DP 2003 – 10

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June 2003

CETE – Centro de Estudos de Economia Industrial, do Trabalho e da Empresa

Research Center on Industrial, Labour and Managerial Economics

Research Center supported by Fundação para a Ciência e a Tecnologia, Programa de Financiamento Plurianual through the Programa Operacional Ciência, Tecnologia e Inovação (POCTI) of the Quadro Comunitário de Apoio III, which is financed by FEDER and Portuguese funds.

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Why Do Firms Use Fixed-Term Contracts? *

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June, 2003

Abstract

This paper investigates the reasons why firms use fixed-term contracts. Two distinctive features of these contracts - reduced firing costs and the prohibition of contract rollover - are highlighted. Firms' decisions related to temporary contracts - the choice of the contract on offer and contract conversion - are modeled within standard adjustment costs and matching settings. Regression analysis is performed on the stock of fixed-term contracts and the flows of temporary workers to permanent positions. Results from a beta-binomial regression model indicate that screening workers for permanent positions is the single most important reason why firms use this type of contract.

KEYWORDS: Fixed-Term Contracts, Adjustment Costs, Temporary Employment

JEL CODES: J23, J41.

*We would like to thank participants at the LOWER Conference (Braga, 2001) and the Meeting of the European Economic Association (Lausanne, 2001). The authors also gratefully acknowledge the partial financial support from *Fundação para a Ciência e a Tecnologia*. We also thank the *Departamento de Estatística do Ministério da Segurança Social e do Trabalho* that kindly allowed us to use the data. The usual disclaimer applies.

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1 Introduction

In virtually all labor markets, deregulation was the policy response to high and persistent unemployment. In Europe, many countries adopted two-tier reforms that, while increasing flexibility at the margin, left unchanged mandates applying to already existing contracts. As a result, new contractual arrangements governed by less stringent rules, particularly as regarded firing costs, were introduced. Subsequently, some of these new forms of contract rapidly gained importance. In the U.S.A., where no similar rigidities could be found, it was also the case that new forms of work also developed.

Rationalization of the growing share of these work arrangements has been offered within an adjustment cost framework. In this context, firms hire contingent workers because they want to save on future dismissal costs, independently of their origin. Notwithstanding, the focus on adjustment costs alone may be too narrow. Recent studies dispute the common view that fixed-term contracts actually offer firms increased flexibility due to restrictions that typically apply to the rolling over of these contracts (Hunt, 2000; Maurin, 2000). Besides, there are a number of reasons other than saving on prospective firing costs that may make firms willing to use fixed-term contracts:

- First, temporary workers may be preferred because they may be less costly to employ.
- Second, fixed-term contracts, like other temporary contractual types, are preferred alternatives when temporary or temporarily vacant positions are being filled. This is partly what these types of contracts were designed for.
- Third, if there is uncertainty about the value of the match, fixed-term contracts may serve as screening devices. If a job match is a pure experience good, its true value is revealed only after the match is formed. When the information about the true value of the match arrives, the match will be classified as good or bad depending on how its true value compares to the

firm's reservation value. Accordingly, the match is either maintained or terminated. If match destruction is optimal the firing cost will be borne. Hence, in contexts like this, firms may find it optimal to hire workers on temporary contracts for a trial period, and at a latter stage either offer them a permanent contract or dismiss them.

- Fourth, independently of any of the reasons above, using fixed-term contracts to fill permanent positions may be part of the firm's personnel policy.

Churning, that is worker turnover in excess of job turnover, has been previously reported as a permanent feature of some firms' employment records and not only the inevitable response to unfortunate mismatches (Burgess et al., 2000). Such policies may be rationalized within an efficiency wage framework where firms are thought of as choosing different combinations of wages and turnover at continuing positions. Firms choose one type of strategy over the other depending on the fundamentals of their technology, skills, and cost structure. Costly monitoring and training are likely to be associated with a high wage - low turnover strategy, as are higher average skill level and more efficient hiring technologies (Lane et al., 1996).

Churning strategies may also be rationalized within a simple adjustment cost framework. Because the cost of firing one worker with a temporary contract is reduced, firms may be more willing to hire new workers and examine them on the job. But because of non-renewal clauses, firms may prefer to fire the worker while his contract is temporary and take a chance with a new one (Blanchard and Landier, 2002). The result is persistent match destruction at continuing positions, i.e., churning.

To understand the reasons why employers use fixed-term contracts is important because they shape their consequences for the economy at large. The implications of fixed-term contracts for long-term productivity growth depend crucially upon the reasons why employers use them.

If fixed-term contracts are used as buffer stocks, implications are mixed. Flexi-

ble contracts facilitate firing in downturns, reducing labor hoarding and fostering productivity. But, because they reduce job stability, the use of fixed-term contracts as buffer stocks also hinders match-specific learning-by-doing and investments in training, and harms long-run growth prospects.

On the contrary, if fixed-term contracts are used as screening devices, they generate better growth prospects due to better learning about match quality, which translates into better job matches and, therefore, more stable employer-employee relationships (Nagypál, 2001).

Finally, if fixed-term contracts are used for churning workers they unequivocally have adverse effects in terms of productivity growth, again because they reduce match-specific learning-by-doing and investments in training, and because more, otherwise good, matches are terminated and replaced with new ones of an uncertain value (Blanchard and Landier, 2002).

Assessing the role fixed-term contracts play in employers' staffing policies is essentially an empirical problem for which only limited evidence is available. Typically, studies that address this issue do it from the employee's perspective, using data from national Labor Force Surveys to compute transitions in and out of temporary employment.

The results available for Italy (Adam and Canziani, 1998), France (Abowd et al., 1999), and the United Kingdom (Booth et al., 2002), all indicate that fixed-term contracts are stepping stones to permanent forms of employment rather than dead-end jobs. This is consistent with the hypothesis that fixed-term contracts are a mechanism of screening workers for permanent positions more than they are buffer-stocks or instruments of churning policies, which would lead instead to labor market segmentation.

However, all studies that use Spanish data (Alba-Ramirez, 1998; Adam and Canziani, 1998; Amuedo-Dorantes, 2000; Guell and Petrongolo, 2003), indicate the contrary. In Spain fixed-term contracts seem to be very much a vehicle of labor market segmentation: employment with fixed-term contracts is largely involuntary, less well paid, and offers limited advancement opportunities.

In the U.S. labor market, temporary forms of work, which include part-time work, temporary agency employment, independent contracts, and short-term hirings, are mostly used to accommodate workload fluctuations and to fill temporarily vacant positions, although, some employers report using flexible forms of employment to screen workers for regular positions (Autor, 2001, Houseman, 2001).

The purpose of this paper is to investigate the reasons why fixed-term contracts are used in the Portuguese labor market, and derive policy implications there from. The Portuguese labor market institutional framework provides an interesting setting for studying fixed-term contracts for two reasons: first, because it is an extreme case of high firing costs (acccording to a recent OECD study (OECD, 1999), Portugal ranks first in the stringency of employment protection legislation); and second, because the access to detailed longitudinal employer information about worker flows, gives a unique opportunity to investigate the conversion of temporary contracts into open-ended contracts.[1]

The paper is organized as follows. Section 2 briefly states the theoretical background. Section 3 gives an overview on the role of fixed-term contracts in the Portuguese labor market. Section 4 describes the two empirical models used in regression analysis. Section 5 describes the data used in the article. In Section 6, the profile of fixed-term contract users is described and the determinants of contract conversion are investigated. Section 7 concludes.

2 A Simple Theoretical Framework

Think of a firm as a collection of jobs. At time t_0 the firm creates n new permanent positions. Permanent positions live for two periods indexed by $T = 1, 2$. Permanent and temporary workers alike can fill permanent positions. Permanent workers enjoy high job security, temporary workers do not. The difference between the two types of workers is captured by the corresponding firing costs ϕ_f, indexed by superscript $i = H, L$ where H and L indicate high and low firing cost contracts,

[1] To the best of our knowledge, this is the first study that looks at transitions from fixed-term to open-ended contracts, using employer survey data, which - as in any labor demand empirical research - is the best we can aim for.

respectively.

For employers, the problem of filling a vacancy is one of optimally assigning to jobs workers who are observationally equivalent but have different productivity on the job.

Information about the true value of the match is revealed at the end of the first period, denoted t_1. For simplicity, it is assumed that all separations are initiated by the firm (i.e., there are no voluntary quits). All workers hired at t_0 stay with the firm until t_1. At this point in time, those that do not meet the critical match value set by the firm will be fired. Because permanent workers are more costly to dismiss, they enter the firm through a more demanding pre-hiring screening process. Hence, costs of hiring a permanent worker (ϕ_h^H) exceed those of hiring a temporary worker (ϕ_h^L). Thinking of a worker's productivity on the job as the realization of a random variable y drawn from a distribution that is specific to each type of contract (because hiring for permanent contracts are associated with more pre-hiring screening), implies that the mean value of the productivity of a worker hired as permanent is higher than is that of a newly-hired temporary worker. Let $f(y)^i$ denote the probability density of y and the superscprit i the type of contract (again $i = H, L$). Then

$$\bar{y}^L = \int y^L f(y)^L dy^L \quad < \quad \bar{y}^H = \int y^H f(y)^H dy^H \tag{1}$$

Wages are determined by bargaining between the firm and the worker and are not contingent on the output produced by the match (which is information private to the firm), or on the utility it delivers (which is information private to the worker). All workers are paid the same wage regardless of the type of contract they are offered. [2] Define the productivity value of a match, $V(y)$, as the present value of the worker's productivity on the job net of the corresponding wage, or

$$V(y) = \sum_{t=1}^{2} (y_t - w)\rho^{-t} \tag{2}$$

[2]The assumption that all workers are paid the same wage is not essential. Alternatively, we could assume that in period 1, workers with permanent contracts receive higher wages because their expected productivity is higher. In period 2, wages depend on the individual-specific productivity. Nothing essential in the results depends on this.

where ρ is the discount factor.

Define also the total productivity match value, $V'(y)$, as the $V(y)$ less the current value of the cost of destroying the match at the end of period 2 (t_2), or

$$V'(y) = \left[\sum_{t=1}^{2}(y_t - w)\rho^{-t}\right] - \phi_f\rho^{-2} \tag{3}$$

where ϕ_f denotes firing costs.

2.1 The choice of the type of contract

The condition for a worker to be hired with a permanent contract is that the total expected productivity value of a permanent match net of the corresponding hiring cost exceeds that of a temporary match, i.e.,

$$V'(\bar{y}^H) - \phi_h^H \quad > \quad V'(\bar{y}^L) - \phi_h^L \tag{4}$$

or equivalently,

$$\sum_{t=1}^{2}(\bar{y}_t^H - \bar{y}_t^L)\rho^{-t} \quad > \quad (\phi_f^H - \phi_f^L) + (\phi_h^H - \phi_h^L) \tag{5}$$

Condition 5 simply states that in forward looking firms the expected productivity of a permanent match must be high enough to compensate, over its survival period, the additional hiring costs and firing costs they imply relative to those incurred if the match were formed as temporary.

2.2 The decision to keep/replace permanent matches

By assumption, the true value of the match is revealed to the firm at time t_1. At this time, a decision must be made as to maintining or destroying the permanent match. Permanent matches are optimally maintained if their true total productivity value exceeds the expected productivity value of replacing the match in the second period, net of the costs of match replacement. Assuming that productivity is constant throughout the entire two periods, condition (5) will hold in each period. This implies that permanent workers will necessarily be replaced with permanent workers. In this case, match replacement is optimum if:

$$(y_2 - \bar{y}_2^H)\rho^{-1} \quad \leq \quad \phi_h^H + \phi_f^H \tag{6}$$

Condition 6 illustrates the fact that adjustment costs insulate incumbent workers from the competition of outsiders.

2.3 The decision to keep/replace temporary matches

If at time t_0 workers were hired as temporary, at time t_1 employers still have to decide whether to keep the match or replace it with a similar one. If conversion clauses do not apply, this decision is essentially the same as in the case of permanent workers. However, if conversion clauses apply, employers must take into account that if keeping the match, this must become permanent. Match conversion implies the immeadiate destruction of match value because of the increase in the cost of firing the worker in the future if his contract becomes permanent today. The condition for optimal conversion of a temporary contract into a permanent one is:

$$(y_2 - \bar{y}_2^L)\rho^{-1} \quad \geq \quad (\phi_f^H - \phi_f^L)\rho^{-1} - (\phi_f^L + \phi_h^L) \tag{7}$$

Condition 7 implies that, for a certain expected productivity value of a new temporary match, replacement of temporary matches is more likely if the costs of replacing a temporary match (the costs of hiring and firing a temporary worker) are low and the relative costs of firing a permanent worker are high. In labor markets characterized by such conditions, employers feel more tempted to fire temporary workers and try their luck with similar replacement matches of an uncertain value. As a result, unproductive churning is more important in those settings.

3 Two empirical models

To discriminate empirically between the competing reasons why employers may choose to employ their workforce with fixed-term contracts we employed two regression models.

The first model focuses on the employer's decision to offer a fixed-term contract as an alternative to standard (open-ended) contracts. The dependent variable is the number of individuals employed with a fixed-term contract (the number of events) out of the total number of employees at the firm (the number of trials). In these circumstances a count model applied to proportions (of which the Poisson regression model is the most commonly assumed) is often used. The same kind of specification would also be indicated for the second regression model where the dependent variable is the number of fixed-term contracts that were converted to permanent (the number of events) out of the total of fixed-term contracts existing at the firm (the number of trials).

However, if data display overdispersion, the Poisson assumption will fail and generalized count models generated by mixtures are more adequate. Unobserved heterogeneity or true contagion, both may generate overdispersed data, which is, in fact, a common feature of count data. One way overdispersion may be manifested is through a higher relative frequency of zero observations than is consistent with the Poisson assumption.[3]

In these circumstances, the count data models more commonly used in applied work are negative binomial models that may be interpreted as a Poisson-gamma mixture, which can be viewed as a Poisson distribution with unobserved individual (gamma) heterogeneity, but that also allows for particular forms of dependence for the underlying stochastic process (true contagion). The problem with the negative binomial specification is that it assumes an infinite upper bound for the variate of interest, which makes it inappropriate if it is small, as is the case with the dependent variables of the two regression models being studied.

In these cases, a beta-binomial model is a useful alternative. This model has as a starting point the binomial model

$$P(Y = y) \quad = \quad \frac{n!}{y!(n-y)!} p^y (1-p)^{n-y} \tag{8}$$

but assumes that the probability p that the event occurs in any of its n trials

[3]Hurdle models are sometimes used to deal with this feature of the data, which is commonly referred to as "excess zeros" or "zero inflation".

depends on a set of unobserved individual characteristics, and that it is distributed as a beta random variable with parameters α and θ. Under these assumptions, the dependent count variable Y follows a beta-binomial distribution defined by [4]

$$P(Y=y|x,n) = \frac{n!}{y!(n-y)!}\frac{\Gamma(\frac{\theta+1}{\alpha\theta})\,\Gamma(\frac{1+n\alpha\theta-y\alpha\theta}{\alpha\theta})\,\Gamma(\frac{1+y\alpha}{\alpha})}{\Gamma(\frac{1}{\alpha})\,\Gamma(\frac{1}{\alpha\theta})\,\Gamma(\frac{\theta+1+n\alpha\theta}{\alpha\theta})} \tag{9}$$

with

$$E(Y|x,n) = n\frac{\theta}{1+\theta} \tag{10}$$

and

$$V(Y|x,n) = n\frac{\theta}{1+\theta}\frac{1+\theta+n\alpha\theta}{(\theta+1)(1+\theta+\alpha\theta)} \tag{11}$$

Assuming α is a constant and θ depends on x exponentially according to $\theta = exp(x'\beta)$, it is clear that the marginal effects of the explanatory variables are identical (except for the n term) to the logit regression model:

$$\frac{\partial E(Y)}{\partial x_j} = \beta_j\Big(\frac{e^{x'\beta}}{1+e^{x'\beta}}\Big)\Big(1-\frac{e^{x'\beta}}{1+e^{x'\beta}}\Big)n = \beta_j p(1-p)n \tag{12}$$

meaning that the coefficients on dummy explanatory variables can be interpreted as odds ratios.

The log-likelihood function to be maximized is defined as

$$\begin{aligned} L(\alpha,\beta) &= \sum_{i=1}^{N} log\Big[\Gamma(\frac{e^{x_i'\beta}+1}{\alpha e^{x_i'\beta}})\Big] + log\Big[\Gamma(\frac{1+n_i\alpha e^{x_i'\beta}-y_i\alpha e^{x_i'\beta}}{\alpha e^{x_i'\beta}})\Big] + log\Big[\Gamma(\frac{1+y_i\alpha}{\alpha})\Big] \\ &- log\Big[\Gamma(\frac{1}{\alpha})\Big] - log\Big[\Gamma(\frac{1}{\alpha e^{x_i'\beta}})\Big] - log\Big[\Gamma(\frac{e^{x_i'\beta}+1+n_i\alpha e^{x_i'\beta}}{\alpha e^{x_i'\beta}})\Big] \end{aligned} \tag{13}$$

This beta-binomial regression model stands for the binomial in very much the same way that the negative binomial model stands for the Poisson. This means that it may still be interpreted as a binomial distribution with individual heterogeneity, but also as giving the number of successes when both success and failure are contagious.[5] The accommodation of true contagion is an welcome feature of

[4] See Santos Silva and Murteira (2000).

[5] The estimation procedure automatically weights each observation by the corresponding risk set. That is, in the incidence of fixed-term contracts equation, the observations are (implicitly) weighted by the number of employees. In the transition to permanent employment equation the observations are weigthed by the number of workers under fixed-term contracts.

this distribution because the dependent variables in the two models described before may display that property. In fact, if one firm uses fixed-term contracts as a structural component of its staffing policy, the occurrence of an event increases the probability of further occurrences and conversely. Likewise, in the second model, if firms use fixed-term contracts as part of a strategy of churning workers around a fixed number of positions, failure to convert one contract into a permanent one increases the probability of further failures in the same way that using fixed-term contracts as screening devices implies that success is also contagious.

4 Data

The data used throughout this article comes from the Social Audit (Balanço Social) which is an annual survey run by the Portuguese Ministry of Employment. When it was first introduced in 1986 it covered state-owned firms only. Since then its coverage has expanded, first to firms with at least 500 employees and, since 1992, to firms with at least 100 employees. For these firms, answering the survey is mandatory.

Each year, a respondent establishment reports data on a large variety of topics concerning the characteristics of the workforce and labor costs. This is organized into six major areas: (i) company details; (ii) employment; (iii) labor costs; (iv) occupational safety; (v) vocational training; and (vi) social expenditures.

The employment block, which is the largest component of the survey, collects detailed information on the characteristics of the firm's workforce. This includes the total number of workers (year average and end-of-year count), including the skill composition, age structure, tenure, and the educational level of the workforce. Total employment is also decomposed by type of contract.

Extensive information on the stock and flows of workers with fixed-term contracts is also available. Reasons why permanent workers left the firm during the course of each calendar year are also reported. The bulk of data used in the present work comes from this block. Other data used below refer to wages (wage level and wage dispersion), costs of vocational training, and other social expenditures.

Four waves of the survey were available to this study, covering the period from 1993 to 1996. The sample we used contains information on 8 121 year*firms and a total of 3.1 million workers.

The Social Audit provides complete information that enables us to identify the share of fixed-term contracts in total employment and the proportion of fixed-term contracts that were converted to permanent ones during the calendar year.

The stock measure of fixed-term contracts was obtained using the total number of such contracts reported by respondents, which is referred to the year-end (head count on December 31st). For consistency, the corresponding count of the total number of employees was used, instead of the year average, which is also reported.

However, using the year-end count of fixed-term contracts to compute the corresponding rate of conversion would be inappropriate. Hence, the total number of such contracts that existed during the calendar year and the number that during the same period became permanent were used.

The sole measure of wages reported is the firm-level average for its entire workforce excluding top-level managers. Because average wages of temporary and permanent workers are not available separately, the wage variable used in regression simply tells us if firms are high or low-wage firms, giving us no information on the relative wage of temporary and permanent workers. The wage variable is, however, complemented with a measure of wage dispersion computed as the ratio between the wages corresponding to the firm's 95th percentile and the 5th. This is intended to serve as a proxy for union strength at the firm, as stronger unions are associated with reduced wage dispersion.

Data on other human capital variables are available and were used. Firms are asked about the year's total expenditure on training but there are no data on the type of training, whether up-front or other. Hence, the corresponding per capita measure (computed by dividing by the firm's total workforce) is used. The same holds true for the firm's expenditure with fringe benefits offered to their employees, which include firm-provided social insurance and other subsidies, as well as expenditures with group-facilities.

Separations of permanent workers are also reported, as well as the corresponding reasons. Those not initiated by the firm (voluntary quits and separations due to retirement or death) are indirect evidence of the number of permanent positions open at the firm and are also used in estimation.

5 Fixed-Term Contracts in the Portuguese Labor Market

In the Portuguese labor market, between 1991 and 1998, fixed-term contracts represented, on average, 14 percent of total employment. The two employment surveys (the employer based - IEE -, and the household based - IE), despite their differences, report remarkably similar levels and trends in the share of temporary employment (Figure 1).

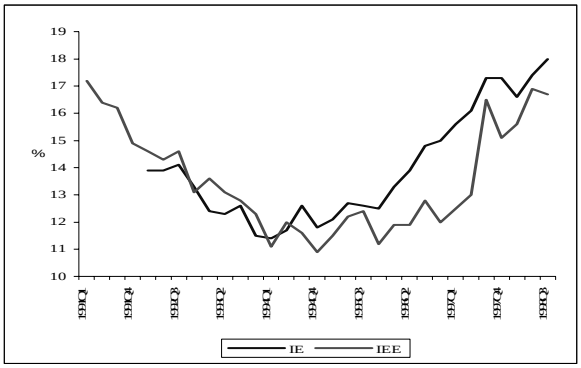

Figure 1: Incidence of Fixed-Term Contracts

The incidence of fixed-term contracts varies dramatically across occupational categories. Temporary contracts account for only 4 percent of total employment of managers, but this share varies inversely with the skill-level, reaching 68 percent for apprentices at the lower-end of the scale. This pattern of variation of the incidence of fixed-term contracts across skill-levels indicates that firms use staffing policies that differ enormously across occupational categories. At the top of the occupational scale, workers are either recruited as permanent or they are offered an open-ended contract after a short trial period. For lower-skill levels, individuals are predominantly hired under fixed-term contracts, which, on average, have longer

duration. This has an obvious adjustment cost interpretation as hiring and training costs are known to increase with the skill-level (Oi, 1962).

Stock measures of the share of fixed-term contracts are known to understate their true importance (Houseman, 2001), which is more accurately measured by the proportion of fixed-term contracts in employment flows (i.e., accessions and separations).[6] On average, fixed-term contracts account for 62 percent of all accessions and 43 percent of all separations (Figures 2 and 3).

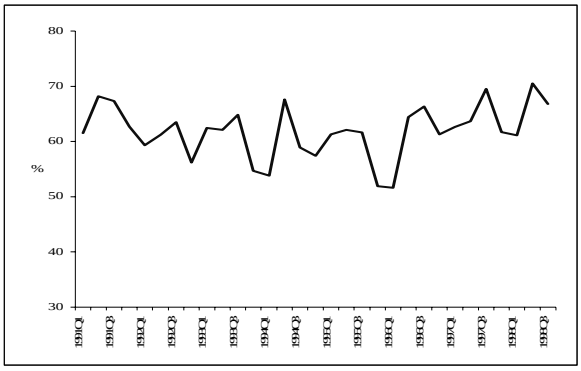

Figure 2: Proportion of Fixed-Term Contracts on Total Accessions

Quarterly measures of job and worker turnover indicate very different patterns of employment adjustment for permanent and temporary workers. Temporary positions are highly volatile and temporary employment is highly unstable. The average turnover rate of jobs filled by temporary workers is 21.7 percent, indicating that, on average, every quarter about one out of five temporary positions is either created or destroyed (see Table 1).[7] The worker turnover rate of temporary workers is 30.6 percent, implying that about one in three workers with a fixed-term contract either joins or leaves his employer every quarter. The corresponding ratios for permanent contracts are one in twenty-five (for jobs) and one in twenty (for workers). These results indicate very clearly that workers with fixed-term

[6]For larger firms (100 employees or more) point-in-time measures capture, in Portugal, only 54 percent of the total number of individuals with fixed-term contracts at any point within the corresponding calendar year. Houseman (2001) finds a similar result but with a difference of degree - instead of a two-to-one ratio she finds a five-to-one for short-term hiring in the United States. Although not strictly comparable, these figures indicate a longer average duration of temporary contracts in Portugal.

[7]There is also an indication that quarterly worker turnover rates do not exceed by much job turnover rates. See also Blanchard and Portugal (2001).

contracts bear most of the burden of employment adjustment.[8]

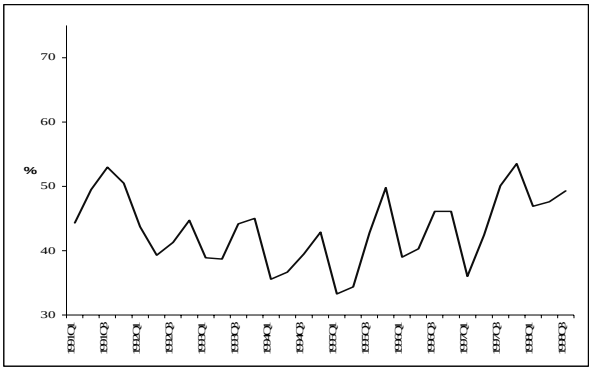

Figure 3: Proportion of Fixed-Term Contracts on Total Separations.

	Job and Worker Turnover					
	Job Creation	Job Destruction	Job Turnover	Hiring Rate	Separation Rate	Worker Turnover
All Workers	2.3	3.1	5.4	4.0	4.8	8.9
Permanent	1.9	2.6	4.6	1.9	3.2	5.1
Temporary	9.8	12.0	21.7	16.4	14.2	30.6

Table 1: Job Turnover and Worker Turnover, by Type of Contract. Source: IEE. All job and worker turnover measures were computed using the methodology of Davis et al. (1996).

6 Estimation results

6.1 The profile of fixed-term contract users

As mentioned before, our strategy was to estimate a regression model where the dependent variable (Y) is the number of fixed-term contracts existing at each firm. n is total number of employees at the firm, which also constitutes an upper bound on the number of fixed-term contracts the firm may offer at any time. p is the probability that the firm offers a fixed-term contract to any of its n employees. α and θ are the parameters of the distribution of p, which is beta-distributed. x is a set of characteristics of the firm and its workforce.

[8]Similar results are also available for Spain (Salvador and Dolado, 1995, Serrano, 1998) and Sweden (Arai and Heyman, 1999). The two Spanish studies, which use different types of data, indicate that the turnover of positions filled with temporary contracts is five-to-ten times larger than the corresponding measure for permanent contracts. The Swedish study indicates a five-to-one relationship.

The main variables of interest in vector x are wages, fringe benefits, training costs and tenure. Controls for the age and size of the firm and the age and qualification profile of its workforce are included in the regression. Industry and year dummy variables were also included. Since tenure plays a pivotal role, the model is estimated with and without the corresponding control. Specification A in the first column of Table 2 does not control for tenure. A set of dummy variables corresponding to the proportion of the firm's workforce in different tenure intervals (less than two years, between two and five years, and more than five years - omitted) is included in specification B. An interaction between the proportion of employees with shorter tenure and training costs is further included in specification C.

The wage variable included in the set of regressors is the log of the average wage per worker computed at the firm level. This average is computed by dividing the total annual wage bill of the firm by the head count. In this measure, all salaried workers (and their wages) independently of the type of contract are included.

The estimate of the coefficient of the wage variable in all the three specifications reported is positive and statistically significant, indicating that high-wage firms use fixed-term contracts more intensively. The estimated marginal effects in Table 3 indicate that a 10 percent change in the firm average wages generates an increase of 0.17 (column 1) to 0.35 (column 3) percentage points in the probability of a worker having a fixed-term contract. A positive sign for the wage variable may indicate that employers predominantly choose a high wage - low churning strategy, and therefore use fewer temporary workers when, controlling for qualifications and other relevant characteristics of the workforce, they pay higher wages. However, a compensating differential interpretation is also warranted by this result if firms that employ temporary workers must compensate them for the reduced job security they are offered (Hamermesh and Wolfe, 1990). Notwithstanding, such interpretation is weakened by the fact that the wage variable used in the regression measures average wages paid to the firm's entire workforce and not only to its temporary workers.

Consistent with a human capital interpretation, our results also indicate that the least intensive users of fixed-term contracts are those firms that pay higher fringe benefits and invest more in training.[9]

Of all the parameters of interest, the coefficient of the training variable is the most sensitive to the inclusion of the control for the tenure structure of the firm's workforce, changing from not statistically significant at the 10 percent level to significant at 1 percent when the control for tenure is included.[10] What this result tells us is that, conditional on the tenure structure of the workforce, the firms that invest less in training are also the ones that use more fixed-term contracts.

The remaining results permit us to picture a more complete profile of the firms that use fixed-term contracts more intensively - they are smaller (between 100 and 500 employees) and younger firms, employing a greater share of younger and less qualified workers. The estimates obtained for the industry dummies defined at the 1-digit SIC level (not reported) indicate that firms in construction, and trade, restaurants and hotels are those that employ the greatest proportion of workers with fixed-term contracts.[11]

6.2 The conversion of fixed-term contracts to permanent contracts

In the second regression model the dependent variable Y is defined as the number of fixed-term contracts in the firm that during the calendar year were converted to permanent. In this equation the number of trials n is the total number of fixed-term contracts that existed at the firm over the same period of time.

[9]The variable Fringe Benefits measures the firms total expenditure on items such as private social security plans, recreational activities for employees, assistance to student employees and others divided by the firm's total number of workers. The variable Training Costs is the firm's average investment in formal training per worker.

[10]Note that the marginal effect of the tenure variable has to be interpreted as follows: a one percentage point increase in the proportion workers with less than two years of tenure increases by 0.9 percentage points the proportion of of fixed-term contracts (column 2 of Table 3)

[11]We also would like to include as regressors some measure of seasonal fluctuations of the firm's workload as well as some measure of the volatility of the demand for the firm's output. That would permit a direct check of the use of fixed-term contracts to insulate permanent workers from economic shocks (buffer stocks). However, in the Social Audit this kind of data is not present. Instead, we computed proxies of these two variables using a third source that uses common firm identifiers - the *Inquérito ao Emprego Estruturado* (IEE) and Personnel Records. Seasonal fluctuations were proxied with a measure of quarterly employment variables around their annual average over a 5-year period. To measure volatility we used the average deviation of the firm's annual sales from the corresponding 5-year average. Both these sources are plant-based implying that these variables are measured with error. Although the estimates obtained for the corresponding coefficients are significant and have the right sign, they were excluded from all specifications reported in Table 2. Results are not sensitive to the exclusion of these variables.

	Beta-Binomial Regression Model		
	(A)	(B)	(C)
Log Wages	0.072**	0.147*	0.151*
	(0.035)	(0.036)	(0.036)
Wage dispersion	0.010*	0.007*	0.007*
	(0.001)	(0.001)	(0.001)
Fringe benefits	-0.149*	-0.097*	-0.099*
	(0.009)	(0.011)	(0.011)
Training	-0.136	-0.382*	-0.182
	(0.200)	(0.090)	(0.178)
Tenure 1		4.027*	4.059*
		(0.083)	(0.084)
Tenure 2		1.378*	1.374*
		(0.096)	(0.096)
Training * Tenure 1			-0.689**
			(0.345)
Firm age			
less than 2 years	0.006	-0.315*	-0.315*
	(0.074)	(0.075)	(0.075)
2 - 5 years	0.177*	-0.202*	-0.200*
	(0.060)	(0.058)	(0.058)
Firm size			
500-999 employees	-0.126**	-0.052	-0.053
	(0.051)	(0.060)	(0.060)
1000 employees or more	-0.124**	-0.114**	-0.113***
	(0.060)	(0.063)	(0.063)
Worker age			
25-44 years	-2.250*	-0.600*	-0.622*
	(0.172)	(0.169)	(0.168)
45-64 years	-3.712*	-0.655*	-0.671*
	(0.137)	(0.147)	(0.147)
Constant	1.124*	-2.410*	-2.431*
	(0.250)	(0.260)	(0.261)
Alpha	1.341*	1.021*	1.020*
	(0.017)	(0.013)	(0.013)
Qualification Level	Yes	Yes	Yes
Log likelihood	-36881.8	-35860.1	-35857.4
Observations	7601	7601	7601

Table 2: Determinants of the Use of Fixed-Term Contracts. Standard errors in brackets. *, **, *** denote statistical significance at 1, 5 and 10 percent, respectively .

The set of firm characteristics is similar to that used in the previous section - we control for wage levels and dispersion, training costs and benefit expenditures, the firm's size and age, as well as for the age, qualification and tenure structure of the firm's workforce. All of the three specifications include two additional variables

	Marginal Effects		
	(A)	(B)	(C)
Log Wages	0.017	0.034	0.035
Wage dispersion	0.002	0.002	0.002
Fringe benefits	-0.034	-0.022	-0.023
Training	-0.031	-0.088	-0.042
Tenure 1		0.932	0.939
Tenure 2		0.319	0.318
Training * Tenure 1			-0.159
Firm age			
less than 2 years	0.001	-0.069	-0.069
2 - 5 years	0.042	-0.045	-0.045
Firm size			
500 - 999 employees	-0.028	-0.012	-0.012
1000 employees or more	-0.028	-0.026	-0.026
Worker age			
25 - 44 years	-0.518	-0.139	-0.144
45 - 64 years	-0.854	-0.152	-0.155

Table 3: Marginal Effects from the Incidence of Fixed-Term Contracts Equation.

that measure the proportion of permanent workers that quit voluntarily (denoted "quits") and the proportion of the permanent workforce that left the firm due to retirement or other "natural" causes, such as death (denoted "attrition"). Results are reported in Table 3.

In all three specifications the estimate of the coefficient of wages (taken in logarithmic form) is positive and statistically significant. The estimation results indicate that a one percent increase in average wages increases between 0.181 and 0.213 percentage points the proportion of fixed-term contracts that are converted to permanent (see Table 5). Put differently, high-wage firms that (according to results in the previous section) employ a greater share of temporary workers, also offer a permanent contract to a greater share of their temporary workforce.

In this equation, the wage dispersion variable has a negative sign, which is as expected and further justifies its use as a proxy for union strength at the firm level. However, all the estimates are barely significant if at all.

The coefficients of the two variables that capture the incidence of quits of permanent workers at the firm level are positive and highly significant in all of the estimated equations. This result indicates that the greater the proportion of sepa-

	Beta-Binomial Regression Model		
	(A)	(B)	(C)
Log Wages	0.226*	0.178*	0.189*
	(0.048)	(0.045)	(0.046)
Wage dispersion	-0.004***	-0.002	-0.003
	(0.002)	(0.002)	(0.002)
Fringe benefits	0.065	0.041	0.052
	(0.061)	(0.061)	(0.062)
Training	-0.044	0.399*	-0.426
	(0.182)	(0.143)	(0.369)
Attrition	4.951*	4.440**	4.303**
	(1.877)	(1.845)	(1.850)
Quits	1.187*	0.962*	0.995*
	(0.318)	(0.331)	(0.331)
Tenure 1		-1.340*	-1.399*
		(0.096)	(0.096)
Tenure 2		1.180*	1.210*
		(0.146)	(0.146)
Training * Tenure 1			1.650*
			(0.484)
Firm age			
less than 2 years	-0.048	0.117	0.116
	(0.112)	(0.114)	(0.114)
2 - 5 years	0.058	-0.037	-0.058
	(0.079)	(0.081)	(0.081)
Firm size			
500-999 employees	0.006	-0.003	0.003
	(0.074)	(0.074)	(0.074)
1000 or more employees	-0.051	-0.056	-0.041
	(0.080)	(0.080)	(0.080)
Worker age			
25-44 years	-0.088	-0.446**	-0.452**
	(0.197)	(0.195)	(0.195)
45-64 years	-1.085*	-1.302*	-1.299*
	(0.167)	(0.188)	(0.188)
Constant	-3.744*	-2.937*	-3.065*
	(0.345)	(0.331)	(0.345)
Alpha	1.697	1.618	1.615
	(0.031)	(0.030)	(0.029)
Qualification Level	Yes	Yes	Yes
Log likelihood	-19857.0	-19733.9	-19729.1
Observations	7601	7601	7601

Table 4: Transitions to Open-Ended Contracts. Standard errors in brackets. *, **, *** denote statistical significance at 1, 5 and 10 percent, respectively .

	Marginal Effects		
	(A)	(B)	(C)
Log Wages	0.213	0.182	0.181
Wage dispersion	-0.004	-0.002	-0.003
Fringe benefits	0.061	0.042	0.050
Training	-0.041	0.409	-0.409
Attrition	4.667	4.548	4.128
Quits	1.119	0.985	0.955
Tenure 1		-1.372	-1.342
Tenure 2		1.209	1.161
Training * Tenure 1			1.583
Firm age			
less than 2 years	-0.003	0.010	0.009
2 - 5 years	0.004	-0.003	-0.004
Firm size			
500 - 999 employees	0.000	-0.002	0.000
1000 employees or more	-0.004	-0.004	-0.033
Worker age			
25 - 44 years	-0.083	-0.457	-0.434
45 - 64 years	-1.023	-1.334	-1.246

Table 5: Marginal Effects from the Transitions to Open-Ended Contracts.

rations of permanent workers not initiated by the employers, the higher is the rate of conversion of temporary contracts to permanent. These two variables provide us with evidence on firms' policies to manning permanent positions. Confronted with the separation of one permanent worker, the firm has three options - it may destroy the corresponding position or hire a replacement worker either on a permanent or on a temporary basis. The two latter alternatives are the ones of interest here. As mentioned above, in the Portuguese labor market the majority of newly-admitted workers are offered a temporary contract.

All the evidence available indicates that workers that start up on a new job with a permanent contract since the very beginning occupy the most qualified jobs. For those hired with fixed-term contracts, the estimates obtained for the two quit variables (voluntary and forced) indicate that they will eventually end-up receiving a permanent contract. Put differently, what these results tell us is that firms where permanent positions open up typically hire temporary replacement workers and screen them on the job. If the temporary match proves good enough, the worker

receives a permanent position. If not, the temporary contract is terminated and the recruitment process starts anew.

As in the equation for the number of fixed-term contracts, the result we obtain for the coefficient of the variable "Training" very much depends on whether a control for tenure is present or not. Without controlling for tenure (specification A) the training coefficient is small and negative, which is contrary to what standard human capital theory would imply. A negative sign here indicates internal dualism where workers with fixed-term contracts are used as buffer-stocks in a modified insider-outsider mechanism. However, when the control for tenure is included additively (specification B), the training coefficient becomes positive and statistically significant, indicating that firms that invest more in the training of their workforce are the ones that more frequently offer them permanent contracts. This is consistent with human capital theories. But if this positive nexus between investments in training and the rate of conversion of fixed-term contracts can be associated with training of newly-admitted workers, then it would also unequivocally indicate that these temporary contracts are used for screening purposes. This is a sizable effect, meaning that an increase of a 1 000 PTE (around five dollars) in training expenditures (per worker) leads to an increase of 0.04 percentage points in the conversion rate.

To further check on that result, an interaction term between training expenditures and the proportion of employees with tenure less than two years was included as a regressor in specification C. If positive, the corresponding coefficient implies that the positive effect of training expenditures is larger in firms where low-tenured workers account for a larger share of total employment. This is, in fact, what the results show. The coefficient estimate is positive - 1.650 - and highly significant and the coefficient of training becomes not significant and negative. We conclude that the positive effect of training on the rate of conversion of temporary contracts is due to a non-trivial component of training offered to newly-admitted temporary workers.

The coefficients of the two tenure variables representing, respectively, the pro-

portion of the firm's workforce with tenure less than two years and between two and five years (tenure longer than five years being the omitted category) reveal an interesting pattern. Firms with a larger share of low-tenured workers, presumably those with a larger share of employees with fixed-term contracts, are the ones that convert fixed-term contracts to permanent ones less frequently. This may simply indicate that firms wait until the maximum legal duration of fixed-term contracts to convert them into open-ended contracts. But, this result can also indicate that, for some firms at least, churning may be a structural component of their staffing policies. The estimates obtained for the set of industry dummies also indicate that such use of fixed-term contracts may have a precisely defined sectoral scope. The two industries identified above as the most intensive users of fixed-term contracts - construction and wholesale and retail trade and restaurants and hotels - are also the ones that offer fewer permanent contracts to their temporary workforce.

7 Conclusions

Recent research has produced evidence that shows that the actual impact of fixed-term contracts at both the macro and micro-levels is inconsistent with what was previously expected. Aggregate employment adjustment is not significantly speeded up when the use of fixed-term contracts is made easier (Hunt, 2000), and unemployment may actually increase (Blanchard and Landier, 2002). Clauses prohibiting the rolling over of temporary contracts were identified as the main reason behind these results.

At the micro-level, clauses of non-renewal offer yet another reason for firms to use fixed-term contracts - good temporary matches may be destroyed and replaced by other similar matches of an uncertain value only to bypass the legal obligation of converting fixed-term contracts into open-ended ones. Said another way, because fixed-term contracts cannot last indefinitely, firms may be willing to adopt personnel policies with a structural churning component.

Hence, an accurate description of the role of fixed-term contracts at the micro (as well as at the macro-level) must take into account their two distinct features -

reduced firing costs and the prohibition of contract roll-over. This implies modeling the firm's approach to fixed-term contracts as a combination of two decisions. First, at hiring and firing points, firms must choose their preferred margin of adjustment - temporary or permanent. Second, for each temporary contract offered, firms must at some point decide whether to convert it into a permanent form or terminate it.

The empirical results show that screening is a major motivation for employing workers with fixed-term contracts. A particularly strong result indicates that training and fixed-term contracts are complements, which is consistent with recent interpretations of training as an ability screen device. What our results indicate is that fixed-term contracts may actually be playing a screening role similar to what the temporary help supply industry reportedly plays in the U.S. (Autor, 2001). This result is reinforced by direct evidence on the magnitude of transition rates from fixed-term to open-ended contracts, and is consistent with evidence also reported for France (Abowd et al., 1999) and the U.K. (Booth et al., 2002). Our findings do not support the hypothesis of firms using fixed-term contracts as part of churning strategies. This is consistent with previous findings that indicate that, for workers, fixed-term contracts are more a port of entry to a permanent employment than a short-term form of employment (Varejão, 2003).

These results have important policy implications. To the extent that fixed-term contracts are primarily a mechanism of screening workers for permanent positions, they do not justify concerns over job insecurity and cannot be held responsible for the development of segmented labor markets. On the contrary, as a screening mechanism, fixed-term contracts may actually increase match quality and, indirectly, job security.

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8 Appendix

8.1 Legislation on Dismissal and Fixed-Term Contracts

8.1.1 Dismissals of Workers with Open-ended Contracts

Rules governing the termination of permanent contracts in Portugal are widely perceived as very restrictive, placing that country high in all international rankings of labor market rigidities (OECD, 1999). Fixed-term contracts, which were first regulated in 1976, were conceived as an instrument of flexibilization at the margin. The mushrooming of fixed-term contracts eventually led to major changes in the legal framework governing both types of contracts in 1989, when most rules currently in force were established.

Types of dismissal

Individual dismissal is permitted in case of an employee's culpable behavior, employee's failure to adapt to changes in the nature of his work, and of redundancy. Redundancies affecting more than one worker (firms with fifty workers or less) or more than four (firms with more than fifty workers) become collective dismissal.

Notification

In all cases of individual dismissal, written communication of impending dismissal to the employee and to the works council and/or union is required. This statement must give the reasons on which the dismissal is based. The worker and his representatives are then given the opportunity to dispute the employer's allegations. In case of economic redundancies, the worker may further ask for Labor Inspectorate intervention, in which case officials have to verify the validity of the arguments put forward by the employer. For all types of dismissal these procedures take at least three weeks.

60-days advance notification of a collective dismissal to the works council or union and to the Ministry of Employment is also required. Within 15 days consultations between the three parties are mandatory. Alternatives to redundancy, the number of dismissals, and ways to mitigate the effects of dismissal are all issues that must be addressed during this consultation process. Once an agreement is

reached, each worker selected for dismissal must be notified of the impending job loss. This must be done at least 60 days before the date of dismissal. Otherwise, the worker is entitled to the corresponding pay.

Severance Pay

In all cases of dismissal (except for disciplinary reasons) the worker is entitled to a payment equal to one month of pay for each year of service, subject to a minimum of three months of pay.

Unlawful dismissal

Only courts may declare a dismissal unlawful, mostly on the grounds of the employer's failure to comply with dismissal mandatory procedures. Consequences of such court decision are the employer being obliged to reinstate the worker in his previous position and pay him an amount equal to what he would have received from the time he was last paid to the moment the decision was made. The worker may choose to quit, in which case he is entitled to an indemnity corresponding to one-month pay for each year of service (subject to a 3-month minimum).

8.1.2 Dismissals of Workers with Fixed-Term Contracts

Valid cases

Fixed-term contracts are permitted for objective reasons (replacement of temporarily absent permanent workers, exceptional workload, seasonal work, and specific projects). They are also permitted for business start-ups, the launching of new activities of uncertain duration, and recruiting the long-term unemployed and those individuals looking for their first job.

Duration

Fixed-term contracts have a minimum duration of six months unless they are justified on objective grounds, in which case no minimum applies. Their maximum duration is set at three years (two in the cases of business start-ups and the launching of new activities). Three successive renewals are the maximum permitted.

Expiration

The contract expires only if the employer notifies the worker eight days in

advance that he does not intend to renew it; otherwise it is automatically renewed. If the maximum duration of the contract is exceeded, the contract automatically becomes permanent.

Termination

When the end of a contract is reached and not converted into a permanent contract, the worker is entitled to a terminal bonus equal to two days pay for each complete month of the contract's elapsed duration.

If the employer terminates the contract before its term, and the termination is unlawful, the worker is entitled to compensation equal to the pay loss from dismissal to the date of the court's decision or the term of the contract (whichever occurs first). He or she is also entitled to reinstatement if the term of the contract has not yet been reached.

In the case of voluntary quits, the worker must notify the employer 30 days in advance; 15 days if the duration of the contract is less than 6 months. Otherwise the worker must pay the employer an indemnity equal to the pay corresponding to the advance notice period.

Restrictions

If, during the period of the contract the firm opens a vacancy for a permanent position, workers with fixed-term contracts who may qualify for the job are given priority over other applicants.

If, after an elapsed duration of 12 months, a contract is not renewed for reasons not attributable to the worker, he or she cannot be replaced within a period of three months.

	Sample Statistics	
	Mean	Std. Dev.
Employment	379.06	873.56
Fixed-term contracts	127.38	331.33
Transitions to Open-ended	12.88	43.07
Log Wages	7.01	0.47
Wage dispersion	7.69	9.33
Fringe benefits	0.13	0.49
Training	0.02	0.1
Attrition	0.01	0.01
Quits	0.03	0.04
Tenure 1	0.25	0.22
Tenure 2	0.19	0.13
Training * Tenure 1	0.01	0.05
Firm age		
less than 2 years	0.02	0.15
2 - 5 years	0.05	0.22
Firm size		
500 - 999 employees	0.07	0.27
1000 employees or more	0.06	0.23
Worker age		
25 - 44 years	0.57	0.11
45 - 64 years	0.26	0.16

Table 6: Descriptive Statistics