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ABSTRACT

Excess Turnover and Employment Growth: Firm and Match Heterogeneity*

Portuguese firms engage in intense reallocation, most employers simultaneously hire and separate from workers, resulting in a large heterogeneity of flows and excess turnover. Large and older firms have lower flows, but high excess turnover rates. In small firms, hires and separations move symmetrically during expansion and contraction periods, on the contrary, large firms adjust their employment levels by reducing entry and not by increasing separations. Most hires and separations are on fixed-term contracts and shrinking firms replace a larger share of their separations under fixed-term contracts, while expanding firms replace most of the separations under open-ended contracts. The comparison with the U.S. shows that while worker and job flows are lower in Portugal, the excess turnover is remarkably close in the two countries.

NON-TECHNICAL SUMMARY

The simultaneity of hirings and separations at the firm level generate significant rates of excess turnover – firms hire and separate from twice as many workers as the number of jobs they want to expand or contract. The characterization of this turnover is important as it may segment the labor market when firms face rigid employment protection legislation. We show that the composition of turnover is heterogeneous in expanding and contracting firms, according to firm and match characteristics. Large and older firms churn a large fraction of workers, and fixed-term contracts are subject to a much larger excess turnover. Overall Portugal and the U.S. show similar churning rates – the ratio of the separation (hiring) and job destruction (creation) rates is close to two. This is obtained, however, with job and worker flows, in Portugal, that are two thirds of those estimated for the U.S.

JEL Classification: J21, J23, J63

Keywords: job flows, worker flows, excess turnover, fixed-term contracts, firm size

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1 Introduction

Almost nine percent of Portuguese workers separate from their firms each quarter and a similar percentage is newly hired. The simultaneity of separations and hires at the firm level generates considerably smaller job flows (half the worker flows). The resulting excess worker turnover is at the core of search and matching theories and is analyzed empirically in this paper. The work of Davis, Haltiwanger and Schuh (1996) highlighted the importance of computing firm level job and worker flows to understand fluctuations in employment and unemployment. The theoretical basis for the existence of a continuous flow of hires and separations in the same firm can be found in Jovanovic (1979), Gibbons and Katz (1991) or Topel and Ward (1992). The existence of shocks (uncertainty) on the allocation of labor is the main explanation for the simultaneous occurrence of job creation and destruction. Additionally, it is recognized that the labor market works with imperfect information, whether it is because of asymmetries in information, as in Gibbons and Katz (1991), or because of differences in match productivity, as in Jovanovic (1979) and Topel and Ward (1992). These factors are behind the simultaneous existence of hires and separations of workers, as firms and workers search for a better match. More recently, the literature has also evolved to include macroeconomic perspectives (e.g. Hall (2005), Shimer (2007) and Petrongolo and Pissarides (2008)).

This paper contributes to the characterization of employment adjustment intensity in a context of heterogeneous labor market conditions and within an institutional framework that imposes constraints to labor adjustments. The structure of job and worker flows, job tenure, and unemployment duration is a function of the incentives provided by the institutional setting (Lazear (1990), Bertola (1990), and Blanchard and Katz (1997)). Our results confirm that more rigid labor markets have lower levels of job and worker flows. However, and more interestingly, we also show that the level of worker churning is similar across countries.

We use two administrative matched employee-employer datasets covering all private sector jobs in the period from 2001 to 2006: the monthly records of the Portuguese Social Security and the annual data from *Quadros de Pessoal*. The two datasets complement each other in our analysis. The Social Security data has intra-annual information, and *Quadros de Pessoal* is richer in terms of firm and worker information.

Workers rotation rates in the Portuguese labor market largely exceed the rates of job creation and destruction. On average, in expanding firms (those that increase their employment level),

the creation of 100 jobs in a year involves the hire of 175 workers and the separation from 75 workers. That is, it resulted in the excess turnover of 150 workers. Similarly, in contracting firms (those that reduce their level of employment), the reduction of 100 jobs involved the separation from 160 workers and the hire of 60 new workers.

But our results point towards a strong heterogeneity in the pattern of workers rotation: (i) workers in the services sector are subject to more turnover than in the manufacturing sector; (ii) in larger firms there is a higher incidence of excess worker turnover (90 percent of new contracts do not result in net increases in the level of employment for expanding firms with over 250 employees, while for smaller firms the same figure drops to 30 percent); (iii) it is interesting to note that, in small firms, hires and separations move symmetrically during periods of expansion and contraction of employment – expanding firms rely on hires, whereas shrinking firms rely on separations to adjust their employment level. On the contrary, when shrinking, large firms adjust by reducing entry and not so much by increasing separations. Indeed, for larger firms the separation rates of growing and shrinking units are roughly equal, but the hiring rate is much larger for those firms with net job creation. The latter result can be interpreted as evidence that the restrictions on firing imposed by the labor regulation affect more larger firms; (iv) these restrictions should also be related with the fact that the rate of job destruction is flat over the firm age distribution, a result somewhat at odds with the Schumpeterian view of firms' demography, which would predict increasing job destruction rates; (v) finally, the pattern of workers rotation for different match characteristics reflects also the impact of labor regulations. Workers rotation is much higher among workers with fixed-term contracts and low-wage workers, who are also the ones with the largest gains in employment.

As pointed out in Haltiwanger, Scarpetta and Schweiger (2008) and Bassanini and Marianna (2009), international comparisons of job and worker flows are a difficult task because very often the data lack comparability (national data sources use different definitions and collection protocols, resulting in quite different flow rates). With this caveat in mind, we compare our results with the ones reported in the literature. In general, our results do not differ from the ones observed for other European economies with comparable labor legislation (see, for example Abowd, Corbel and Kramarz (1999), Haltiwanger and Vodopivec (2002), Gómez-Salvador, Messina and Vallanti (2004) and Kugler and Pica (2008)). Compared with the results for the US reported in Davis, Faberman and Haltiwanger (2006) and Davis, Faberman, Haltiwanger and Rucker (2008), Portugal has smaller job and worker flows, both at the annual and quarterly

frequencies – slightly less than two thirds. Consistently, the data do not show cross-country differences in churning rates; the ratio between hirings and job creation flows (a measure of workers churning) is 1.9 in the US and 1.8 in Portugal (and similarly for the ratio between separations and job destruction). This result is consistent with the one obtained in Bassanini and Marianna (2009), who for a large number of countries report a very small variation in churning rates.

2 Data

In the analysis of the process of job and workers flows in the Portuguese economy we use two administrative statistical sources. This is particularly useful, not only because it allows a cross validation of the results between the two datasets, but mainly because the two datasets complement each other in a number of important aspects. The statistical sources are the *Quadro de Pessoal* (QP) and the Social Security records (SSR), both collected by the Ministry of Employment (MTSS).

2.1 *Quadros de Pessoal* (QP) database

The QP is an administrative dataset collected on an annual basis (reported to the month of October of each year). It covers all Portuguese firms with at least one salaried worker, with the exception of government workers, entities that employ non-permanent rural workers and domestic workers. The QP is a source of information of great importance in the microeconomic analysis of employment in Portugal and has been extensively used (see Cabral and Mata (2003), for a detailed description of the dataset).

The data are available since 1982 (with the exception of 1990 and 2001), but we restrict the analysis to the 2002 – 2005 period in order to cover the same period for which we have Social Security data. In 2005, the data cover about 340 thousand firms with a total of nearly 3 million employees.

It is worth mentioning that the longitudinal file of workers often presents a number of records that does not match with the number of employees declared in the longitudinal file of firms. In such cases, the flow of workers identified in the workers' file do not match the pattern of job flows identified in the firms' file and could be overstated. To limit the impact of this mismatch on the estimates of flows, the results from QP refer only to firms in which the number of valid

individual records is at least 90 percent of the number of workers that the firm reported as its level of employment. The resulting sample covers, on average, 1.5 million workers each year.

2.2 Social Security Records (SSR) database

Social Security data have been increasingly used in labor market studies. These studies include issues related with mobility and the wage determination process (e.g. Lalive (2008) and Dustmann, Ludsteck and Schönberg (2009)). The nature of the information, self-declared wages subject to mandatory contributions to the Portuguese Social Security system, makes the SSR a unique source of information on labor market developments. The data set registers, not only wages, but all social and unemployment related financial transfers paid to taxpayers by the Social Security system.

The SSR covers the period from March 2000 to March 2006. The dataset includes all employer-employee pairs for which there is at least one month of wages declared to the Social Security. For each of these pairs, the dataset has the information on the first and last month in which there are wage payments and the number of months with wage payments during that period.

The dataset has about 14 million job matches, 75 percent of them corresponding to uninterrupted employment spells with the same employer. In the remaining cases there were interruptions in wage payments. This may be explained by justified leave under the same contractual relationship or by two successive work periods for the same employer, with intervening non-employment spells. We are able to identify the former cases with the information on absences (for example, sick, maternity or parental leaves) and these were considered as a single employment spell. The latter can only be identified if there is a subsidized unemployment spell, in which case we consider the two work periods as distinct employment spells. This results in a conservative identification of worker hirings and separations.

3 Terminology

The concepts of job and worker flows used in the paper follow Davis et al. (1996), who define them as follows:

Job flows

Job creation – Job creation at time t is equal to the change in employment for firms that

expand or begin their activity between $t-1$ and t;

Job destruction – Job destruction at time t is equal to the change in employment for firms that contract or exit the market between $t-1$ and t;

Workers flows

Hires – The hire of workers at time t is equal to the number of workers in a firm at time t that were not employed in that firm at $t-1$;

Separations – The separation of workers at time t is equal to the number of workers in a firm at time $t-1$ that are not employed in that firm at t;

Based on job or workers flows, we can define:

Net job creation – The net job creation at time t is equal to the difference between the level of employment at $t-1$ and t ;

Excess worker turnover – The excess worker turnover at time t is equal to the difference between total worker turnover (hires plus separations) and the absolute net change in employment.

Excess job turnover – The excess job turnover at time t is equal to the difference between total job turnover (job creation plus job destruction) and the absolute net change in employment.

In this paper, we emphasize the relationship between employment growth and job and worker flows. To this end, we present these flows by type of employment growth at the firm level. From period to period (quarterly or annually), we identify firms with positive employment growth, with negative employment growth and with no change in employment.

An important concept in the literature is the churning of workers, defined in Burgess, Lane and Stevens (2000) as the difference between excess worker turnover and excess job turnover. Given that our analysis is carried out for each of the three groups of firms defined above as a function of the type of employment change, our measure of excess worker turnover coincides, for each of these groups, with the concept of worker churning. Notice also that the excess worker turnover equals twice the separations for expanding firms, and twice the hirings for contracting firms.

To convert these measures of employment change to rates, we divided them by the average employment in $t-1$ and t. Davis et al. (1996) discuss the advantages of this measure over traditional rates of growth. For example, for firms that did not exist at time $t-1$ the growth rates are not computable, while with the definition used in this article the corresponding value is 2 (and in the case of firms leaving the market the corresponding rate of destruction takes the

value -2).

As most of our analysis is done for the three groups, we calculate these rates using the average level of employment in each group (as opposed to total employment in the economy). To distinguish the job creation and destruction rates for the aggregate economy from the ones obtained for each group of firms, we label the latter as expansion and contraction rates, respectively.

4 Job and workers flows: Excess turnover rates

The relationship between job and worker flows is complex, since there are many competing reasons for the existence of workers excess turnover. Indeed, several studies show that the behavior of labor demand by firms is rather complex (see, for example, Hamermesh, Hassink and van Ours (1996)). Firms that reduce their level of employment also hire new workers and firms undergoing expansion also separate from workers.

Clearly, the magnitude of job flows will always be lower than that of worker flows. The process of workers reallocation beyond what would be necessary to increase or decrease the level of employment, i.e. the one that occurs in excess of job flows, is related to the re-evaluation of the match quality. This reassessment may be made either by the employer, resulting in the simultaneous existence of lay-offs and hires, or by the worker, resulting in the occurrence of voluntary exits and the subsequent replacement of the worker.

This process of mobility must be understood as an investment decision, by comparing the costs of changing labor market partner with the benefits of future earnings (Jovanovic 1979). The existence of worker flows in excess of job flows should be understood as an essential aspect of the functioning of the labor market. Job mobility allows individuals to improve their careers as identified, for example, in Topel and Ward (1992).

4.1 Aggregate flows

Table 1 shows the rates of job creation and destruction, as well as the rates of hires and separations of workers for all firms in the economy. We compute both annual and quarterly rates, using Social Security data. The annual hiring rate captures only the workers hired in the reference year that were still working in the firm at the end of that year. Also, the annual separation rate captures only the exit of workers who were already in the firm in the previous

year. Thus, annual data ignores all transitions involving entry and exit in the same year.

The average rates of annual job creation and destruction are close to 12 percent. These figures are very close to the ones obtained from Quadros de Pessoal in Blanchard and Portugal (2001) and more recently in Centeno, Machado and Novo (2008). On average, over the period, firms that expand their employment level or that enter the market, created almost 13 new jobs for every 100 jobs in the economy and firms that contract their employment level or that leave the market destroyed 12 jobs for every 100 existing jobs.

[TABLE 1 HERE (see page 25)]

The process of creation and destruction of jobs is characterized by much larger flows of entry and exit of workers. This process occurs simultaneously in most firms, whether they are expanding or contracting their employment level. In aggregate terms, worker flows are around twice the number of job flows (25 percent, on average). This is clear evidence of significant levels of churning; worker flows exceed, at a rate of two, the minimum rotation needed by firms to promote the observed adjustment in their employment level.

The level of job and worker flows differs substantially according to the frequency with which these flows are observed, higher-frequency quarterly data capture flows that are left unidentified in annual observations. On average in each quarter, expanding Portuguese firms create 5 new jobs for every 100 existing jobs (and a similar number is destroyed). This process of expansion and contraction of employment in firms is achieved through the hire and separation from 9 employees.

This quarterly figure is substantially higher than the ones reported in previous studies for the Portuguese economy. For example, Blanchard and Portugal (2001) reports a quarterly rate for worker outflows of 4.3 percent for the 1991-1995 period. Besides the time period, there are two main reasons for these differences. The first is the sample coverage, as their study uses the Inquérito ao Emprego Estruturado, an employment survey that oversamples large and older firms in the manufacturing sector. The second, and more important reason, is the exclusion of entry and exit of firms, which is known to be responsible by a large fraction of total worker turnover in most countries. Abowd, Corbel and Kramarz (1999) study the French labor market using a sample of firms with at least 50 workers and highlight the same type of biases when comparing their results with other studies.

To sum up, the results for job and worker flows point to a significant degree of excess

turnover in Portugal, at the annual and quarterly frequencies. The hiring rate exceeds the job creation rate by a ratio of two, and similarly for the ratio of the separation and job destruction rates. We will analyse this issue in greater detail in the following sub-section.

4.2 Excess worker turnover

The phenomenon of excess turnover is easier to analyze if the information is presented in a less aggregated way. Table 2 separates firms according to their type of employment growth in two successive periods. We have a group of firms with net job creation, another with net job destruction, and finally a group of firms with stable employment. For each group, we study worker hires, separations, and excess turnover.

[TABLE 2 HERE (see page 25)]

In annual terms, the excess worker turnover in expanding firms corresponds to 150 percent of their expansion rate, i.e., to generate 100 new jobs these firms hire and separate from a total of 250 workers. In shrinking firms, there is also a high turnover of workers, but lower than the one observed in expanding firms; to destroy 100 jobs these firms hire and separate from 220 workers.[1]

One interesting result is obtained for firms that have stable employment. These firms have hiring and separation rates lower than those of the other two groups, yet they still engage in substantial turnover and separate and hire, on average, from 10 percent of their workforce each year. Their hiring rate is close to the hiring rate of contracting firms, and their separation rate is two-thirds of the one of expanding firms. Firms with stable employment level are not lethargic.

The level of excess turnover is lower in the quarterly data than in the annual data. In expanding firms the excess turnover rate is close to 95 percent and in shrinking firms the rate is 80 percent. This result is expected if the excessive turnover is related with processes that last more than three months, which are therefore not always observed in a quarterly time window. This is certainly the case for most fixed-term contracts, and in general for the duration of specific tasks. Additionally, the trial period under Portuguese labor law may last more than one quarter (up to 180 days for qualified workers).

[1]The excess worker turnover is defined, for firms with net job creation, as two times the ratio between the separation and expansion rates; and for firms with net job destruction, as two times the ratio between the hiring and the contraction rates. As pointed out before this is also equivalent to a churning rate.

The symmetric behavior of expanding and contracting firms is revealed in their quite different intensity of hires and separations. Firms in expansion separate from a much smaller fraction of their workforce than firms in contraction. Similarly, contracting firms hire a percentage of new workers rather smaller than those that are expanding. These results hide a rather heterogeneous behavior that will be analyzed in the following sections. For instance, large firms in contraction separate from a percentage of workers that is similar to the one of those in expansion. Also, the ability of firms to adjust their employment level through both hirings and separations, even in a context of strong protection of permanent employment, is related to the role of fixed-term contracts in the worker turnover.

The pattern of excess turnover can be further detailed if we relate the individual behavior of each firm in terms of the flow of workers and net employment growth. Figure 1 follows Davis et al. (2006) and shows the sectional relationship between the hiring and separation rates and the net employment growth for each year and firm in the Social Security data. The hiring and separation rates are measured in the vertical axis as a percentage of total employment. The rate of employment growth is measured in the horizontal axis (also as a percentage of total employment). The solid lines starting from the origin (zero net creation of employment) show the minimum level of recruitment (for firms in expansion) and separations (for firms in contraction) needed to change the level of employment in a particular percentage. Figure 1 uses all annual observations for continuing firms, between 2001 and 2006, and estimates, for small intervals of the distribution of the rate of employment growth, the average hiring and separation rates. These rates are weighted by firm size, using total employment. Figure 1 allows also to examine the relationship between worker and job flows.

[FIGURE 1 HERE (see page 23)]

The main results drawn from the chart can be summarized as follows: the hiring and separation rates are non linear functions of the employment growth rate, having an inflection point around the null employment growth; the hiring rate grows at about the same pace (and in a linear fashion) as the employment growth rate in firms in expansion; the same behavior is displayed by the separation rate in firms in contraction; expanding firms have higher rates of worker separation than the observed hiring rate in firms reducing employment; finally, Figure 1 shows that firms with lower net job creation rates have higher excess worker turnover. This result is in line with the one reported for US firms in Burgess et al. (2000).

5 Firm heterogeneity: Sector, size and age

5.1 Sector: Manufacturing and services

Over recent decades the services sector has been gaining importance in the Portuguese economy. The specificities of manufacturing and services result, naturally, in differentiated human resources policies; in general, the services sector is characterized by the existence of lower levels of firm-specific human capital, resulting in greater mobility.

Table 3 shows larger worker flows in the services sector; hiring and separation rates are larger, both for expanding and contracting firms. This pattern has been found in previous research – industries that create more jobs also destroy more jobs (Haltiwanger et al. 2008). In quarterly terms, expanding firms in the services sector hire workers representing 18.4 percent of their average employment; for firms in the manufacturing sector, that figure is 16.1 percent. Similarly, but with a greater gap between sectors, firms that reduce their level of employment separate from 16.6 percent of their workforce in the services sector and 12.4 percent in the manufacturing sector.

[TABLE 3 HERE (see page 26)]

The higher rotation of workers in services results, also, in larger excess worker turnover; in quarterly terms 110 percent of the new hires become "redundant". In manufacturing firms the excess turnover drops to 72 percent.

As observed in the aggregate behavior, excess worker turnover is lower in contracting firms. Indeed, contracting firms in services have a rate of excess turnover of 100 percent, decreasing to 55 percent for the manufacturing sector. The smaller figure for manufacturing reflects a quite low hiring rate of contracting firms (2.8 percent), therefore, almost all separations result in reductions in the level of employment. In services, the hiring rate of firms in contraction is almost twice, 5.4 percent. This difference can be associated with the more common practice of labor hoarding in manufacturing (related with the importance of specific human capital), which is also reflected in the smaller incidence of non-permanent contracts in the manufacturing sector.

5.2 Firm size and age

Two key characteristics of firms are highly correlated with the magnitude of their job and worker flows: size and age (Davis et al. 1996). Job and worker flows are large for smaller firms, while

the relationship between age and job destruction is more complex. We should note, however, that given the survival bias of firms, there is a strong correlation between a firm age and size, and it is not easy to separate the effect of the two variables on job and worker flows.

We start with the relationship between job and worker flows and the size of firms, as measured by the (average) number of workers. Firm size is an indicator of the firm survival likelihood and workers in larger firms tend to invest more in firm-specific human capital. This is consistent with the evidence discussed in Abowd, Kramarz and Margolis (1999), who find that seniority profiles are steeper in large firms.

The quarterly results by average firm size over the period under review (2001 to 2006) reported in Table 4 highlight three key facts. First, for expanding firms separation rates increase monotonically with firm size, decreasing monotonically for contracting firms. Secondly, hiring rates have a less monotonic behavior. They are U-shaped for expanding firms; decreasing with size for firms up to 250 workers and slightly increasing for larger firms. The pattern of the hiring rate for contracting firms is more irregular, although with a tendency to increase with the firm size. Finally, regardless of the firm size, the hiring rates of firms in expansion are always clearly above the hiring rates of firms in contraction, but separation rates in the two types of firms converge quite significantly with firm size (they are virtually the same for firms with more than 500 workers). This means that large firms shrinking their employment level rely on a reduction in entry, and not in an increase in separations. This result is consistent with the findings for French large firms in Abowd, Corbel and Kramarz (1999) and Anderson and Meyer (1994) for the US. For Veneto, in Italy, Tattara and Valentini (2005) also report a greater excess turnover in larger firms.

[TABLE 4 HERE (see page 27)]

In terms of excess turnover, Figure 2 illustrates that larger firms are the ones that "experiment" workers the most. Even though they do not exhibit high rates of expansion or contraction (they are closer to a desired level of employment), these firms foster greater worker turnover. For example, in firms with 250 to 499 workers, for every job created almost two workers (1.9) are hired, i.e., 90 percent of the hirings do not result in employment gains. If we consider firms with 10 to 49 employees, the same indicator is substantially lower, 1.3 workers per job created.

[FIGURE 2 HERE (see page 23)]

Despite not being able to separate the impact of size and age on job flows, it is interesting enough to study how these flows evolve over the firm life cycle. It has been shown that job creation declines with age, but the relationship between age and job destruction may be more difficult to interpret (Davis et al. 1996).

Figure 3 displays the rates of job creation and job destruction for Portuguese firms as a function of their age. It is clear that the job creation strongly falls with the firm age, but job destruction is much flatter during the first 30 years of the firm's life. According to the simple Schumpeterian model (Aghion and Howitt 1998), older firms tend to have more obsolete technologies, to lose market share and re-adjust the size of their workforce. The Portuguese case does not conform completely with this view. The fact that job destruction does not increase over the firm life cycle may be directly related with employment regulation in the Portuguese labor market. Indeed, the cost of adjusting the level of their workforce is increasing with the worker tenure, which generated a strong segmentation in the Portuguese labor market, similar to the one observed in other European countries, such as France, Italy, and Spain. Older firms have a more tenured workforce that is more costly to adjust, leading to lower rates of job destruction. To further analyse the impact of employment regulation on labor market flows we now turn to the role of match characteristics.

[FIGURE 3 HERE (see page 24)]

6 Match characteristics: The type of contract and wages

6.1 The role of contract types in worker flows

We have seen that hiring and separation decisions account in similar ways to the variability of employment in Portuguese firms. We now show how this can be accomplished by means of fixed-term contracts usage, in a labor market that shares a high rigidity in regular employment protection, and a large scope to use fixed-term contracts. Indeed, the share of fixed-term contracts in employment has been increasing almost continuously in the Portuguese labor market, representing nowadays around 20 percent of salaried employment.

In Portugal, workers may be hired on open-ended contracts or on fixed-term contracts. Under the current legislation, fixed-term contracts can be signed for most tasks in a firm, generally up to three years, but in some cases they can last up to six years. Contrary to some other countries, in which the probationary period is rather short, as is the case of France, in

Portugal this period can last up to six months for regular workers, which reduces the role of fixed-term contracts for selection and screening. At the termination of the contract, the worker receives a severance payment equal to 3 days for each month of employment under a fixed term-contract (2 days if the employment relationship lasted less than 1 year), and 1 month for each year of seniority under open-ended contracts (with a minimum of 3 months).

The incidence of fixed-term contracts is clearly influenced by the rigidity in the regulation of open-ended contracts. Blanchard and Landier (2002) argue that partial reforms of the labor market, such as the introduction of fixed-term contracts, concurrently with open-ended contracts, may have a negative impact on the functioning of the market. More recently, Kahn (2009) and Kahn (2007) show evidence of the impact of the legislation protecting employment on the pattern of temporary employment incidence. The literature associates the existence of various types of contracts to the different roles played by these contracts in adjusting the level and composition of employment, or to the uncertainty that usually surrounds the process of job creation.

Fixed-term contracts are more prevalent in firms increasing employment (they represent around 25 percent of their total employment) than in firms decreasing employment (they represent around 15 percent of their total employment). For all groups of firms, fixed-term contracts are the most important type of entry into firms (56 percent of all accessions in continuing firms). The share of fixed-term contracts in accessions is even larger for those firms with decreasing employment (60 percent), while hirings of open-ended contracts is more frequent at those firms with increasing employment (with 45 percent of all entries). Around 40 percent of all exits come from separation of workers under fixed-term contracts, and this share is larger for expanding firms (around 50 percent) than for shrinking firms (where only 35 percent of all exits are from workers under fixed-term contracts).

Table 5 shows the hires and separation rates for the set of firms that remain in QP in two consecutive periods. We perform this analysis on the annual data of QP since the information about the type of contract is not available in the SSR data.

For the three groups of firms in Table 5, annual worker flows are much higher for those under fixed-term contracts. The difference is larger in terms of hires than separations (hiring rates of workers under fixed-term contracts are about 4 times higher in expanding firms and separation rates of workers under fixed-term contracts are about 3 times higher in shrinking firms).

[TABLE 5 HERE (see page 28)]

Table 5 shows that the level of excess turnover observed in the Portuguese economy is quite differentiated by type of contract; expanding firms replace a larger share of permanent workers, whereas contracting firms replace a larger share of temporary workers. Indeed, in expanding firms annual excess turnover is 115 percent, for fixed-term contracts, whereas it is 175 percent for open-ended contracts. The opposite occurs in shrinking firms; the excess turnover of workers on fixed-term contracts is very large, at 270 percent, whereas that for workers on permanent contracts is much smaller, at 55 percent. These are striking differences and reveal the importance of fixed-term contracts to the adjustment of employment level in Portuguese firms.

These number demonstrate the importance of fixed-term contract as a matching device. To further analyse this issue, we computed the proportion of all fixed-term contracts entries less all fixed-term contracts exits divided by all fixed-term contracts entries. This can be interpreted, as in Abowd, Corbel and Kramarz (1999), as a flow-through rate for fixed-term workers. For a statistic close to zero, this type of contracts is more of a short-term and temporary nature, and the closer the statistic is from one the more these contracts can be considered as a port-of-entry in firms. The mean of this statistic for the Portuguese economy is 27.8 percent, thus approximately one-quarter of all fixed-term hires result in a longer-term employment match (the equivalent figure for France is slightly larger, 36.8 per cent).

6.2 Worker rotation over the wage distribution

Another dimension in which firms adjust their labor force is the wage scale. We will not proceed in this paper with a detailed analysis of how the pattern of job mobility is coupled with wage mobility in the Portuguese economy. However, it is interesting to examine the incidence of worker turnover by wage quintiles. The theoretical results suggest greater turnover at lower wage levels (Jovanovic 1979). With the survival of high quality matches, the separation rate should decrease over the distribution of wages. Also regarding hirings, the existence of internal labor markets, where workers are initially hired for a relatively low level and then progress internally (Lazear and Oyer 2004), would also result in a falling hiring rate over the distribution of wages.

These patterns are observed for our sample of Portuguese firms (Table 6). Hiring and separation rates fall monotonically over the wage distribution, regardless of the type of employment growth observed at the firm level. In expanding firms, annual hiring rates are 36 percent for the 1st wage quintile and 15.7 for the upper quintile and separation rates are also cut significantly,

from 10.1 percent to 6.7 percent. In contracting firms the hiring and separation rates vary within the same range.

[TABLE 6 HERE (see page 28)]

The pattern of excess worker turnover shows a high replacement of workers in upper quintiles for expanding firms (around 150 percent) and only a modest excess turnover at the bottom quintile (75 percent); growing firms are usually more willing to replace exiting high wage workers. On the contrary, contracting firms have a much lower excess turnover rate of upper quintile workers (quite similar to the one observed for workers in the bottom quintiles). Thus, firms involved in downsizing of their workforce display a more spread behavior of excess turnover over the wage distribution.

7 Comparing job and worker flows with the US

The results presented in this paper are broadly in line with those obtained in studies for other countries. There are signs of strong heterogeneity in the flow of workers, as in other developed countries, notably France and the United States. Notice, however, that the comparison of job and worker flows across countries is constrained by several factors (see the recent approach by Bassanini and Marianna (2009)). Indeed, these flows depend, among other things, on how the information is collected (administrative data vs specific business surveys), the level of coverage of data (census vs sample of specific parts of the population, for example large firms), and the sectoral composition of each country employment.

In this section, we use two data sources for US data: the Job Openings and Labor Turnover Survey (JOLTS) for worker flows, and the Business Employment Dynamics (BED) for job flows. The BED data are virtually based on census of establishments, and the adjusted JOLTS data from Davis et al. (2008) approximates the firm demography in BED (note that the original JOLTS data do not cover new firms, nor exiting firms). These adjustments make the US flows comparable with the ones obtained for Portugal with the census data from Social Security records.

Figure 3 displays the time series of the hiring and separation rates obtained for the Portuguese labor market and the JOLTS data reported in Davis et al. (2008) for the United States. The results show that worker flows in the US are consistently higher than those observed in Portugal.

[FIGURE 4 HERE (see page 24)]

Table 7 present a more complete comparison of job and workers flows for the US and Portugal. Labor market flows in Portugal are smaller than in the US both on annual and quarterly terms. On average, and for the period considered, the quarterly flows in Portugal are about two-thirds of those in the US. Similar differences were found in other studies, see for example Bassanini and Marianna (2009) for a larger number of countries.

[TABLE 7 HERE (see page 29)]

The ratio between worker and job flows can be used as a measure of the churning of workers. The churning rates reported in Table 7 are very similar in both countries: close to 2. Firms expanding one employment position hire two workers and firms contracting one employment position separate from two workers. As reported in Bassanini and Marianna (2009) churning rates display much less variation across countries than job and worker flows, after controlling for differences in sectoral distribution of employment. A similar result is reported for Denmark in Albæk and Sorensen (1998) using annual data from 1980 to 1990. In the manufacturing sector, the ratios between the hiring and job creation rates, and between the separation and job destruction rates are, on average, slightly above 2.

These results highlight the importance of modelling excess worker turnover at the firm level, in line with Burgess et al. (2000) and Burgess, Lane and Stevens (2001). Their results indicate a high persistence of churning across firms, dismissing that churning is mainly explained by unfortunate mismatch.

Another interesting fact in the comparison of the Portuguese and US labor markets is the existence in both countries of greater volatility in the rates of separation, when compared to the hiring rates (Table 8). In Portugal, the volatility of the separation rate is 26 percent higher than that of the hiring rate, while in the US it is 15 percent higher. This is an important fact for the study of the cyclical behavior of these variables and their relationship with other aggregates of the labor market, such as the unemployment rate. An important aspect of this analysis is that the separation rate includes job-to-job transitions. These transitions are markedly pro-cyclical, so the behavior of the separation rate can become acyclical or pro-cyclical, unlike the exit rate to unemployment, which has a counter-cyclical behavior (Shimer 2007).

[TABLE 8 HERE (see page 29)]

8 Conclusion

This paper characterizes the processes associated with worker and job flows in the Portuguese economy. The empirical analysis highlights the strong heterogeneity in worker and job flows among firms. The most important conclusions that emerge from this study are:

1. Annual job creation is characterized by the hiring of 1.75 workers and the separation of 0.75 workers for each job created in a given year. In quarterly terms, the figures are lower, at around three quarters of the annual values;

2. Annual job destruction is characterized by the hiring of 0.6 workers and the separation of 1.6 workers for every job destroyed, maintaining the relationship of three quarters between the quarterly and the annual data;

3. On average, when a firm is changing employment, the adjustment is made primarily by increasing accessions if the firm is expanding and increasing separations if the firm is contracting;

4. In contrast, employment adjustment in large firms is made through changes in the number of accessions, as separation rates are quite similar for expanding and contracting firms;

5. More than half of all hirings and around 40 percent of all separations are done with fixed-term contracts;

6. Hiring under fixed-term contracts is more prevalent on contracting firms that also display a larger excess worker turnover under this type of contract;

7. Around one quarter of all fixed-term contracts are converted into open-ended contracts;

8. In Portugal and the US, the differences in job flows are similar to the differences in worker flows and firms churn workers at similar rates. In both countries worker flows and twice the job flows.

These results indicate that firms have a marked idiosyncratic behavior (which is visible, for example, in the sectoral and firm size results). The human resources policies of these firms seem to be permanently attached to a minimum level of worker turnover. The reasons for this behavior, even in a context where the ability to adjust the level of employment is determined by the rigidity of legislation, may be very different. For example, some organizations may need

a constant influx of new workers (new human capital, knowledge and creativity), while other firms, due to the specific activity or human resources policies, may opt for a strategy of low wages/high turnover.

The evolution of the labor market in countries with high employment protection has been characterized by an increased use of more flexible contractual forms. In these countries the burden of flexibility is imposed on specific groups and generates a high degree of labor market segmentation that may have negative consequences for the overall welfare.

In addition, our results also show that some firms are more exposed to the stringency of labor regulations, namely medium and large firms. The process of employment adjustment in these firms relies more on changes in the hiring rate than on changes in the separation rate. This result is consistent with the findings of Abowd, Corbel and Kramarz (1999) and Haltiwanger et al. (2008), and reflect the fact that smaller firms can more easily circumvent these regulations.

References

Abowd, J., Corbel, P. and Kramarz, F. (1999), 'The entry and exit of workers and the growth of employment: An analysis of french establishments', *Review of Economics and Statistics* **81**(2), 170–187.

Abowd, J., Kramarz, F. and Margolis, D. (1999), 'High wage workers and high wage firms', *Econometrica* **67**(2), 251–333.

Aghion, P. and Howitt, P. (1998), *Endogenous growth theory*, MIT Press.

Albæk, K. and Sorensen, B. (1998), 'Worker flows and job flows in Danish manufacturing, 1980-91', *The Economic Journal* **108**(451), 1750–1771.

Anderson, P. and Meyer, B. (1994), 'The extent and consequences of job turnover', *Brookings Papers on Economic Activity. Microeconomics* **1994**(1), 177–236.

Bassanini, A. and Marianna, P. (2009), Looking inside the perpetual-motion machine: Job and worker flows in OECD countries, Working paper 4452, IZA.

Bertola, G. (1990), 'Job security, employment and wages', *European Economic Review* **34**(4), 851–879.

Blanchard, O. and Katz, L. (1997), 'What we know and do not know about the natural rate of unemployment', *Journal of Economic Perspectives* **11**, 51–72.

Blanchard, O. and Landier, A. (2002), 'The perverse effects of partial labour market reform: Fixed-term contracts in France', *Economic Journal* **112**(480), 214–244.

Blanchard, O. and Portugal, P. (2001), 'What hides behind an unemployment rate: Comparing portuguese and us labor markets', *American Economic Review* **91**(1), 187–207.

Burgess, S., Lane, J. and Stevens, D. (2000), 'Job flows, worker flows, and churning', *Journal of Labor Economics* **18**(3), 473–502.

Burgess, S., Lane, J. and Stevens, D. (2001), 'Churning dynamics: An analysis of hires and separations at the employer level', *Labour Economics* **8**(1), 1–14.

Cabral, L. and Mata, J. (2003), 'On the evolution of the firm size distribution: Facts and theory', *American Economic Review* **93**(4), 1075–1090.

Centeno, M., Machado, C. and Novo, Á. A. (2008), 'The anatomy of employment growth in Portuguese firms', *Economic Bulletin, Banco de Portugal* **Summer**, 75–101.

Davis, S., Faberman, J., Haltiwanger, J. and Rucker, I. (2008), Adjusted estimates of workers flows and job openings in JOLTS, *in* K. Abraham, M. Harper and J. Spletzer, eds, 'Labor in the New Economy', NBER, Cambridge, MA.

Davis, S., Faberman, R. and Haltiwanger, J. (2006), 'The flow approach to labor markets: New data sources and micro–macro links', *The Journal of Economic Perspectives* **20**(3), 3–26.

Davis, S., Haltiwanger, J. and Schuh, S. (1996), *Job Creation and Destruction*, MIT Press.

Dustmann, C., Ludsteck, J. and Schönberg, U. (2009), 'Revisiting the german wage structure', *Quarterly Journal of Economics* **124**(2), 843–881.

Gibbons, R. and Katz, L. (1991), 'Layoffs and lemons', *Journal of Labor Economics* **9**(4), 351–380.

Gómez-Salvador, R., Messina, J. and Vallanti, G. (2004), 'Gross job flows and institutions in Europe', *Labour Economics* **11**(4), 469–485.

Hall, R. (2005), 'Job loss, job finding, and unemployment in the US economy over the past fifty years', *NBER Macroeconomics Annual* **20**, 101–137.

Haltiwanger, J., Scarpetta, S. and Schweiger (2008), Assessing job flows across countries: The role of industry, firm size, and regulations, Working paper 13867, NBER.

Haltiwanger, J. and Vodopivec, M. (2002), 'Gross worker and job flows in a transition economy: An analysis of Estonia', *Labour Economics* **9**(5), 601–630.

Hamermesh, D., Hassink, W. and van Ours, J. (1996), 'New facts about factor-demand dynamics: Employment, jobs, and workers', *Annales d'Economie et Statistique* **41–42**, 21–40.

Jovanovic, B. (1979), 'Job matching and the theory of turnover', *The Journal of Political Economy* **87**(5), 972–990.

Kahn, L. (2007), 'The impact of employment protection mandates on demographic temporary employment patterns: International microeconomic evidence', *The Economic Journal* **117**(521), 333–356.

Kahn, L. (2009), 'Employment protection reforms, employment and the incidence of temporary jobs in Europe: 1995-2001', *Labour Economics* **forthcoming**.

Kugler, A. and Pica, G. (2008), 'Effects of employment protection on worker and job flows: Evidence from the 1990 Italian reform', *Labour Economics* **15**(1), 78–95.

Lalive, R. (2008), 'How do extended benefits affect unemployment duration? A regression discontinuity approach', *Journal of Econometrics* **142**, 785–806.

Lazear, E. (1990), 'Job security provisions and employment', *Quarterly Journal of Economics* **105**(3), 699–726.

Lazear, E. and Oyer, P. (2004), 'Internal and external labor markets: A personnel economics approach', *Labour Economics* **11**(5), 527–554.

Petrongolo, B. and Pissarides, C. (2008), The ins and outs of European unemployment, Working paper 3315, IZA.

Shimer, R. (2007), Reassessing the ins and outs of unemployment, Working Paper 13421, NBER.

Tattara, G. and Valentini, M. (2005), Job flows, worker flows and mismatching in Veneto manufacturing 1982-1996, Working paper 05123, EconWPA.

Topel, R. and Ward, M. (1992), 'Job mobility and the careers of young men', *Quarterly Journal of Economics* **107**, 439–479.

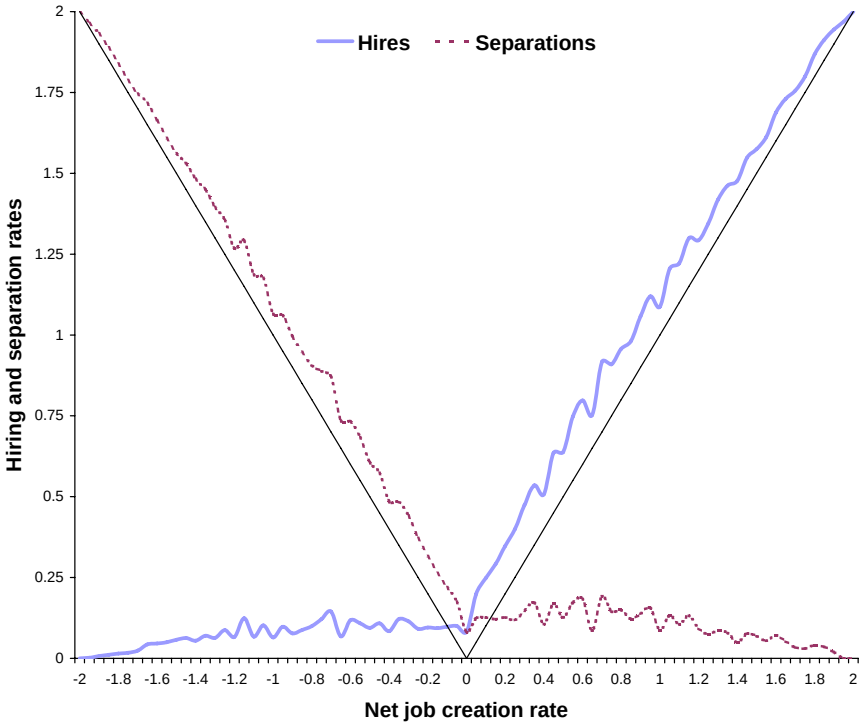

Figure 1: Firm level workers flows and net job creation rate, annual data, 2001-2006

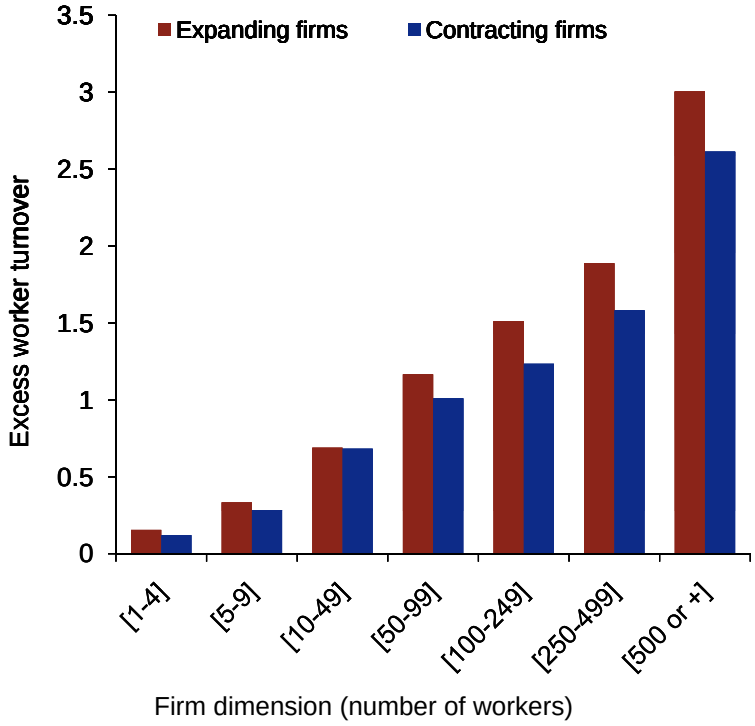

Figure 2: Excess worker turnover by firm size, 2001-2006

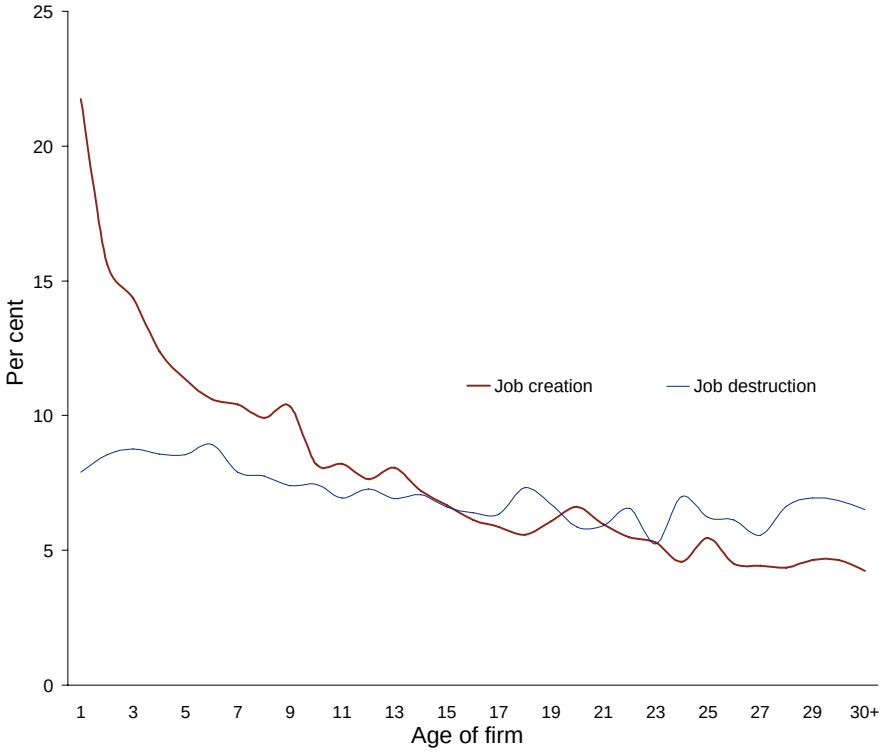

Figure 3: Job flows by firm age, 2001-2006

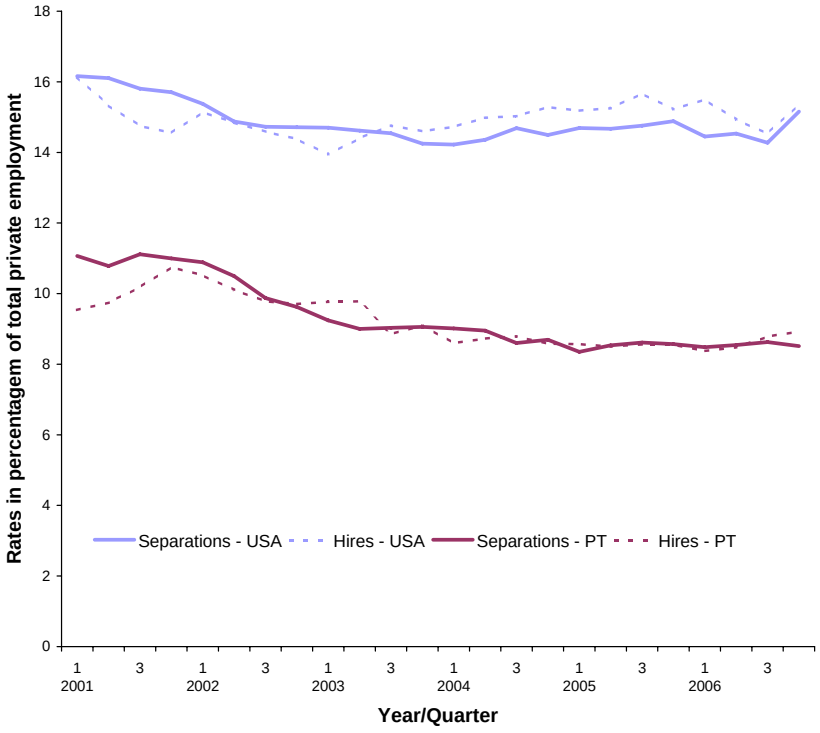

Figure 4: Hiring and separation rates - Portugal and the US

Table 1: Average annual and quarterly job creation and destruction rates and workers hiring and separation rates, 2001-2006

Year	Job		Workers		
	Creation rate	Destruction rate	Hiring rate	Separation rate	Net job creation
	(1)	(2)	(3)	(4)	(5)
Annual average	13.5	11.8	26.1	24.4	1.6
Quarterly average	5.2	5.1	9.4	9.2	0.1

Sources: SSR (2000-2006).
Sample covers all firms in the Portuguese labor market with salaried workers in the general public Social Security System. It covers an average of 3 million workers each year (financial and public sectors are poorly covered, as they have their own social security and pensions systems). Entry of new firms and exit of firms are included in these calcualtions.

Table 2: Average worker flows: Hiring and separation rates by type of employment growth, 2001-2006

Employment growth category	Expansion rate	Hiring rate	Separation rate	Contraction rate
	(1)	(2)	(3)	(4)
Average annual rate (2001-2006)				
Firms with net job creation	21.1	37.0	15.9	
Firms with net job destruction		11.6	30.7	19.1
Firms with stable employment		10.5	10.5	
Average quarterly rate (2001:03-2006:12)				
Firms with net job creation	12.1	17.8	5.7	
Firms with net job destruction		4.2	14.8	10.6
Firms with stable employment		2.3	2.3	

Sources: SSR (2000-2006).
Notes: (1) The expansion rate is the job creation rate of existing firms that expanded their employment between period $t-1$ and t; (2) and (3) see text; (4) The contraction rate is the job destruction rate of firms that reduced their employment from period $t-1$ to t without exiting the market.

Table 3: Average worker flows: Hiring and separation rates by sector of activity and type of employment growth, 2001-2006

Employment growth category	Expansion rate (1)	Hiring rate (2)	Separation rate (3)	Contraction rate (4)
		Manufacturing		
Average annual rate (2001-2006)				
Firms with net job creation	20.4	32.4	12.0	
Firms with net job destruction		8.2	26.4	18.1
Firms with stable employment		10.2	10.2	
Average quarterly rate (2001:03-2006:12)				
Firms with net job creation	11.9	16.1	4.3	
Firms with net job destruction		2.8	12.4	9.7
Firms with stable employment		2.2	2.2	
		Services		
Average annual rate (2001-2006)				
Firms with net job creation	21.3	39.3	17.9	
Firms with net job destruction		14.8	34.9	20.1
Firms with stable employment		10.8	10.8	
Average quarterly rate (2001:03-2006:12)				
Firms with net job creation	11.9	18.4	6.4	
Firms with net job destruction		5.4	16.6	11.2
Firms with stable employment		2.4	2.4	

Sources: SSR (2000-2006).

Notes: (1) The expansion rate is the job creation rate of existing firms that expanded their employment between period $t-1$ and t; (2) and (3) see text; (4) The contraction rate is the job destruction rate of firms that reduced their employment from period $t-1$ to t without exiting the market.

Table 4: Average worker flows: Quarterly hiring and separation rates by firm (average) dimension and type of employment growth, 2001-2006

Employment growth category	Expansion rate (1)	Hiring rate (2)	Separation rate (3)	Contraction rate (4)
		[Firm average work force dimension (2001-2006)]		
			[1-4]	
Firms with net job creation	34.1	36.8	2.7	
Firms with net job destruction		2.6	45.6	43.0
Firms with stable employment		1.9	1.9	
			[5-9]	
Firms with net job creation	24.0	28.0	4.0	
Firms with net job destruction		3.3	26.3	23.0
Firms with stable employment		2.4	2.4	
			[10-49]	
Firms with net job creation	13.9	18.6	4.8	
Firms with net job destruction		4.3	17.0	12.7
Firms with stable employment		2.8	2.8	
			[50-99]	
Firms with net job creation	8.5	13.5	5.0	
Firms with net job destruction		3.8	11.4	7.5
Firms with stable employment		3.0	3.0	
			[100-249]	
Firms with net job creation	6.8	12.0	5.2	
Firms with net job destruction		3.6	9.3	5.8
Firms with stable employment		2.9	2.9	
			[250-499]	
Firms with net job creation	7.0	13.5	6.6	
Firms with net job destruction		4.5	10.2	5.7
Firms with stable employment		3.2	3.2	
			[500 ou +]	
Firms with net job creation	5.7	14.3	8.6	
Firms with net job destruction		5.1	9.0	3.9
Firms with stable employment		3.6	3.6	

Sources: SSR (2000-2006).
Notes: (1) The expansion rate is the job creation rate of existing firms that expanded their employment between period $t-1$ and t; (2) and (3) see text; (4) The contraction rate is the job destruction rate of firms that reduced their employment from period $t-1$ to t without exiting the market.

Table 5: Average hiring and separation rates of workers by type of contract and type of employment growth, 2001-2006

		Open-ended	Fixed-term
Firms with net job creation	Hiring	15.2	54.1
	Separation	7.1	19.7
Firms with net job destruction	Hiring	4.2	33.2
	Separation	19.1	57.6
Firms with stable employment	Hiring	4.7	27.0
	Separation	5.8	19.3
Weight in 2005		80.7%	19.3%

Sources: Workers longitudinal file from Quadros de Pessoal, 2003 to 2005; Firms longitudinal file from Quadros de Pessoal, 2003 to 2005.
Notes: The rates are computed as a percentage of the employment level in year t; It considers only firms that remain in activity for 2 consecutive years.

Table 6: Average hiring and separation rates of workers by wage quintile and type of employment growth, 2003-2005

		Wage quintiles				
		1st	2nd	3rd	4th	5th
Firms with net job creation	Hiring	36.3	28.4	22.2	19.8	15.7
	Separation	10.1	10.6	9.8	8.3	6.7
Firms with net job destruction	Hiring	11.2	9.9	8.4	7.6	5.2
	Separation	36.7	28.5	21.6	18.0	15.0
Firms with stable employment	Hiring	8.9	7.9	6.5	6.0	5.7
	Separation	7.8	7.1	6.4	5.9	6.4

Sources: Workers longitudinal file from Quadros de Pessoal, 2003 to 2005; Firms longitudinal file from Quadros de Pessoal, 2003 to 2005.
Notes: The rates are computed as a percentage of the employment level in year t; it considers only firms that remained in activity for 2 consecutive years; (2) Wage quintiles refer only to full-time workers with full remuneration.

Table 7: Job and Worker Flows - Portugal (BDRSS) and the United States (JOLTS, BED), 2001-2006

	Job Creation	Hiring	Job Destruction	Separation	Hiring/ JC	Separation/ JD
			Annual (2001-2006)			
Portugal	13.5	26.1	11.8	24.4	1.9	2.1
USA	14.6	28.5	13.7	28.0	2.0	2.0
PT/USA	0.93	0.92	0.86	0.87		
			Quarterly (2001:Q1-2006:Q1)			
Portugal	5.2	9.4	5.1	9.2	1.8	1.8
USA	7.9	14.9	7.6	14.8	1.9	1.9
PT/USA	0.66	0.63	0.67	0.62		

Source: The worker flows figures for the US are estimates using JOLTS taken from Davis et al. (2008). The job flows figures for the US are obtained from BED as in Davis et al. (2006). BED data are based on a virtually census of US establishments. The correction of JOLTS's data approximates the firm demography in BED.

Table 8: Average hiring and separation rates - Portugal (BDRSS) and the United States (JOLTS), 2001-2006

		Average	Standard deviation
Hiring rate			
	Portugal	9.22	0.72
	U.S.A.	14.96	0.48
Separation rate			
	Portugal	9.36	0.98
	U.S.A.	14.86	0.56
Relative volatility (Hirings/Separations)[(1)]			
	Portugal		0.74
	U.S.A.		0.85

Source: The data for the US are estimates using JOLTS taken from Davis et al. (2008). The correction proposed approximates JOLTS's firm demography (which does not cover new firms, nor exiting firms) to the firm demography reported in other data sources for the American market.
Notes: (1) Volatility is measured by the standard deviation of the data series.