Explaining job mobility: an integrated analysis of the determinants of promotions and firm separations.

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Abstract

This study analyses the determinants of job mobility – both within and between firms – using a Portugese matched employer-employee data set covering the period 1986-2000. The main issue addressed is whether the determinants of transitions within firms and between firms differ. We might expect them to do so because promotions depend on employers' decisions, while movements between firms may also depend on decisions by workers. However most previous research has focused on one transition type, but not both. One distinctive feature of the data is that promotions and their dates are reported by the firm and not by the worker. This reduces the degree of ambiguity on how promotions are defined. Estimates from hazard regression models allowing for firm-level shared frailty indicate that, depending on the definition adopted women may have greater or lower chances of promotion. However, concerning turnover the time between transitions is longer for women than for men. Compared to full-time workers, part-timers have lower promotion rates but faster inter-firm mobility rates. Workers who have been promoted or moved firms before are more likely to do so again. While the size of the firm is a relevant determinant of promotion it is not so for separations. The rates of both events are higher in firms with positive growth in terms of number of employees.

Keywords: career paths, promotions, turnover, matched panel data, frailty
JEL Classification: J41, J63

1 Introduction

Seldom is the worker−job match a fairy tale ending with the words *and they lived happily ever after.*
Rational choice and optimization behaviours determine the decisions of employers and employees
driving the career paths, and mobility of individuals either within one firm or between firms. This
study will focus on the determinants of transitions in the labour market and adds to the existing
literature in three distinct ways. First, although promotions and job separations are both part of
job histories they are not often studied jointly. In this study these events will be analyzed in a
competing risks context which allows a comparison of the determinants of different types of job

mobility. Second, in spite of the fact that mobility decisions are influenced by both sides of the market − workers and firms − and that promotions depend on the employers decision, very rarely is the firm taken into consideration. This issue will be addressed by introducing in the model observable factors of the firm as well as shared frailty at the firm level. Moreover, the firm reports the date when employees are promoted which as well as providing a clearer definition of promotion may also undisclose promotion policies of the firm. Third, the information used in this study is taken from a longitudinal matched employer-employee dataset covering the entire private sector of the Portuguese economy. Some advantages derive from this fact, such as less issues related to sampling and follow-up process of workers and firms; availability of data on both sides of the market; and the consequent possibility of drawing a set of conclusions applicable to the entire economy.

Analysis of promotions within firms has been given some attention in the empirical literature in terms of the characteristics of promoted workers (Wise 1975, McCue 1996, Pergamit and Veum 1999, Francesconi 2001), the evolution of promotion chances with time (Rosenbaum 1979), differences in promotions probabilities between gender (Lazear and Rosen 1990, Jones and Makepeace 1996, Booth *et al.* 2003), the importance of performance or/and seniority in promotions decisions (Abraham and Medoff 1985, Bell and Freeman 2001), or the impact of promotions on wages (McCue 1996, Pergamit and Veum 1999, Francesconi 2001). Also, some authors model the impact of promotion on performance and check for the possible occurrence of the Peter principle (Fairburn and Malcomson 2001, Lazear 2004). The main findings in the literature are not consistent for gender which can have a positive, negative or insignificant impact on promotion. Seniority and education appear to be positively associated with promotion. However, some results suggest that more educated workers should attain promotion in a short period of time, not being promoted otherwise. Working full-time, having been promoted at least once, and belonging to large firms is expected to increase the probability of promotion. Promotion rates were also found to positively vary with firm growth (as measured by the number of employees). Consequences of promotion are usually measured in terms of wage growth which is expected to be positive, though the magnitude

of the increase varies between studies. Another possible outcome of promotion to a different job is a loss in terms of performance, that is, workers tend to show lower ability after being promototed. However, given that demotions are usually rare this outcome is argued not to be associated with an incorrect promotion decision.

Among these studies the definition of promotion varies. Some identify a promotion by observing its impact. For example, workers who have changed job within the firm are asked if they were promoted (McCue 1996, Francesconi 2001, Booth *et al.* 2003). In others a promotion is self-reported by the worker (Pergamit and Veum 1999). In any case, a promotion is identified by the worker. Also, sometimes promotions are identified from changes observed in the data. For example, observed changes in occupations or levels within the hierarchy (Rosenbaum 1979, Sicherman and Galor 1990, Jones and Makepeace 1996). However, a promotion represents intrafirm mobility and is a decision made by the employer. In addition to only having the workers' perception of events, in several studies there is little information collected about the firm.

In contrast to intrafirm mobility, interfirm mobility can be directly determined by the worker. Why workers move across firms, the consequences of such movements and comparisons with workers who remain in the firm is also an important research topic. Some studies try to identify the characteristics of workers who move between firms (Booth *et al.* 1999). Farber (1994) concludes that time-aggregation affects the shape of the hazard which is not monotonically decreasing, and finds that heterogeneity and state dependence are important determinants of firm separations. Topel and Ward (1992) study the determinants of turnover, and the wage growth associated with this kind of job mobility. The main conclusion is that wages are strong determinants of changes of firm, but they are also determined by the process of search and mobility.

Analysis focussing simultaneously on the determinants of promotions and changes of firm are less common. Recognizing that job transitions, either defined as a change in occupation within firm or as changes of firms, are a part of workers' career path Sicherman and Galor (1990) developed a theory of career mobility which predicts that schooling, ability and job experience determine promotions, and that the optimum spell length to quit a firm is shorter for individuals who were

not promoted than for individuals that have received a promotion. Bishop (1990) specifically adresses the importance of performance in the occurrence of both events, and concludes that high produtivity decreases quit rates and increases the likelihood of promotion. If training costs are supported by the firm, additional hours of training reduces the probability of being fired, has no impact on the probability of quitting the firm, and increases the probability of being promoted. The size of the firm is found to be positively correlated with both quit rates and promotions. Booth and Francesconi (2000) study gender similarities and differences in the determinants of mobility (quits, layoffs, promotion) in the UK. While Bernhardt and Scoones (1993) and Scoones and Bernhardt (1998) model the relationship between the acquisition of human capital and preemptive wage offers with promotion and turnover.

When analysing job transitions in the labour market it has not been common to use matched employer-employee data. Most previous studies are based on information of specific firms, hence focussing on internal labour markets (Wise 1975, Rosenbaum 1979, Abraham and Medoff 1985, Jones and Makepeace 1996) which has the advantage of allowing for a clearer definition of promotion, but the disadvantage of not being representative of the labour market as a whole. Some others rest upon longitudinal data on individuals (Topel and Ward 1992, Farber 1994, McCue 1996, Francesconi 2001, Booth *et al.* 2003).

The majority of previous research focusses on job mobility for the UK and US, the case of Portugal has not yet been studied. Lima and Pereira (2001) estimate the impact of promotion on workers' wages in large firms in Portugal, and Lima and Centeno (2002) relate promotion probabilities of top executives with the degree of openness of the firm (measured by the fraction of hiring in the external labor market). Besides addressing job mobility in Portugal this paper intends to fill in the existing gaps in the literature on career paths of employees by considering both types of job mobility in a competing risks framework and by explicitly modelling the influence of the firm in such process.

The main empirical findings of this study are the following. Observed and unobserved characteristics of firms are important determinants of job mobility. This converges both in terms of the

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significance of all observed characteristics of firms, and in terms of models performing better when introducing firm-specific frailty than when considering worker-specific frailties. It is also found that the impact of gender is highly dependent on the definition of promotion adopted. Compared to men, women take longer time to change firms and have greater hazards of receiving automatic promotions, but smaller hazard to have merit promotions. Job mobility varies positively with schooling. Survival time to promotion is greater the smaller the firm is, though the size of firms seems not to be a strong determinant of interfirm mobility. The hazard of job mobility is greater if the growth of the firm is positive, however the growth of the firm has a stronger impact on the turnover rate.

The rest of the article is organized as follows. Section 2 presents the theoretical background. Section 3 describes the data and methodology, and section 4 presents the empirical specification. Empirical results and checks of robustness are discussed in section 5. Section 6 concludes the analysis.

2   Theoretical background

The essence of labour markets is the interaction of workers and employers which determines the price (wage) and quantity (employment) to be offered in equilibrium. The neoclassical assumption that labour markets can be perfectly competitive yields the conclusion that workers can change job types in response to differing wage rates, and in equilibrium workers earn the value of the marginal product of labour which is equall in every firm. If all workers are endowed with the same characteristics, turnover is not an issue given that firms can easily find an equally skilled worker and workers can find a compatible firm. However, an important concept in labour economics is human capital which can be broadly defined as a set of characteristics in which workers can invest and increase their own productivity. On-the-job training, schooling and the acquisition of information about the economic system (Becker 1962) are examples of activities that improve skills of individuals and raise their future real income prospects. The human capital accumulated can be general or specific to the firm. While general human capital increases the marginal productivity of employees

by the same amount in every firm, specific human capital increases the marginal productivity more in the firm where the worker is located. Investments in firm specific training affect the productivity of workers and the profitability of firms. Consequently, turnover becomes an important topic. As firms pay (at least) part of the training costs they are particularly concerned about the turnover of employees with firm-specific human capital and, recognizing that quits depend on wages, they may offer these workers a higher wage that could not be easily matched by competing firms.[1] Given the potential to increase profitability, to motivate workers to invest in firm-specific human capital employers may create a promotion scheme and commit to a wage structure attached to such scheme. A promotion is then a consequence of human capital investment.

Promotions can also be interpreted in the context of tournaments (Lazear and Rosen 1981, Rosen 1986, Bognamo 2001). A promotion is a prize that is allocated to workers who rank higher than all other workers in a group over a given period. Because workers know that not all of them will be promoted the probability of promotion provides incentive to exert effort without the need for any formal contract between workers and the firm. Productivity is the determinant of success. Winners are moved to higher positions that involve higher prestige, higher responsibility, and higher earnings. Tournament models, however, rarely consider that external labour markets also provide incentives for workers and firms. Chan (1996) extends the model to include external competition in the tournament. The possibility of recruiting from outside instead of promoting from inside may reduce the incumbents incentive to exert effort. To overcome such a possibility, firms can increase the probability of success of insiders resulting in the fact that, to win, external workers have to be significantly superior to the internal contestants.

If external competition is allowed, workers may quit the firm because they find better external alternative wages. Such an alternative is likely to occur if the worker searches while employed (Burdett 1978). In search models older workers get higher wages not because they have accumulated more human capital, but because they have received more wage offers. Workers engaging in job search are expected experience more wage growth than those who do not search either because

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[1]'preemptive wages' as defined by Pergamit and Veum (1999).

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they are offered higher wages when changing firms or due to possible bargaining within the firm. Furthermore, as workers in low wage jobs have potentially more gains from employed search, they should have higher turnover rates. In the context of search models − if jobs are pure search-goods − a separation will occur due to the arrival of information about an alternative prospective match. Job matching models consider jobs as experience goods, *i.e.,* it is by experiencing it that the quality of the match is identified. Turnover is a consequence of optimal reassignment caused by the accumulation of better information as time elapses. In the case a worker-firm pairing is a mismatch the worker might choose unemployment. On the other hand, the better the match the greater the investment in firm-specific human capital will be and the less likely it is for the match to end (Jovanovic 1979 a, b, 1984). Promotion may be the firm's optimal response after learning about a worker's productivity. These models predict also that job durations are correlated. On the one hand, successive jobs start at successively higher wages, and consequently the second job is likely to last longer than the first. On the other hand, workers who have quit more often in the past are less likely to have acquired a history that generates a solid attachment to a firm of any type and will have regular quits (MacDonald 1988). Job shopping theory (Johnson 1978) predicts that mobility occurs to a greater extent early in the career because workers are not aware of their own abilities or the characteristics of the labour market. Given the uncertainty on the returns in various jobs, workers will try a variety of jobs. Education reduces job mobility by reducing its role in acquiring information and quit rates are expected to decline with seniority.

Therefore, a wide range of theories help explain job mobility. More than substitutes these theories complement themselves. It is natural that evidence in this study will relate not to one single theory of mobility but to them all in their varied but related scopes.

3 Data and methodology

Lists of personnel is a longitudinal dataset with matched information on workers and firms. Since 1985, the survey is annually collected (in March until 1993, and in October from 1994 onwards) by the Portuguese Ministry of Employment and the participation of firms with registered employees

is compulsory. The data includes all firms (about 200 thousand per year) and employees (about two million per year) of the Portuguese private sector. The present analysis covers the period running from 1986 through 2000, with 1990 excluded because the database was not built in that year. Although the survey is still ongoing, currently the data available for analysis ends in the year 2000. Each firm and each worker has a unique registration number which allows them to be traced over time in the data. All information − on both firms and workers − is reported by the firm. In general, the information refers to the situation observed in the month when the survey is collected. In some cases, namely information on dates, reported data may be retrospective but limited to the past within that specific firm. Information on workers includes, for example, gender, age, education, level of skill, occupation, date of admission in the firm, date of last promotion, wage (split into some of its components) and hours of work. Firm and establishment level data include, for example, the industry, location, number of workers, number of establishments, and legal setting.

From cross section to multivariate survival data

Before constructing the panel, some data cleaning was carried out to guarantee that only one record per worker per firm per year exists. The initial panel dataset contains information on 5,784,531 distinct workers corresponding to 27,577,308 observations of workers over time. The accuracy of the information was checked by making use of three variables: gender, date of birth and education. A two step procedure was adopted to deal first with missing information and then with inconsistent data. Workers for whom inconsistencies or missing data on gender, birthdate and education remained after the procedure were dropped from the panel. 10% of the original dataset was lost with this procedure. To proceed with the study a random sample (clustered by the worker identification code) of 10% was drawn from the cleaned panel dataset. This sample contains 2,522,278 observations (related to 520,222 workers over time) and is representative of the full sample.[2]

The analysis is based upon two key variables: the date of admission to the firm and the date

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[2]The sample was created due to computation limitations.

of last promotion. The former allows the determination of the beginning of a spell within a firm. The latter allows identification of how long it takes for a worker to be promoted within the firm. These two variables were also subject to tests of consistency. When possible, date of admission was imputed by making use of the available information. Observations for which there were still a) missing, b) decreasing date of admission, c) date of admission later than the reported year, or d) date of admisson later than date of the survey, were dropped. 2.7% of the sample was lost with this procedure.

Promotions are identified by the reported date of last promotion within the firm. This variable is retrospective and its limit is the date of admission to the firm. Of the 2,454,194 observations 1,533,458 have a reported date of last promotion. However, some inconsistencies were identified and replaced to missing.[3] 438,896 unique dates of last promotion are identified in the dataset. Change of firms are identified by combining the identification code of the firm and the date of admission. If both these variables change from one record (of the same subject) to the other, then it is understood that the worker has changed firm. Using the reference month in which the survey was filled in, it is possible to proxy the spell length for separations. Some spells will be censored, either because the panel ends or due to withdrawal.[4] Despite of the fact that the survey is annually collected, information on dates (date of admission, date of last promotion, date of the survey) is reported in the format year/month. Therefore, the time unit of this analysis is the month. The length of the first reported event is equal to the difference between the date when the event occurred and the date of admission. The length of the following events is equal to the difference between the date of the current event and the date of the previous recorded event.

After constructing the time to promotion further consistency checks were implemented resulting in dropping 16% of the records.[5] Further, only records regarding employees with age within the

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[3]38,6% reported dates of last promotion were equal to the date of admission to the firm. As workers should keep seniority after promotion, these cases were considered misreportings by the firm and were recoded to missing. And 0,1% of the cases were recoded to missing due to the fact that date of last promotion was earlier than date of admission to the firm.

[4]Withdrawal can happen for reasons such as retirement, movements to the public sector (which is excluded from the data), unemployment, non-employment, and self-employment (without registered employees).

[5]Because dates can be retrospective, 36% of promotions referred to spells completed before the start of the survey. Some overlapping events (1.5%) were caused by changes in the identification code of the firm. Due to misreportings,

range [14,65[were kept.

Concepts used: promotion and changes of firm

Collective agreements are settled between unions and employers for the purpose of regulating employment relationships. These agreements are the normal source of regulation on the subject of career progress. In the dataset it is not possible to distinguish between the two different types of promotion mentioned in the collective agreements: automatic and merit promotions. Automatic promotions take place as a consequence of accumulated length of service. However, Pinto et al. (1996) mention that provisions giving predominance to automatic promotions as a system of career advancement are becoming less frequent, and that some flexibility can be introduced by rules giving the employer the possibility of demanding an appraisal of the employee's abilities (although length of service remains as a request for promotion). Merit promotions are mostly dependent on the employers will and, according to legal scholars, merit promotions imply a change to the contract of employment. The definition of career paths signals that occupational category is the subject of the contract of employment. There are about 1,000 different occupations (defined at the 6 digit level) which are comparable across waves of the survey. Moreover, the instructions of the survey clearly request employers to take into consideration the tasks the worker is effectively performing regardless of their level of education and to record occupations at the most detailed level possible.[6] This set of instructions supports the conclusion that changes in occupation will be signalling changes in tasks performed.[7] A change in occupation (read jointly with the date of last promotion) is then used to identify a merit promotion.

Three definitions of promotion will be considered in the empirical analysis: i) all promotions − identified by a reported date of last promotion in year t; ii) merit promotions − identified by a reported date of last promotion in year t, with an observed change in occupation from year $t-1$

some spells had a negative time length.

[6] Occupations are recorded in accordance to the National Classification of Occupations 1994 (compatible with the International Standard Classification of Occupations, 1988 version).

[7] Sicherman and Galor (1990) use occupation at the two digits level to identify occupational mobility. The main assumption is that the narrower the number of categories the more likely it is to exist changes in tasks performed by the worker.

to year t; iii) automatic promotions − identified by a reported date of last promotion in year t, without an observed change in occupation from year $t-1$ to year t.[8]

Changes of firms are identified by changes in the date of admission and the firm identification code. Most common in the literature is to distinguish workers using the reason for leaving the firm, either quits or layoffs. Such a distinction is perhaps used to signal the quality of the match and the quality of the worker as, for example, Sicherman and Galor (1990) predict that workers with high probability of promotion are more likely to quit if they do not receive a promotion. In this sense, 'good' workers can quit to improve their career prospects somewhere else. But workers can also quit firms for several other reasons, for example, family related reasons. A third reason of why workers change firms - which is far less considered in the literature - is that firms close, and the characteristics of workers are meaningless in determining the hazard of changing firms when a firm is closing. It is well established that large firms stand a better chance of survival than small and medium sized firms. In the Portuguese market, however, more than 75% of the firms have less than 10 workers, meaning that shutdows are likely to occur. Furthermore, Mata and Portugal (1994) found that only 50% of new firms survived for a period of four years. Such facts suggest a great rate of firm creation and destruction in Portugal, which will induce movements of workers in the labour market that are not strictly related to a pure mismatch between workers and firms. Therefore, what may better distinguish the quality of workers is the length of time to find a new job. Notwithstanding the fact that the stock of vacancies plays an important role, one can expect that more able and motivated workers will exert greater efforts to find a job. Alternatively, they can search while still employed, and consequently experience shorter spells of non-employment. Usually, in Portugal, a distinction is made between spells of unemployment. Unemployment is considered to be short run if the spell is of length less than 12 months, and long-run if the spell duration is equal or greater than 12 months. Using this threshold, separations were disaggregated by the length of time a worker takes to re-appear in the dataset. Therefore, three kinds of separations will

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[8]Rosenbaum (1979) gives promotions two functions within firms: i) recruitment to upper levels of the hierarchy; and ii) rewards that can be material or just symbolic status. In any case, organizations can benefit from greater compliance and commitment of workers. I assume that automatic promotions are performing the latter function.

be analysed: i) all separations; ii) separations with gap length less than 12 months; iii) separations with gap length greater or equal to 12 months. When promotions and separations are distinguished in this ways, the analysis is related to four competing risks of failure instead of two.

The analysis is carried out using information on 480,354 distinct workers with 885,795 observations. Some descriptive statistics of the spells are presented in table 1. Nearly 44% of the records relate to completed spells with median survival time of 28 months. When two competing risks are considered, 28% of the completed spells are relative to promotions and the other 16% concern firm separations. The median survival time to promotion is 48 months, while the median survival time to change from firm is close to 13 years. Less than 75% of the individuals at risk separate from the current firm, and this is the reason why no information is provided for the 75th percentile of survival time for separations. When four competing risks are considered, 9.6% of the completed spells are related to merit promotions and 18.6% are automatic promotions. 75% of the workers wait more than 27 months to receive automatic promotions and more than 69 months to be awarded merit promotions. Separations with non-employment period of length lower than 12 months are the rarest event (5% of completed records). Separations with period of non-employment with duration greater than 1 year account for about 11% of the completed spells and in order to experience this event 75% of the subjects wait more than six years.

[Table 1 about here]

Job mobility is a continuous process in time. Because events are recorded using the month as the time unit, the time to job mobility is not being exactly measured. Consequently, time aggregation may cause the estimates of parameters to be biased. However, under some circumstances the time aggregation bias can be considered negligible, and non-adjusted (inconsistent) estimates will be very similar to adjusted estimates. Petersen (1991) concludes that when the incidence rate is smaller than .1 the relative bias (between adjusted and non-adjusted estimates) is small (less than 5%), and if the incidence rate is smaller than .05 then the relative bias is less than 2%. By inspection

of incidence rates of this sample, in about 90% of the possible failure times the rate is less than .05. It will then be considered that the potential bias arising from time aggregation will not cause non-adjusted estimates to differ from adjusted estimates to a great extent, and no adjustment will be made.

4   Empirical specification

Theoretically, one is to expect that, for some length of time after the match is formed, both workers and firms engage a screening process to identify the quality of the match. Consequently, the hazard of mobility would increase up to some time and then be monotonically decreasing. Non-parametric hazard functions (see figure **??**) have this shape.[9]

[Figure **??** about here]

Hazard plots were used as a preliminary check of the suitability of four different parametric distributions: lognormal, loglogistic, weibull and exponential.[10] Klein and Moeschberger (2003) refer that these graphical checks do not prove that a specific distribution is the correct one, they only signal if a model is inappropriate. As for every failure event the weibull and exponential distributions performed worse than the other two they were discounted and the analysis proceeded with the lognormal and loglogistic distribution. When the distribution of survival time is assumed to be either lognormal or loglogistic the model is implemented in the accelerated failure time metric. This means that a linear relationship between the natural logarithm of survival time and the characteristics X is assumed.[11]

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[9] For similar empirical results, in the case of promotions see Rosenbaum (1979) and McCue (1996); and in the case of changes of firm see, for example, Farber (1994).

[10] The procedure follows Nelson (1972, 1982). According to Blossfeld et al. (1989), under the assumption that the model is valid, OLS estimates can be used to determine the parameters of the distribution and the R^2 statistic can be used to identify which distribution best fits the data.

[11] Given the acceleration parameter $\exp(-XB)$, a distribution is assumed for $\psi = \exp(-XB)t$. Alternatively, $t = \exp(XB)\psi$ and $\ln(t) = XB + \ln(\psi)$. In this study, two different sets of models will be estimated assuming either that ψ follows a loglogistic or a lognormal distribution.

Survival times may be correlated because individuals belong to firms, or because workers can fail more than once (recurrent events). In the case of recurrent events, correlation comes from two sources. First, heterogeneity across individuals influences the likelihood that they will experience an event, resulting in within-subject correlation in the occurrence and timing of recurrent events. Second, there may be event dependence, *i.e.*, the occurrence of one event may make further events more or less likely. To control for heterogeneity, a conditional frailty model with gamma distributed random effects will be estimated.[12]

The parameters of the model are estimated via maximum likelihood.[13] The likelihood function is obtained by calculating the group-level conditional likelihoods and integrating out the frailty. Given i groups with j observations per group with a trivariate response $(t_{0ij}, t_{ij}, d_{ij})$ indicating the start time, end time, and failure/censoring, respectively, for the jth individual in the ith group. An individual, j, failing at time t_j contributes to the likelihood function the value of the density at time t_j. A censored observation contributes to the likelihood function the value of the survival function at time t_j. Both completed and censored spells are conditional on the entry time t_{0j} and on the intra-group correlation. Given that competing risks are assumed to be independent, the log-likelihood function is the sum of the the log-likelihoods for each different event and depends only on the parameters specific to each destination.

As mentioned above, two specifications will be considered when analysing the determinants of job mobility. One with two competing risks, where workers may fail (*i.e.* experience mobility) due to promotions or to separations. The other with four competing risks where workers may fail due to merit promotions, automatic promotions, changes of firm with non-employment period of length less than twelve months, or changes of firm with non-employment duration greater or equal to twelve months. The specification for the vector of regressors includes observed characteristics of

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[12]Given n groups with the ith group comprised of n_i individuals $(i = 1, ..., n)$, frailty introduces an unobservable multiplicative effect α on the hazard, so that conditional on the frailty the hazard function is $h_{ij}(t|\alpha_i) = \alpha_i h_{ij}(t)$ for $j = 1, ..., n_i$, where α is some random positive quantity assumed to have unit mean and variance θ. The relationship between the conditional and the unconditional survival functions is $S_{ij}(t|\alpha_i) = \{S_{ij}(t)\}^{\alpha_i}$. Consistency of estimates depends on the assumption that the error terms are uncorrelated with the explanatory variables in the model. This assumption is made here.

[13]These parameters are (β, γ, θ) in case the loglogistic distribution is assumed, and (β, σ, θ) in case the lognormal distribution is assumed

workers and firms. The regressors related to workers are age (and its squared term) at the beginning of the spell, gender (dummy variable), a categorical variable for education reported according to the International Standard Classification of Education (ISCED, 1997 version).[14] A dummy variable reporting whether in the year previous to job mobility the worker was earning a wage greater or smaller than the median wage paid by the firm. Workers were also distinguished by whether or not they were working full time. To control for some overall caracteristics of the economy a dummy for the year when the event occurred was created. The categories were defined according to the evolution of the unemployment rate which was declining until 1992 (category 1), increased from 1992 to 1996 (category 2) and started to decline again after 1996 (category 3). Regarding the firms, a categorical variable was created for the size of firm. Firms are micro if they employ less than 10 workers, small if they employ more than 9 and less than 50 workers, medium if they employ more than 49 and less than 250 workers, and are large if the employ more than 249 workers. Another categorical variable was created for the growth of the firm (between $t-1$ and t) which is measured by changes in the number of people within the firm. Three categories were created to account for negative growth, null growth or positive growth. The legal setting, the region (identified at the district level) and the industry (at two digit level) were also included. Unobservable characteristics on workers (ability, motivation, ambition) or firms (promotion policies, market image) that may contribute to accelerate or decelerate the survival time to job mobility are considered by including frailty shared at the firm level and at the worker level. Summary statistics of the regressors are presented in table 2. The reference group consists of males, with schooling ISCED level 1, with no previous event-specific mobility. These workers earn a wage inferior or equal to the median wage of the firm, work full-time in large limited liability firms in wholesale and retail trade that experience no growth and are located in Lisbon.

[Table 2 about here]

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[14]For Portugal, there is no correspondence to ISCED level 4, and ISCED levels 5 and 6 are not possible to distinguish.

Although either the worker or the firm frailty effects are statistically significant, insofar as it can be ascertained by the likelihood ratio test and the Akaike information criterium the best fitting specifications were those that allowed for correlation within firms (see table 3). This result signals that perhaps the observable characteristics are capturing better heterogeneity of workers than the heterogeneity of firms, and emphasizes the importance of firms as a determinant of the job mobility process. Therefore, one first general conclusion is that once analysing career paths it is important to as much as possible consider characteristics of the firms. As a consequence, models with firm level frailty were chosen.[15]

[Table 3 about here]

To account for some heterogeneity in the propensity that each worker has to experience job mobility, a dummy variable was introduced in the set of regressors. This variable assumes the value one if the worker has previously experienced the type of event under analysis, and zero otherwise.[16] Models assuming lognormal and loglogistic distributions with firm level frailty and a dummy for previous failure were estimated. As can be ascertained from table 4, because it obtains a smaller AIC, the specification assuming survival time to be loglogistically distributed is always preferred. The lognormal distribution was in this way discounted from the possible distributions and only the estimates obtained under the assumption that survival time follows a loglogistic distribution will be analyzed in the following section.[17]

[Table 4 about here]

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[15]This choice is consistent with the suggestion made by Rosenbaum (1979 pp23): "promotion chances may be a fundamental determinant of a wide variety of other attitudes and behaviors and are perhaps more important than individual personal traits or one's level in organization." These chances are likely to be captured by firm-level frailty.

[16]Although working in a discrete time context, Mincer and Jovanovic (1981) suggest that prior mobility variables are strong indicators of mobility in the following period. Their inclusion in the model shows the existence of heterogeneity in mobility behaviour. Also Chamberlain (1985) makes a similar suggestion to account for heterogeneity.

[17]Any of the other estimates – assuming a lognormal distribution or accounting for workers differences in propensities to job mobility – are available upon request from the author.

Estimates are displayed in table 5. Columns i) and iv) in the table, contain the coefficients of the two competing risks model: promotions and changes of firms, respectively. Columns ii), iii), v) and vi) contain the coefficients of the model with four competing risks. Given the functional form of the model, the coefficients measure relative changes in survival time for a given absolute change (or, in the case of dummy variables, a change from zero to one) in the value of the regressors. Put it differently, if multiplied by 100 coefficients give the growth rate of survival time given an absolute change in the regressors. If the signal of a coefficient is positive, survival time is lengthened; if it is negative survival time is shortened.

[Table 5 about here]

5 Results

The results are sensitive to the definition of promotion adopted. The magnitude of coefficients is, in general, greater when merit promotions (column ii) instead of all promotions or automatic promotions are considered (columns i) and iii), respectively). Further, the definition of promotion seems to be the driving force in explaining gender differences in the hazard of promotion. Not distinguishing promotion types yields the result that women have survival time to promotion roughly equal to men's. If merit promotions are considered women face a survival time 10% longer than men's. If, on the other hand, one is to consider automatic promotions (column iii) women have a greater hazard of promotion when compared to men. Therefore, women are more likely than men to have automatic promotions but less likely to receive merit promotions. These findings may help demonstrate why results on the impact of gender on promotion from previous research are not conclusive. Pergamit and Veum (1999), conclude for the US that women are less likely to be promoted than men whereas, using British data, Booth and Francesconi (2000) and Booth et al. (2003) conclude that women are either more or at least as likely as men to be promoted. In the British data used, the worker is first asked if he changed job. However, when asked to give the reason why he did so, apart from the broad category "other reasons" only promotion fits the

possibility of changes of tasks within firms.[18] The definition of promotion used in these studies seems to have some relevance. In Pergamit and Veum's (1999) survey respondents are first asked whether they were promoted, and the follow up question relates to the consequences of promotion. However, the estimates were obtained by using all the outcomes of promotion yielding the result of an almost not significant coefficient for the covariate on gender. These to ways of defining promotion, resemble in the latter case my definition of all promotions and in the former the definition of automatic promotion. On the other hand, McCue (1996) presents two sets of estimates, one related to any change in position and the other related to promotion and change in position. Were the coefficients to be significant, the conclusion would be that in the former case women would have greater hazards than men to be promoted (similar to all promotions here), while in the latter case women would have a lower hazard of promotion (similar to merit promotions).

In Lazear and Rosen (1990) model women are assumed to have better non-market opportunities and, consequently, are more likely to leave the firm (or the labour market) while keeping a high level of utility. For this reason, women would have to meet tougher criteria for promotion, hence being promoted less and possibly being overlooked for promotion in favour of less able men. Despite of the fact that women have lower hazard of merit promotions this result does not seem to be caused by the existence of better non-market opportunities, since the coefficients on the survival time to leave the firm are always positive for women (columns iv)-vi)).[19] Berthoud (2004) reports that Portugal has the lowest median income in terms of purchasing power standards in the EU 15 group, but the highest inequality index and poverty rate. In such a context, it does not seem reasonable to suppose that women could afford to consider non-labour market opportunities as alternatives to labour market participation. On the contrary, women could try to deepen the attachment to the firm.[20] Results are consistent with this hypothesis because although Portuguese women are less

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[18]There is no room, for example, to account for a discretionary reallocation of workers within firm without a promotion.

[19]In an attempt to capture non-market opportunities for women Pergamit and Veum (1999) introduce marital status, number of children and the presence of child with age up to six years in the household. I have no such demographic data to apply this type of controls.

[20]Spiess et al. (2004) document the non-existence of childbirth effect in Portugal – the pattern of average hours worked by women does not change after the first childbirth. Perhaps this finding is a signal of the non-existence of better non market opportunities.

likely than men to change occupation while having a promotion, they do have a greater hazard of being promoted as a consequence of accumulated length of service. The result for promotions is also consistent with the results obtained for the survival time to change firms. On average, the time between transitions is 17% longer for women when compared to men (column iv).[21] Some arguments can help explain this finding. First, women engage less in employed job search than men (Keith and McWilliams 1999), which may be correlated with the non-market activities women develop that provides them with less free time/opportunity to undertake on the job search. Second, Severn (1968) concludes opportunities and incentives influence quit rates. Perhaps then women have smaller set of alternative opportunities, and less incentives to change firms than men. An indication that women might not have a larger set of potential non-market activities is the trend of female labour force participation. In 1986 the rate was 56%, and in 2000 the percentage of active women was 68%. While for men the labour force participation rate remained more or less constant (about 84%) over the period.

The coefficient on schooling provides some support to the view that automatic promotions (column iii)) are being mixed with a certain degree of judgement made by the firms on the workers ability. If greater schooling is a signal of greater potential ability, and if even in the case of automatic promotions more educated workers have shorter survival time to promotion, then automatic promotions are not just a consequence of elapsed duration. Firms may indeed be using these promotions as a prize to some measure of good performance. Furthermore, as more educated workers tend also to have faster rates of transition between firms it is not possible to argue that more educated workers have greater degrees of attachment to firms. The impact of schooling is monotonic for any definition of promotion, i.e., the more educated the workers, the more accelerated the survival time for promotion. For example, in the case of merit promotions, when compared to workers with up to six years of schooling (ISCED level 1) workers with ISCED level 2 would have to wait 20% less time to be promoted whereas workers with a university degree would nearly wait just half of the time to receive a promotion. It is interesting to note the effect schooling in

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[21] For similar results on women's turnover rates see Farber (1994) and Bishop (1990).

the two competing risks for leaving firms (columns v) and vi)). Were workers to take more than one year to find another job, the hazard to change firms is independent of the level of schooling. However, the more schooling a worker has the less time he takes to change between firms within a period of one year. For example, workers with a university degree will take just 27% of the time of workers with 6 years of schooling to change firms within one year. This result may be due to the fact that the quality of the match is identified faster for more highly educated workers, hence more educated workers are either promoted or change firms sooner. Converging to Rosenbaum's (1979) finding that promotion patterns require more highly educated workers to attain promotions in a short period of time, otherwise they would not be promoted. But school attainment can also be correlated with the age of workers. Minimum compulsory schooling was six years from the seventies until mid eighties. Workers with nine years of compulsory schooling appeared in the mid nineties. Also, during the nineties Portugal experienced a boom in the supply of workers with university degrees. It is then reasonable to believe that, on average, more educated workers have lower labour market experience. The less the labour market experience, according to job shopping theories, the less the worker is aware of the overall characteristics, his own and the labour market's, therefore tending to change jobs frequently.

Workers who earn wages above the median hourly wage of the firm have lower hazards of job mobility. One possible explanation for this finding is that these workers might have acquired firm specific human capital, were promoted in the past, and are now receiving greater wages as a return to their past good performance. Another possibility, is that workers receiving higher wages may be located in a level of the firm hiererarchy in which ladders are longer, hence their likelihood of promotion is smaller when compared to workers receiving lower wages (hierarchical level where ladders are smaller).[22] Part-time workers show lower attachment to the firm. These workers are very likely to change firms. On average, to do so, they take 46% less time than full-time workers. Further, when compared to full-time workers, part-timers have a survival time 50% shorter to move

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[22]Wise (1975) suggests that promotions are dependent on the opening of vacancies, and that this effect is likely to be more relevant the closer one is to the top of the hierarchy. On the contrary, promotions at low levels are less likely to depend on the occurrence of openings.

between firms with a period of non-employment of length greater than one year.

The coefficient of previous promotion is extremely strong, it is -.55 in the case of merit promotions and -.87 in the case of automatic promotions. As some heterogeneity is supposed to be captured by this variable, it signals that there are some workers with propensity to be promoted, and suggests the possible existence of fast trackers. However, although negative, the effect of having changed firms previously is not so great in the case of separations with periods of non-employment of length greater than one year. But it is so in the case of separations with gap length inferior to one year. This result suggests the possibility that some workers are 'movers' while some others would be more prone to be 'stayers'.

Regarding firm size, support is found for hierarchical models of the dynamics of the firm. The smaller the firm, the lower the hazard into merit promotion. Smaller firms are less likely to have a structure that supports workers' changes of occupations. Again, opportunity seems to be a relevant determinant of the likelihood of promotion. As expected, the growth of the firm is more influential in the occurrence of merit promotions. Intuitively, if the firm is growing new occupations are likely to be created. Furthermore, this coefficient may also be signalling the preference of firms to fill in jobs located higher in the hierarchy from within by promoting incumbents and offering entry jobs at lower levels in the hierarchy. Noticeable is the fact that the growth of firm increases the hazard of changes of firm more than the hazard of promotion, and the impact is greater for separations with periods of non-employment with length greater than 12 months. This may be correlated with the health of the particular industry or sector, motivating workers to change firms seeking for better career prospects. Some workers may be more aware of their chances of finding a new job, some others may be misled and hence have to wait longer for a new job. On the contrary, when the firm is downsizing the hazard of both promotions and separations is lower.

The legal setting of the firm is also a statistically significant predictor of job mobility. In almost any case, the hazard of promotion is greater in limited liability companies. Workers, however, are more likely to change firms if they are located in sole partnerships. One of the disadvantages for this type of legal setting is the difficulty of obtaining credit given that the risk is concentrated in one

single individual. Do workers realize that these firms are potentially less stable, and possibly more likely to shutdown? This question arises from the fact that, though the hazard of changing firms is greater for this specific legal setting, it is stronger for separations that involve a period of non-employment of length lower than twelve months. Realizing the potential instability of these firms, workers may act rationally and move between firms for the sake of finding more stable employment relationships.

The shape parameter (gamma) reflects the pattern of duration dependence. In the case of the loglogistic distribution hazards can be initially rising, reach a maximum and then decline monotonically. The loglogistic distribution, however, supports also the possibility for strict negative duration dependence (when gamma is greater than one). In the case of promotions the hazard is initially increasing, reaches a peak and then monotonically declines. The same pattern is not so clear in the case of separations. In the case of all separations and separations with gap length greater than one year the hazard initially rises (but not as much as in the case of promotions) and then declines. In the case of separations with a gap of length inferior to one year only negative duration dependence is observed.[23]

6   Conclusion

The analysis of the determinants of job mobility in Portugal was the purpose of this study. Job mobility was here defined as a possible means of career advancement. Three contributions are made to the literature. Firstly, two broad types of events were analysed, promotions and turnover. However, both of these events can be defined in a variety of ways. Assuming that the determinants of mobility may depend on the fashion in which events are defined, promotions were split into merit and automatic promotions, and separations were split according to the length of time workers take to find

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[23]Conditional and unconditional hazard funtions (not presented here) were plotted. Given that for every type of event both hazards had the same shape, it is possible to conclude that unobserved heterogeneity is important but it does not generate deviations of population hazards from mean individual hazards. Given the possible dimension of left truncation (some spells lasted nearly 800 months) the same estimations were done for a sample of workers who had started their spell in the firm after January 1985 (640,131 records). The same results were obtained, i.e., specifications with loglogistic distribution and firm frailty have always fitted best, and the sign of coefficients did not change.

a new job. This distinction revealed to be fruitful in the sense that sharper differences/similarities were possible to be observed regarding the impact of observed factors and interesting comparisons and links were possible between the determinants of promotion and turnover. One finding that clearly derived from such a distinction is related to gender differentials in the access to promotion which heavily depend on the definition of promotion adopted. The second contribution made was introduction of firms in the analysis. A major conclusion is that, in fact, firms cannot be ignored as a explanatory factor of job mobility, for not only were all the coefficients significant, but also models with unobserved frailty of the firm always performed best. The third contribution is that rather than using data from one single firm, the data set used is economy wide and allows for conclusions applicable to the labour market as a whole.

Estimates suggest that it does not seem to be the case that, in Portugal, women have attractive non-market opportunities that would lead them to be less stable workers. This result, associated to the fact that Portuguese women have a high participation rate in the labour market, opens the question on the outcomes of participation more than on the participation itself. It was also clear from the results that, once in the labour market, highly educated workers have greater hazards of promotion than workers with ISCED level 1, and were they to change firms they are very likely to find a job within the next year. On the contrary, the lower the education of workers the greater the risk of being non-employed for more than one year. Therefore, investments in education seem to be rewarded and incentives to these should be given. Some evidence was found that the less the stability of the firm the less likely workers are to have positive job mobility (in the sense of having a promotion or change from firm with a non-employment period inferior to one year). As such, some support on the planning and organization of smallers firms would be a positive policy.

The models here considered assumed that, conditional on observable characteristics and on firm frailty, spells were independent. A relevant extension to this work is to introduce models that relax this assumption and allow for occurrence dependence and dependent competing risks.

Table 1: Summary statistics of events

	Frequence	Percent	Incidence rate	Survival time 25%	Survival time 50%	Survival time 75%
Records:	885,795	100				
Censored	497,440	56.2				
Completed	388,355	43.8	.01629	12	28	75
Two competing risks:						
Promotions	249,341	28.2	.01046	20	48	171
Separations	139,014	15.7	.00583	37	154	
Four competing risks:						
Merit Promotions	84,683	9.6	.00355	69	531	
Automatic Promotions	164,658	18.6	.00691	27	93	
Separations, gap$<$12	45,808	5.2	.00192	203		
Separations, gap$\geq$12	93,206	10.5	.00391	73	297	

Source: Own calculations based on Portugal, MTSS (1986-2000).

Table 2: Descriptive statistics

Age	30.5		
	(10.72)		
Gender		Industry	
Male	60.01	Agriculture, silviculture and fishing	2.23
Female	39.99	Extraction	0.68
		Food, beverages and tobacco	4.11
Education		Textiles, clothing, leather	15.00
ISCED 0	3.48	Wood, cork	3.81
ISCED 1	65.91	Paper	1.88
ISCED 2	11.92	Chemicals	2.20
ISCED 3	13.45	Non-metalic mineral products	2.85
ISCED 5/6	5.24	Base metals	0.62
		Metal products	8.51
Hourly wage (in previous period)		Electricity, gas and water supply	1.36
>median hourly wage of firm	42.45	Construction	11.19
≤median hourly wage of firm	57.55	Wholesale and retail trade	17.16
		Hotels and restaurants	5.66
Scheme of payment		Transport and communication	6.49
Full-time	82.02	Banking and insurance	3.34
Part-time	10.69	Services to community	1.65
other	7.30	other	11.26
Year		Region	
≤1992	19.67	Aveiro	7.26
1992<year≤1996	32.01	Beja	0.70
1996<year≤2000	48.32	Braga	9.29
		Bragança	0.38
Firm growth		Castelo Branco	1.36
0	74.85	Coimbra	2.80
<0	8.09	Évora	1.06
>0	17.06	Faro	2.65
		Guarda	0.84
Size of firm		Leiria	3.74
Micro	19.01	Lisboa	33.80
Small	27.45	Portalegre	0.69
Medium	24.23	Porto	20.25
Large	29.31	Santarém	3.23
		Setúbal	4.50
Legal Setting		Viana do Castelo	1.52
Public	3.27	Vila Real	0.69
Sole partnership	10.58	Viseu	2.02
Anonimous partnership	24.28	Açores	1.39
Limited liability partnership	55.74	Madeira	1.82
Other	6.13		

Note- Apart from age, all variables are dummy and their percentual distribution is presented. Standard deviations are in parentheses. Source: Own calculations based on Portugal, MTSS (1986-2000).

Table 3: Selected estimates of regressions

	Worker Frailty		Firm Frailty		Worker Frailty		Firm Frailty	
	Llogistic	Lnormal	Llogistic	Lnormal	Llogistic	Lnormal	Llogistic	Lnormal
	i)	ii)	iii)	iv)	v)	vi)	vii)	viii)
Panel A								
		All Promotions				All separations		
Intercept	3.874	4.045	3.593	3.879	4.293	3.719	4.327	3.593
	(161.24)	(167.00)	(150.15)	(157.25)	(102.86)	(88.67)	(97.56)	(80.51)
ln gamma	-0.383		-0.488		-0.070		-0.081	
	(203.01)		(230.67)		(29.40)		(32.50)	
ln sigma		0.223		0.187		0.542		0.502
		(139.23)		(90.19)		(255.85)		(211.27)
theta	0.271	0.199	1.406	1.277	0.373	0.339	0.439	0.458
No. of subjects	885,795	885,795	885,795	885,795	885,795	885,795	885,795	885,795
No. of groups	480,354	480,354	165,163	165,163	480,354	480,354	165,163	165,163
No. of failures	249,341	249,341	249,341	249,341	139,014	139,014	139,014	139,014
LL	-508,540	-511,105	-456,447	-459,964	-359,865	-361,348	-351,009	-351,668
AIC	1,017,199	1,022,329	913,014	920,047	719,850	722,816	702,139	703,455
Panel B								
		Merit Promotions				Separations, gap<12 months		
Intercept	5.174	5.144	5.056	5.281	5.276	5.169	5.021	4.888
	(122.92)	(120.47)	(114.45)	(118.27)	(81.84)	(77.09)	(70.56)	(66.78)
ln gamma	-0.108		-0.223		0.124		0.082	
	(37.30)		(71.11)		(32.39)		(20.36)	
ln sigma		0.539		0.498		0.830		0.780
		(206.73)		(167.23)		(231.33)		(200.65)
theta	0.167	0.107	1.006	0.927	0.201	0.158	0.773	0.754
No. of subjects	885,795	885,795	885,795	885,795	885,795	885,795	885,795	885,795
No. of groups	480,354	480,354	165,163	165,163	480,354	480,354	165,163	165,163
No. of failures	84,683	84,683	84,683	84,683	45,808	45,808	45,808	45,808
LL	-260,040	-261,049	-247,181	-248,756	-178,449	-178,348	-174,506	-174,500
AIC	520,201	522,218	494,483	497,631	357,018	356,817	349,133	349,119
Panel C								
		Automatic Promotions				Separations, gap≥12		
Intercept	4.607	4.748	3.752	4.310	5.632	5.060	5.614	4.973
	(154.95)	(163.57)	(128.73)	(146.85)	(109.52)	(98.17)	(103.96)	(91.46)
ln gamma	-0.312		-0.487		-0.032		-0.032	
	(135.22)		(181.02)		(11.19)		(10.58)	
ln sigma		0.291		0.222		0.598		0.577
		(146.33)		(86.96)		(229.34)		(204.65)
theta	0.494	0.425	1.916	1.638	0.559	0.494	0.476	0.479
No. of subjects	885,795	885,795	885,795	885,795	885,795	885,795	885,795	885,795
No. of groups	480,354	480,354	165,163	165,163	480,354	480,354	165,163	165,163
No. of failures	164,658	164,658	164,658	164,658	93,206	93,206	93,206	93,206
LL	-403,765	-402,748	-363,423	-362,963	-260,973	-263,062	-256,167	-257,779
AIC	807,650	805,617	726,966	726,046	522,066	526,244	512,455	515,677

Note- All specifications include as regressors age (and its square), and dummies for gender, education, hourly wage, scheme of remuneration, year, size of firm, firm growth, legal setting of the firm as well as industry and region. In all specifications, the frailty effect is highly statistically significant. Source: Own calculations based on Portugal, MTSS (1986-2000).

Table 4: Selected estimates of regressions with firm frailty

|	Promotions			Separations		
	All	Merit	Automatic	All	gap<12	gap$\geq$12
	i)	ii)	iii)	iv)	v)	vi)
Loglogistic						
Intercept	3.570	4.933	3.806	4.218	4.889	5.555
	(156.42)	(116.79)	(137.91)	(95.77)	(70.25)	(103.07)
ln gamma	-0.530	-0.261	-0.537	-0.093	0.056	-0.037
	(263.11)	(84.53)	(213.98)	(37.03)	(13.84)	(12.42)
theta	1.131	0.881	1.408	0.443	0.781	0.480
No. of records	885,795	885,795	885,795	885,795	885,795	885,795
No. of groups	165,163	165,163	165,163	165,163	165,163	165,163
No. of failures	249,341	84,683	164,658	139,014	45,808	93,206
AIC	876,022	489,181	688,588	701,060	348,019	512,289
Lognormal						
Intercept	3.811	5.179	4.204	3.477	4.728	4.895
	(160.41)	(119.43)	(151.65)	(78.49)	(65.61)	(90.32)
ln sigma	0.154	0.471	0.172	0.487	0.758	0.569
	(78.30)	(159.95)	(71.72)	(202.90)	(193.68)	(199.14)
theta	1.045	0.826	1.253	0.464	0.761	0.486
No. of records	885,795	885,795	885,795	885,795	885,795	885,795
No. of groups	165,163	165,163	165,163	165,163	165,163	165,163
No. of failures	249,341	84,683	164,658	139,014	45,808	93,206
AIC	890,216	493,667	693,381	702,055	348,077	515,349

Note- All specifications include as regressors age (and its square), and dummies for previous failure of the specific event type, gender, education, hourly wage, scheme of remuneration, year, size of firm, firm growth, legal setting of the firm as well as industry and region. In all specifications, the frailty effect is highly statistically significant. Source: Own calculations based on Portugal, MTSS (1986-2000).

Table 5: Estimates of loglogistic regression with firm-level frailty of job mobility

	Promotions			Changes of firm		
	All	Merit	Automatic	All	gap<12	gap≥12
	i)	ii)	iii)	iv)	v)	vi)
age	0.063	0.058	0.058	0.061	0.079	0.047
	(59.14)	(28.06)	(46.28)	(26.41)	(21.73)	(16.42)
(age squared)/100	-0.074	-0.061	-0.071	-0.025	-0.062	0.003*
	(50.98)	(21.14)	(42.04)	(7.33)	(11.65)	(0.69)
Female	-0.018	0.100	-0.060	0.166	0.222	0.147
	(4.18)	(12.11)	(11.89)	(17.98)	(15.17)	(12.79)
ISCED 0	0.161	0.341	0.135	0.073	0.240	0.048*
	(12.53)	(13.23)	(9.22)	(2.87)	(5.81)	(1.58)
ISCED 2	-0.153	-0.201	-0.154	-0.008*	-0.179	0.080
	(27.16)	(18.29)	(23.11)	(0.63)	(8.87)	(4.89)
ISCED 3	-0.197	-0.257	-0.199	-0.024**	-0.301	0.125
	(34.54)	(23.28)	(29.55)	(1.82)	(15.07)	(7.50)
ISCED 5/6	-0.303	-0.468	-0.256	-0.341	-0.728	-0.093
	(37.13)	(29.74)	(26.26)	(16.09)	(23.37)	(3.30)
Hwage>median hw firm	0.215	0.289	0.201	0.080	0.122	0.031
	(57.83)	(39.91)	(46.08)	(10.20)	(9.64)	(3.14)
Part-timer	0.040	0.213	-0.006*	-0.464	-0.305	-0.505
	(6.04)	(15.98)	(0.81)	(38.10)	(15.53)	(34.02)
Previous failure	-0.720	-0.548	-0.870	-0.285	-0.479	-0.140
	(191.53)	(74.76)	(192.80)	(33.27)	(34.61)	(13.05)
Micro firm	0.072	0.320	0.195	-0.019*	0.132	-0.038*
	(5.84)	(14.43)	(13.09)	(0.88)	(3.70)	(1.45)
Small firm	0.106	0.248	0.222	-0.053	0.002*	-0.011*
	(10.09)	(12.92)	(17.10)	(2.74)	(0.05)	(0.46)
Medium firm	0.162	0.197	0.241	-0.004*	0.076***	-0.004*
	(17.31)	(11.36)	(20.52)	(0.22)	(2.47)	(0.18)
growth of firm<0	0.169	0.241	0.161	0.266	0.119	0.320
	(23.28)	(16.73)	(19.31)	(19.87)	(5.74)	(19.04)
growth of firm>0	-0.054	-0.230	0.056	-0.583	-0.460	-0.662
	(8.51)	(20.26)	(7.45)	(55.59)	(27.73)	(51.58)
Public	0.205	0.414	0.040***	0.680	0.486	0.636
	(14.66)	(13.15)	(2.44)	(10.82)	(4.23)	(8.63)
Sole partnership	-0.033	0.050	-0.069	-0.232	-0.480	-0.087
	(3.34)	(2.93)	(6.15)	(16.09)	(21.81)	(4.90)
Anonymous partnership	0.100	0.054	0.070	0.273	0.238	0.286
	(10.87)	(3.36)	(6.09)	(16.54)	(8.99)	(13.86)
Intercept	3.570	4.933	3.806	4.218	4.889	5.555
	(156.42)	(116.79)	(137.91)	(95.77)	(70.25)	(103.07)
ln gamma	-0.530	-0.261	-0.537	-0.093	0.056	-0.037
	(263.11)	(84.53)	(213.98)	(37.03)	(13.84)	(12.42)
ln theta	0.123	-0.126	0.342	-0.814	-0.248	-0.733
	(10.80)	(6.57)	(26.72)	(54.22)	(10.69)	(40.09)
No. of records	885,795	885,795	885,795	885,795	885,795	885,795
No. of failures	249,341	84,683	164,658	139,014	45,808	93,206
LL	-437,950	-244,529	-344,233	-350,469	-173,949	-256,084

Note- All coefficients significant at the 1% level, excluding: *** significant at the 5% level; ** significant at the 10% level; and *** not significant at the 10% level. Absolute asymptotic t statistics in parentheses. All the models include dummies for region, industry, and year. Source: Own calculations based on Portugal, MTSS (1986-2000).

Figure 1: Smoothed hazard estimates
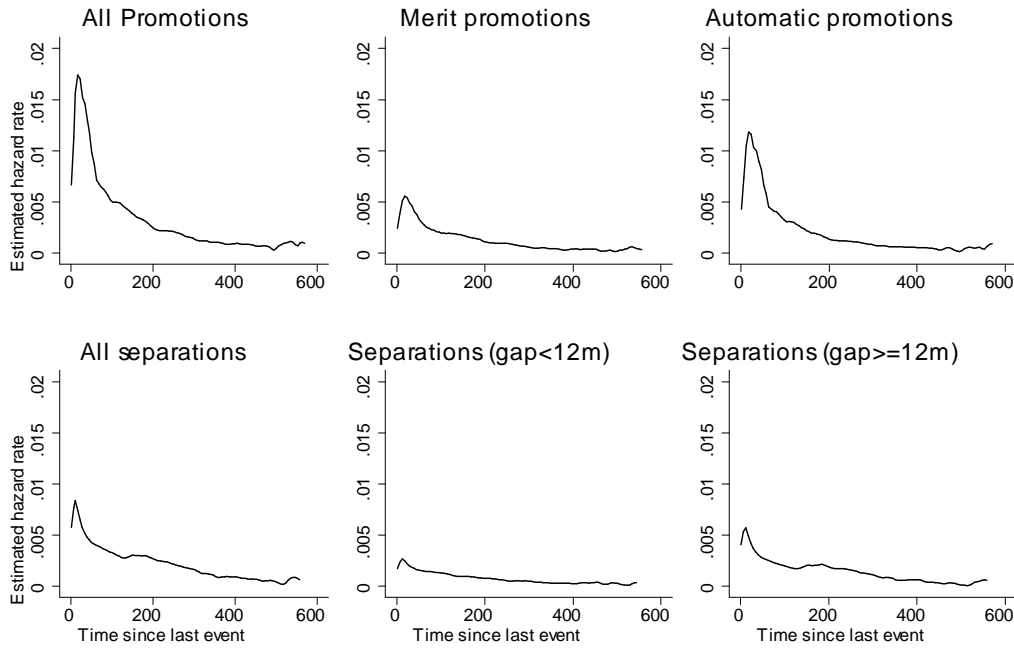
Note.- Estimates based on the Epanechnikov kernel with a bandwidth of 7 months.
Source: Own calculations based on Portugal, MTSS (1986-2000).

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