «Total» refers to the set of both collective agreements at the industry level and collective agreements at the firm level (see note 11).

TABLE 3

Dependent Variable:	Wage Rate Increase (Total)	
Sample Period:	1988-1991	
Number of observations:	176	
	Coefficient	Standard-error(*)
CONSTANT	7.119	0.164
D88	−1.340	0.160
D89	−0.061	0.157
D90	0.234	0.159
Difference % fixed-term workers	0.011	0.008
% Fixed-term workers previous year	0.019	0.005
R^2 Adjusted	0.542	

(*) Heteroskedasticity-Robust. Note: D88, D89 and D90 are year dummies.

TABLE 4

Dependent Variable:	Wage Rate Increase (Firm Agreements)	
Sample Period:	1988-1991	
Number of observations:	174	
	Coefficient	Standard-error(*)
CONSTANT	6.969	0.264
D88	−1.398	0.249
D89	−0.125	0.202
D90	0.404	0.204
Difference % fixed-term workers	0.022	0.013
% Fixed-term workers previous year	0.019	0.008
R^2 Adjusted	0.505	

(*) Heteroskedasticity-Robust. Note: D88, D89 and D90 are year dummies.

Note: «Total» refers to the set of both collective agreements at the industry level and collective agreements at the firm level (see note 11).

With regards to wage discrimination, we have already commented that the Spanish law forbids wage rate discrimination by type of contract. However, it has been observed that while wage rate increases have been higher in recent times in Spain between 1987 and 1992 than previously, the wage drift (the difference between earnings increases and wage rate increases) has been declining[12]. Some authors (Albarracín and Artola (1989)) argued that this can be explained by the increase in fixed-term employment, since this type of workers

[12] See Dolado and Bentolila (1992).

is in more «precarious situation». Thus, their earnings will be lower and the increase of fixed-term employment would reduce average wage earnings.

To investigate this possibility, we analyze a sample of 1209 wage-earners covered by an experimental survey done by the Spanish Statistical Office (see *Instituto Nacional de Estadística, INE* (1991)). This survey has the same structure as the *Labour Force Survey* and also contains information on earnings (the reference period of the survey is the second quarter of 1990). There are 358 fixed-term employees in this sample. Table 5 presents the results of regressing the (natural logarithm of) wage per hour worked on some personal and job characteristics and the nature of the employment relationship (permanent or fixed-term). This regression shows that, on average, fixed-term employees earn about 11% less per hour worked than permanent employees of the same characteristics. This result, however, does not necessarily imply wage discrimination against fixed-term employees, as unobserved ability (and unobserved effort) might be correlated with contractual status and be the cause of such a correlation between earnings and this latter variable.

One way to assess if the previous result can be interpreted as wage discrimination against fixed-term employment is to investigate if it is robust to changes in the variables controlling for workers' and jobs characteristics. Using another sample (see INE (1993)) where occupations and other workers' and jobs' characteristics are better observed, we run a similar wage regression to that presented in Table 5. A summary of the corresponding results is in Table 6. As seen in this table, the coefficient of contract tenure is negative, statistically significant and only slightly lower than in the previous regression. Given the robustness of this result, we believe that it can be interpreted as wage discrimination against fixed-term employees, in the sense that this type of worker earns approximately 9-11% less than permanent workers of similar characteristics and performing similar jobs.

TABLE 5

Dependent Variable:	Natural log of (monthly) earnings per (weekly) hour usually worked	
Number of observations:	1209	
R^2-Adjusted:	0.293	
	Coefficient	Standard-error(*)
CONSTANT	7.639	0.269
FEMALE	−0.200	0.045
SENIORITY 1-3 years	0.027	0.068
SENIORITY 3-10 years	0.126	0.070
SENIORITY over 10 years	0.204	0.068
FIXED-TERM CONTRACT	−0.108	0.059

Note: This regression also includes dummy variables by ages, occupation, levels of study, activity of the firm, institutional sector (public or private), and regions as regressors. Sample obtained from INE (1991).

TABLE 6

Dependent Variable:	Natural log of (monthly) earnings per (monthly) hour usually worked	
Number of observations:	2199	
R^2-Adjusted:	0.516	
	Coefficient	Standard-error(*)
CONSTANT	−1.064	0.131
FEMALE	−0.127	0.021
FIXED-TERM CONTRACT	−0.086	0.031

Note: This regression also includes age, age squared, and dummy variables by occupations, levels of study, activity of the firm, seniority, institutional sector (public or private), regions and firms size as regressors. (The definitions of these dummy variables do not correspond with the definitions of the dummy variables included in the regression presented in Table 5). Sample obtained from INE (1993).

4. Concluding Remarks

After 1986, fixed-term labour contracts are widely used in Spain. In fact, given that over 30% of all wage-earners are employed under fixed-term employment contracts, it can be said that a two-tier employment relation system is in effect. We have argued that there might be substantial wage effects involved in the widespread use of fixed-term contracts. We have presented a bargaining model that shows how the introduction of fixed-term employment may contribute to raise bargained wage growth. We have also presented some evidence that, although cannot be taken as formal tests of our model, suggests that the evolution of wage growth has been affected by the rise of fixed-term employment.

A reasonable reaction to these results is to ask why fixed-term employment has increased so much. It could be argued that had fixed-term employment such effects on bargained wage growth, employers would have not used fixed-term employment contracts. However, there are two reasons why this claim is inaccurate. First, the expected unit labour cost of newly hired workers includes the expected severance payment in case of future dismissal, which may be important in the case of permanent workers and is almost negligible in the case of fixed-term workers. If employers consider that severance payments impose a great burden on expected unit labour costs than that imposed by the plausible positive effects of fixed-term employment on bargained wages, they would rather hire fixed-term workers. As equation [4] makes clear, the proportion of fixed-term employment can be strictly positive even if wages are independent of contract tenure and fixed-term employment contracts imply negative efficiency effects (all that is needed is that fixed-term workers and permanent workers are not perfect substitutes and positive severance payments to dismissed permanent workers). Second, the positive effect of fixed-term employment on permanent workers' wages is plausible more than compen-

sated by the fact that fixed-term workers earn approximately 9-11% less than permanent workers, according to estimations in section 3. Thus, a raise in the proportion of fixed-term workers may imply higher bargained wages but lower average wage earnings. This may explain why the wage drift (the difference between workers' earning growth and bargained wage growth) has been unusually low (even negative) in the years after 1987, as already commented.

Our results suggest that reducing firing cost by promoting the use of fixed-term contracts may introduce significant distortions in the wage determination process. If a consequence of such a promotion is the segmentation of the labour market in a two-tier labour relation system, as in Spain, then the evolution of wages may be affected. These wage effects should be considered when assessing the convenience of achieving labour market flexibility by the promotion of fixed-term employment.

Appendix

As commented in the text, given homogeneity of degree one of the labour input in the number of permanent and fixed-term workers, the profit function is given by:

$$\Pi = \mathcal{N}^{\alpha k} - w(\phi)\mathcal{N} \qquad [A.1]$$

where $w(\phi)$ is the appropriate wage index (to be derived below). The first-order condition for profit maximization gives the labour demand function:

$$\mathcal{N} = \left(\frac{w(\phi)}{\alpha k}\right)^{\frac{1}{\alpha k - 1}} \qquad [A.2]$$

Hence

$$\frac{\partial \mathcal{N}}{\partial w(\phi)} \cdot \frac{w(\phi)}{\mathcal{N}} = \frac{1}{\alpha w - 1} \qquad [A.3]$$

and

$$\Pi = \left(\frac{w(\phi)}{\alpha k}\right)^{\frac{\alpha k}{\alpha k - 1}} - w(\phi)\mathcal{N} = \frac{(\alpha k)^{\alpha k - 1} - 1}{(\alpha k)^{\alpha k - 1}} w(\phi)^{\frac{\alpha k}{\alpha k - 1}} \qquad [A.4]$$

Therefore,

$$\frac{\partial \Pi}{\partial w} \cdot \frac{w}{\Pi} = -\frac{\alpha k}{1 - \alpha k} \qquad [A.5]$$

We now obtain the wage index when both permanent and fixed-term workers are hired and under the technological assumptions in the text. First, note that by the definition of the labour input

$$\mathcal{N} = N_p[1 + (1 - m)\phi^{\sigma}]^{\frac{1}{\sigma}} = N_t[1 - m + \phi^{-\sigma}]^{\frac{1}{\sigma}} \qquad [A.6]$$

Equation [4] in the text gives

$$\frac{w_p + sf(s,\phi) - sf_{\phi}(s,\phi)}{w_t + sf_{\phi}(s,\phi)} = \frac{\phi^{1-\phi}}{1-m} \qquad [A.7]$$

Multiplying by ϕ^{-1} and adding one to both sides yields

$$\frac{[w_p + sf(s,\phi)]\, N_p + w_t N_t}{[w_t + sf_{\phi}(s,\phi)]N_t} = 1 + (1 - m)^{-1}\phi^{-\sigma} = \frac{1}{1-m}\left(\frac{\mathcal{N}}{N_t}\right)^{\sigma} \qquad [A.8]$$

Now, let

$$LC = [w_p + sf(s,\phi)]\, N_p + w_t N_t$$

Then, from equation [A.8]

$$N_t = \mathcal{N}^{\frac{\sigma}{\sigma-1}}\, LC^{\frac{1}{1-\sigma}}\, (1-m)^{\frac{1}{1-\sigma}}\, [w_t + sf_{\phi}(s,\phi)]^{\frac{-1}{1-\sigma}} \qquad [A.9]$$

Similarly, taking the inverse of equation [A.7], multiplying by ϕ and adding one to both sides yields

$$\frac{[w_p + sf(s,\phi)]\, N_p + w_t N_t}{[w_p + sf(s,\phi) - sf_{\phi}(s,\phi)\phi]N_p} = 1 + (1 - m)\phi^{\sigma} = \left(\frac{\mathcal{N}}{N_p}\right)^{\sigma} \qquad [A.10]$$

which implies

$$N_p = \mathcal{N}^{\frac{\sigma}{\sigma-1}}\, LC^{\frac{1}{1-\sigma}}\, [w_p + sf(s,\phi) - sf_{\phi}(s,\phi)\phi]^{\frac{-1}{1-\sigma}} \qquad [A.11]$$

Multiplying equation [A.9] by w_t, multiplying equation [A.11] by $w_p + sf(s,\phi)$ and adding up, we obtain that

$$LC = w(\phi)\,\mathcal{N} = [w_p + sf(s,\phi)]\, N_p + w_t N_t =$$

$$= \mathcal{N}\left[w_t\left(\frac{w_t + sf_{\phi}(s,\phi)}{1 - m}\right)^{\frac{1}{\sigma-1}} + [w_p + sf(s,\phi)][w_p + sf(s,\phi) - sf_{\phi}(s,\phi)\phi]^{\frac{1}{\sigma-1}}\right]^{\frac{\sigma-1}{\sigma}} \qquad [A.12]$$

and, thus, using equation [A.7] again to substitute $w_t + sf_\phi$ into the last term within brackets of previous expression, we get

$$w(\phi) = \left(\frac{w_t + sf_\phi(s,\phi)}{1-m}\right)^{\frac{1}{\sigma}} [w_t + (w_p + sf(s,\phi))\phi^{-1}]^{\frac{\sigma-1}{\sigma}} =$$

$$= \phi^{\frac{1-\sigma}{\sigma}} \left(\frac{w_t + sf_\phi(s,\phi)}{1-m}\right)^{\frac{1}{\sigma}} [w_t + (w_p + sf(s,\phi))]^{\frac{\sigma-1}{\sigma}} = \qquad [A.13]$$

$$= [w_p + sf(s,\phi) - sf_\phi(s,\phi)\phi]^{\frac{1}{\sigma}} [\phi w_t + w_p + sf(s,\phi)]^{\frac{\sigma-1}{\sigma}}$$

Obviously, when $\phi = 0$, $w(0) = w_p + sf(s,0)$

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Resumen

En este artículo se analizan los efectos de la contratación temporal sobre los salarios, cuando es posible contratar trabajadores permanentes, que reciben indemnizaciones en caso de despido, y trabajadores temporales, que reciben indemnizaciones por despido mucho menores o no reciben ninguna. Se identifican dos razones por las que existen tales efectos. En primer lugar, siempre que las tarifas salariales se determinen mediante negociación colectiva y que los trabajadores permanentes disfruten de un mayor poder negociador que los trabajadores temporales, la contratación temporal puede introducir un sesgo alcista en las tarifas salariales. En segundo lugar, puede suceder que exista discriminación salarial en contra de los trabajadores con contrato temporal de forma que éstos reciban un salario inferior. En el caso español, la evidecia empírica muestra que los incrementos salariales pactados en la negociación colectiva son mayores en aquellos sectores donde la proporción de trabajadores temporales es mayor y que los trabajadores temporales reciben un salario inferior al de los trabajadores permanentes (incluso, después de controlar por aquellas características personales y del trabajo realizado que pueden ser observadas).

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