# New Jobs and Their Stability Before and During the Crisis.

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## Abstract

Using administrative records data from the Spanish Social Security Administration, we analyse the nature and stability of job matches starting in two different years: during the economic boom in 2005, and during the recession in 2009. We compare the individual and job and firm characteristics in the two samples and estimate Mixed Proportional Hazard Models distinguishing job-to-job, job-to-unemployment, and other transitions. We find that job-to-job transitions are pro-cyclical, while unemployment transitions are counter-cyclical. Individuals most affected by the economic crisis tend to be young males, living in regions with high unemployment rates, with low qualifications and working in manual occupations (particularly construction), and (especially Spanish speaking) immigrants. The positive relation between job stability and firm size is stronger during the recession.

**Keywords**: Job tenure; Business cycle; Employment transitions; Destination states; Job-separation rate;
**JEL classification**: J64, C41, E32

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## 1 Introduction

The Great Recession has led to important adjustments in the labour market of most developed countries and has dramatically affected the labour market in Spain, which exhibits higher job destruction and lower job creation rates than other European countries. Accordingly, the nature of new job matches may change, an issue addressed only partly in the existing literature. In this paper, we examine shifts in the nature and stability of job matches starting before and during the crisis and decompose the changes in the stability of the new matches into variation in their composition and residual changes induced by changing economic conditions. We particularly focus on the role of firm size and the differences in quality between jobs at small and large firms. The goal of the Europe 2020 Strategy[3] "to create *more* and *better* jobs", emphasizes the necessity of assessing the nature and quality of new jobs over time. We contribute to this by studying the evolution of the characteristics of new job matches over the business cycle. An important indicator of the quality of a match is the duration of the job: better matches typically last longer. By examining the shifts in job stability during boom and recession, we extend the scarce empirical evidence on cyclical fluctuations in match quality, learning more about the nature of exit probabilities and their determinants in different macro-economic contexts.

We consider as a new job match any new position of a worker at a new employer, or at a previous employer after an interruption by unemployment, non-employment, or employment at a different employer. Workers can be new entrants in the labour market, can come from unemployment, or can directly come from another job with a different employer. They can replace another worker who left the same job, or they can get a newly created job – our data do not allow a distinction between these two possibilities.

During the downturn, the demand for labour falls, the number of voluntary job leavers typically falls and the number of unemployed workers rises.[4] Added worker[5]

[3] http://ec.europa.eu/europe2020/index_en.htm

[4] See Longhi and Taylor (2013) for a comparison of the characteristics and behaviour of employed and unemployed job seekers over the business cycle.

[5] Added worker effect: Traditionally inactive groups, for instance married women, increase participation in the labour force to compensate for the unemployment of their husbands (primary workers).

and discouraged worker effects[6] will play a role, as well as emigration or return migration. Consequently, the characteristics of those who start a new job and the characteristics of their jobs vary over the business cycle. Devereux (2002) studies changes in educational composition and Devereux (2004) studies cyclicality of worker quality. In this paper, we analyse the changes in individual and job characteristics of the new matches between two years: before the crisis (2005) and during the crisis (2009). Our main interest is in the stability of these new matches. The relevance of job stability for an individual's career, an employer's personnel policy and the functioning of the labour market is well established (Boockman and Steffes, 2010), but there is little empirical evidence on how job stability and its determinants vary over the business cycle. An exception is Bowlus (1995) who examines how for young males, the extent of mismatch varies over the business cycle. Previous studies typically show the importance of economic conditions for job exits by controlling for the state of the economy through including macroeconomic indicators or yearly dummies (Blázquez-Cuesta, 2008; García-Perez, 1997). This helps to predict the cyclicality of the hazard rates but not the impact of the business cycle on the importance of other determinants of job exits. Dütsch and Struck (2014) capture the economic conditions estimating models for two different years, representative of either cyclical phase.

It is difficult to interpret the business cycle effects on the durations of new jobs since demand and supply forces may work in opposite directions. For instance, during the downturn, the employer may recruit better workers because of the larger applicant pool. On the other hand, workers may be willing to accept matches that they would reject in expansion periods. Job search and matching theory (Jovanovic, 1979) imply that lower expectations of the workers improve job conditions and reduce job-to-job transitions, increasing the durations of new jobs. On the other hand, the decline in expected productivity during the downturn rises the number of layoffs and shortens job tenure. As pointed out by Bergmann and Mertens (2011), more insight in the opposing forces at work can be obtained by considering the exits to different destination states. We therefore compare job stability pattern and its determinants – socioeconomic, firm and job characteristics- of new jobs starting in 2005 and 2009

[6] Discouraged worker effect: The unemployed give up search because of the low chances to find a job.

using models that distinguish several destination states. The observation window for both samples is three years, so that we capture a period of expansion (2005-2007) and a period of recession (2009-2011).

We particularly focus on differences between new matches in large and small firms before and during the crisis. Government policies that stimulate starting a new firm to create employment have been criticized because the stability and quality of new jobs at small firms are often inferior, and these policies can hamper firm growth (Shane, 2009). It seems particularly relevant to analyse to which extent this also applies to Spain in the years of the crisis. In the Spanish policy debate, it has already been suggested that larger firms are necessary to increase productivity and stable employment (Perez, 2014 and Consejo Empresarial para la Competitividad, 2014).

The data we use come from the Longitudinal Working Lives Sample, based upon administrative records from the Spanish Social Security Administration. It contains detailed information on employment and unemployment transitions and individual and job characteristics. We construct two separate samples with job spells starting in 2005 and in 2009, observing the job entrants until either job exit or the end of the observation period. We estimate a Mixed Proportional Hazard (MPH) Models with three destination states: other job, unemployment and non-employment. In order to allow for dependence among the three hazards, unobserved heterogeneity in these hazards is modelled jointly, using a discrete distribution with three points of support. The explanatory variables include individual characteristics, variables that relate to the individual's job, and a regional unemployment rate.

The remainder of the paper is organized as follows. Section 2 presents a brief review of the literature. Section 3 describes the data. Section 4 presents the characteristics and job exit patterns of new jobs. In section 5 we present the econometric framework of job durations. Section 6 provides the main results. Conclusions are drawn in section 7.

## 2 Literature review

In this section we first discuss the literature on the composition of new matches over the business cycle and then the cyclical fluctuations in job stability.

### *2.1 The nature of new job matches over the business cycle*

Devereux (2002) examines how in the US the educational composition of new matches within a given occupation changes over the business cycle. He finds counter-cyclicality in the quality of workers hired, especially in lower paying occupations, implying that less skilled workers have more pro-cyclical job finding rates. Also for the US, Devereux (2004) explores the cyclical quality adjustment of new hires, showing that new matches result in lower quality jobs in recessions than in booms and that part of the wage pro-cyclicality in new matches can be attributed to the variation in quality of the matches over the business cycle. Similarly, van Ours and Ridder (1995), using Dutch data on unemployed workers only, found that jobs obtained in recessions are less attractive. For the same country, Teulings (1993) found that involuntary job seekers (i.e., workers who expect to be dismissed in the near future) get better jobs during an upswing than during a downturn. Among the empirical studies on wage cyclicality,[7] De la Roca (2014) found that in Spain, the sensitivity of wages for the economic cycle declines with tenure and, accordingly, is highest for newly-hired workers. Alba-Ramirez (1991) studied changes in the characteristics of new jobs in the mid-70s and the mid-80s in Spain and found that job losers are among the most disadvantaged groups.

The evolution of employment has been extensively explored by public institutions because of its policy relevance. For instance, Eurofound (2013) used a job-based approach[8] to describe the net employment evolution for EU countries before, during and after the 2008-2010 recession, disaggregating by worker characteristics and employment status. They identify groups most affected by the crisis in the EU such as young male workers, those with low education levels, and those with temporary contracts. The industries with most job destruction are manufacturing and construction. They also point at the persistence of some longer-term trends, like higher expansion in high-skill employment, improvement in female employment both in qualitative and quantitative terms, and a strong growth in part-time work and self-employment.

[7] See Devereux (2004) for more references.

[8] Under this approach, pioneered in the 1990s in the United States by Stiglitz and others (Council of Economic Advisors, 1996), a job is defined as an occupation in a sector and is assigned to a wage quintile. This approach is useful to assess whether employment structures are polarizing.

Several Spanish studies analyse the effects of the current crisis on employment using data from Economically Active Population Survey (EPA). Rocha and Aragón (2012) explored the evolution of net employment between 2008 and 2012, pointing out the increased concentration of employment in very large and very small firms, as well as in high skilled and medium-low occupations. They also showed that construction and manufacturing are the sectors with most job destruction during the crisis, making young, male, low-skilled and immigrant workers the most affected. García-Serrano (2012) investigated the evolution of employment at sector and occupational level for the period 1985-2011 at turning points in the economic cycle, emphasizing the evolution and the pro-cyclical nature of the construction sector in Spain compared to other European countries.

### *2.2 Cyclicality of the durations of new jobs*

Although job stability has been studied much less extensively than unemployment duration, its importance is well established in the literature. From a worker's perspective, job duration influences future prospects, like wage levels and welfare state entitlements (Keith and Mc Williams, 1995; Heinz, 2006) and the development of human capital. From an employer's perspective, separation rates determine employer policies on, e.g., human capital investment, promotions, and wages (Hirsch and Schnabel, 2012).

There is little empirical work on the changes in the stability of new matches over the business cycle. For young males in the US, Bowlus (1995) examined how mismatching measured by job tenure (without distinguishing destination states), varies over the business cycle. She found that mismatching occurs more during recessions but is primarily captured in starting wages. Many studies have focused on changes over time in mean job tenure in countries with different levels of employment protection (see Boockman and Steffes, 2010, for references). However, these studies focus on secular changes rather than cyclicality.

Studies that focus on the individual determinants of job stability usually include controls for the economic conditions. Bergmann and Mertens (2011) and Hirsch and Schnabel (2012) use a calendar time trend for the business cycle. Boockman and Steffes (2010) also incorporate institutional and historical variables. Most of these

studies distinguish several destination states (Frederiksen, 2008; Boockmann and Steffes, 2010; Hirsch and Schnabel 2012; Bratberg et al. 2010; Theodossiou and Zangelidis, 2009), reasons for job termination (Booth et al., 1999) or both (Bergmann and Mertens, 2011).

Dütsch and Struck (2014) extend the previous research examining how firm characteristics and regional economic conditions influence the mobility process in the German labour market. They estimate models for 1999 and 2002, representative of the two cyclical phases. They find that firm's investments in training and internal promotion opportunities (typically taking place in larger firms) foster employment stability, while the opposite happens with the extensive use of fixed-term contracts.

Studies that specifically focus on job stability and the business cycle in Spain are scarce. As in studies for other countries, economic conditions are often included as an explanatory factor through regional unemployment rates, GDP growth rates, or yearly dummies. García-Pérez (1997) and García-Perez and Muñoz-Bullón (2005) used social security records to study patterns and determinants of transitions into and out of employment (involuntary turnover). The latter study emphasizes the role of Temporary Help Agencies in workers' transitions. Arranz and García-Serrano (2004) explored the influence of previous labour market experience on exit rates by reason for termination (end of a contract and layoff). Blázquez (2008) distinguished job separations by destination states (other job and non-employment) for the period 1995-2001 with special attention for low paid workers. Rebollo-Sanz (2012) focused on the relationship between the unemployment insurance and different labour market transitions.

According to the theory of labour market segmentation, large establishments tend to create circumstances that foster employment stability. Empirical studies based on individual level data typically find that job exit rates are indeed significantly lower in larger firms (Bergmann and Mertens, 2011; Boockmann and Hagen, 2008; Rebitzer, 1986; Blázquez-Cuesta, 2008; Rebollo, 2012; Dütsch and Struck,[9] 2014. On the other hand, most studies based on linked employer-employee data (Boockmann and Steffes, 2010; Hirsch and Scnabel, 2012; Martin, 2003) find that it is not firm size as such that

[9] Dütsch and Struck (2014) used linked employer-employee data from Germany.

matters, but factors correlated with firm size such as the presence of works councils or unions, availability of further training, and the amount of firm specific technology. There is also some evidence that some characteristics of large firms help to enhance employment stability, such as more training opportunities, more job flexibility and possibilities of promotion within the firm, and a better ability to adjust the production process to economic shocks (Struck, 2006). The latter also suggests that job stability would suffer less during the crisis in large firms than in small firms.

Shane (2009) argues that the jobs created in small firms are often unstable and not productive. As a consequence, he proposes to eliminate the barriers for firms to grow in size (such as lower taxation or subsidies for small firms) and instead stimulate high growth companies (through, e.g., R&D tax credits). Perez (2014) and Consejo Empresarial para la Competitividad (2014) emphasize that the number of new firms created in Spain is not that small compared to other countries, but the new firms are typically small, have low survival chances, and do not create permanent employment. Creating stable jobs requires eliminating barriers to firm growth,such as subsidies for small firms only or inefficacy in judicial system (García Posada and Mora, 2013), combined with policies that stimulate firm growth affecting the productivity through, e.g., investment, R&D, and professional training as Huerta and Salas (2014) suggest, alerting about the inefficacy of focusing only on increasing firm size as a goal in itself if for increasing per capita income.

## 3 Data

The data we use come from the Longitudinal Working Lives Sample[10] (LWLS), based upon administrative records from the Spanish Social Security Administration (SSA). The LWLS is collected annually since 2004 and contains information on a 4 percent random sample of the population (approximately one million people) who ever had any sort of relationship with the SSA[11] in the sample period, as contributors or as benefit recipients. It is useful for our study because of its longitudinal design and the rich information on employment and unemployment transitions, and individual and job characteristics that it contains. Due to its longitudinal design, individuals in the

[10] We use the LWLS version with fiscal data.
[11] Civil servants are not included in the LWLS.

2004 LWLS remain in the sample as long as they have a relationship with SSA, making it possible to analyse the individuals' labour market changes over time. LWLS provides information on individual characteristics such as gender, age, and nationality, and firm and job attributes such as firm size, sector of activity, annual wages and type of contract.[12]

To compare the expansion and recession periods, we construct two samples that include all job spells (excluding self-employment) that started in 2005 and in 2009, observing them until either the job spell or the observation period end. The latter is 31 December 2011 for the 2009 data and is set to 31 December 2007 for the 2005 data (to increase comparability). This is achieved by merging the data sets LWLS 2005-2006-2007 and LWLS 2009-2010-2011.

We apply several filters to our samples, described in detail in the appendix (Table A2). For instance, our samples are restricted to workers aged 16 to 53 in the year of reference, avoiding exits through an early retirement option. We remove individuals with incomplete information and recode overlapping spells.[13] Moreover, we only include job spells that last at least 31 days (after recoding) since the very short spells can normally not be considered as serious jobs and would require a separate model. We do not consider workers from the agricultural sector because of the particular rules in this sector ("Agrarian Special Regime") and dropped observations from Ceuta and Melilla.

As explained in Section 1, the immediate destination states (within 31 days after the end of the job spell) we distinguish are: finding another job (including self-employment), transition to unemployment with benefits, and exit to non-employment. They are explained in detail in Table 1.

To construct job spells, consecutive job spells with the same employer and a difference shorter than 32 days are considered as one job spell, with the characteristics of the first contract. This limit of 31 days and the requirement that the duration of the new spell is at least 31 days are meant to avoid considering the strategic use of unemployment benefits as job-to-unemployment transition. The job

[12] We use the tax module to obtain information on wages. See Arranz and García-Serrano (2011).

[13] The consecutive criteria applied to preserve spells corresponding to the main activity are: we keep the spells with 1) the highest part-time coefficient; 2) with the longest spell, and 3) with the highest contributory base. The remainder of overlapping spells is removed.

duration is defined as the difference (in days) between the termination date and the starting date of the job. If at the end of the observation period the employee is still working with the same employer, data are considered right censored. Exits from employment for other reasons are also considered right censored.

Our samples consist of 176,419 individuals starting 222,125 new job spells in 2005, and 141,153 employees with 170,249 new jobs spells in 2009. The difference between the two samples reflects the substantial drop in the number of new jobs between 2005 and 2009.

**Table 1: Definition of destination states.**

| Destination states | Definition |
|---|---|
| **Other job** | Immediate job spell of at least 31 days within 31 days after the end of the job under study. It includes transitions to a new employer and self-employment. |
| **Unemployment with benefits** | Immediate unemployment benefit spell of at least 31 days of contributory and/or social assistance benefits within 31 days after the end of the job under study. |
| **Non-employment state** | Defined as the residual group. Includes unemployment without benefits, emigration, black economy and inactivity (for instance to care for family or to become a student). This state is identified if there is no subsequent job spell (of at least 31 days) and no spell with unemployment benefits (of at least 31 days) within 31 days after the end of the job under study. |

## 4 Characteristics of new job matches before and during the crisis.

In this section we describe the variation of the sample composition of new job matches over the business cycle and the influence of the economic situation on job stability patterns, disaggregating by destination states.

### 4.1 Characteristics of new jobs starting before and during the crisis

New job matches are the result of the interaction of job searchers and firms. The business cycle may lead to changes in the pool of job searchers and in the job assignment process, shifting the sample composition of new job starters. To explore the cyclical sample composition variation we compare descriptive statistics of individual and job characteristics of new job starters in the two years (Table 2). The importance of the crisis is reflected in the substantial growth of the average regional unemployment rate.

Worker characteristics considered are age, gender, education level, nationality and dependent children. The average age at the time of starting a new job spell is

about 2 years older in the 2009 sample than in 2005. During the recession period, the proportion of younger individuals (16-29 years old) in new matches decreases, while the proportion of workers older than 35 increases. In a context of excess supply of labour, employers hire more experienced workers, in line with the finding of Devereux (2004).

The drop of the fraction of males (from 54% in 2005 to 51% in 2009) may be due to the relative overrepresentation of males in declining sectors (manufacturing and construction), while women are often employed in growing sectors like health and education. It could also be due to an added worker effect. Only 32% (35%) of the sample individuals have dependent children (younger than 16 years old) in the expansion (recession) period. Most workers starting a new job have Spanish nationality, but the proportion of natives in new matches declined from 89% in 2005 to 85% in 2009. The proportion of non-Spanish speaking immigrants rose from 6% to 10%, possibly due to the surge of immigrants in the pool of job searchers due to job loss.

The distribution of education level of the new matches remains stable. Most individuals (40%) have lower secondary level of education while only 16% have post-secondary level. The proportion of new job starters in non-manual occupations increases slightly from 41% in 2005 to 42% in 2009. Degree of urbanization is captured by a dummy for living in a larger municipality. Around 45% of workers live in a municipality with more than 40,000 inhabitants in 2005 and 48% in 2009.

The job characteristics we consider relate to sector of activity, type of contract, firm size, and daily salary. Sectors of activity are grouped into construction, services and manufacturing industry. Most workers who started a new job in 2005 did it in the services sector (71%). The proportions in the manufacturing and construction sectors fell from 11% to 8% and from 18% to 15% with the burst of the property bubble, respectively. This fits with the pro-cyclical nature of the construction sector and the decrease in industrial employment during recessions found in García-Serrano (2012). In 2005, 9% of new job matches are in sectors with a high level of technology; this fell dramatically to only 3% during the recession.

**Table 2: Descriptive statistics for the 2005 and 2009 samples**

| | 2005 | | 2009 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev** | **Mean** | **Std. Dev** |
| | **MACROECONOMIC VARIABLES** | | | |
| **Unemployment rate (quarterly)** | 0.09 | 0.04 | 0.20 | 0.05 |
| **Male unemployment rate (quarterly)** | 0.07 | 0.021 | 0.19 | 0.05 |
| **Female unemployment rate of (quarterly)** | 0.11 | 0.043 | 0.20 | 0.06 |
| **Inhabitants>40,000 (*)** | 0.45 | 0.498 | 0.48 | 0.50 |
| | **INDIVIDUAL CHARACTERISTICS** | | | |
| **Male (*)** | 0.54 | 0.50 | 0.51 | 0.50 |
| **Age at the year of starting the job spell** | 32 | 9.09 | 34 | 9.22 |
| **Spanish native (*)** | 0.89 | 0.31 | 0.85 | 0.36 |
| **Spanish speaking immigrant (*)** | 0.05 | 0.22 | 0.05 | 0.22 |
| **Non Spanish speaking immigrant (*)** | 0.06 | 0.23 | 0.10 | 0.30 |
| **Children<4 (*)** | 0.11 | 0.32 | 0.13 | 0.33 |
| **Children>3 & <16 (*)** | 0.20 | 0.40 | 0.22 | 0.42 |
| **Primary_education (*)** | 0.18 | 0.39 | 0.19 | 0.39 |
| **Lower_secondary (*)** | 0.40 | 0.49 | 0.40 | 0.49 |
| **Upper secondary (*)** | 0.25 | 0.43 | 0.24 | 0.43 |
| **Post-secondary (*)** | 0.16 | 0.37 | 0.16 | 0.37 |
| | **JOB CHARACTERISTICS** | | | |
| **Non-Manual occupation (*)** | 0.41 | 0.49 | 0.42 | 0.49 |
| **Construction (*)** | 0.18 | 0.38 | 0.15 | 0.36 |
| **Manufacturing (*)** | 0.11 | 0.32 | 0.08 | 0.27 |
| **Services (*)** | 0.71 | 0.45 | 0.77 | 0.42 |
| **High technology (*)** | 0.09 | 0.28 | 0.03 | 0.17 |
| **Firm size missing (*)** | 0.05 | 0.21 | 0.03 | 0.18 |
| **Size_1_9 (*)** | 0.29 | 0.45 | 0.34 | 0.47 |
| **Size_10_19 (*)** | 0.12 | 0.32 | 0.11 | 0.32 |
| **Size_20_49 (*)** | 0.15 | 0.36 | 0.14 | 0.35 |
| **Size_50-249 (*)** | 0.20 | 0.40 | 0.19 | 0.40 |
| **Size_250 (*)** | 0.19 | 0.40 | 0.18 | 0.38 |
| **Current contract is temporary (*)** | 0.64 | 0.48 | 0.62 | 0.48 |
| **Current contract is on-call temporary (*)** | 0.06 | 0.23 | 0.07 | 0.26 |
| **Current contract is open-ended (*)** | 0.03 | 0.17 | 0.05 | 0.23 |
| **Current contract is permanent (*)** | 0.27 | 0.44 | 0.25 | 0.43 |
| **Current contract is part-time (*)** | 0.22 | 0.41 | 0.28 | 0.45 |
| **Temporary Help Agency (*)** | 0.04 | 0.20 | 0.03 | 0.18 |
| **Public Sector (*)** | 0.08 | 0.27 | 0.10 | 0.31 |
| **Real daily wage (euros in 2009) (**)** | 50 | 24.34 | 54 | 27.37 |

*Source: Own calculations using LWLS and the Spanish Labour Force Survey (quarterly regional unemployment rate)*
*Note:* Descriptive characteristics corresponding to the first observation of each individual in each sample.(*)Dummy variables, (**) Real daily wages for full time Jobs. According to t-tests, all differences in means between both samples are statistically significant except for Lower secondary and Post-secondary school).
*Variable definitions are given in Table A1 (Appendix).*

The majority of the new contracts are temporary, about 74% in both periods. Open-ended contracts are especially set up for seasonal activities, as they allow for

interruptions of the employment relation due to seasonality. This type of contract is found in about 3% (5%) of the new jobs in 2005 (2009). The proportion of part time contracts is lower than the European average (Labour Force Survey, 2009), but new part time contracts became more common (22% in 2005 versus 28% in 2009).

The proportion of new jobs signed through Temporary Help Agencies (THA) acting as an intermediary, declined from 4% in 2005 to 3% in 2009. This fall may seem surprising given that the main service provided by the THAs is just-in-time labour that helps firms to adjust to demand fluctuations (Amuedo-Dorantes et al., 2008) and is more necessary in uncertain periods. Possibly the fall is a consequence of the fact that THA contracts are more common for younger and low-qualified workers, larger firms, and more inhabited regions, groups that exhibit a higher reduction in hiring in 2009.

The proportion of new hires in the public sector (not including civil servants) has increased from 8% in 2005 to 10% in 2009. This growth may be explained by the employment creation in public sector industries such as education and health. It may also may be influenced by the increased tendency of the public sector to hire through labour contracts instead of in the form of civil service employment, in a context of public spending cuts.

The average real daily wage in a new job increased from €50 in 2005 to €54 in 2009 sample.[14] The percentiles in Table 3 show that the rise in wages is non-uniform: higher paid jobs exhibit greater wage growth than mid and low paid new jobs. A possible explanation of the greater wages growth in higher paid jobs is, in line with Devereux (2002), that the abilities of workers hired might be higher in recessions as during a recession, the tasks within occupation require better skills.

To sum up, the changes in sample composition reveal interesting facts that are in line with previous studies: first, the marked sectorial character of this crisis and the dramatic reduction in high technology intensive jobs. Second, the growth of the share of new hires in micro-enterprises during the crisis. Third, the countercyclical nature of the number of part time jobs. Fourth, the surge in the demand for labour in public services as well as the growing trend in hiring through labour contracts. Finally, higher growth in real wages in high-paid jobs than in low and medium paid jobs.

[14] Both amounts in euros in 2009, deflated by the average annual CPI of base 2011, and referred to full-time jobs.

**Table 3. Percentiles and variation in the real daily wage in new job matches in 2005 and 2009.**

| | | | Variation | |
|---|---|---|---|---|
| **Percentiles** | **2005** | **2009** | **Absolute** | **Relative** |
| 1% | 18.15 | 19.49 | 1.34 | 7% |
| 5% | 25.61 | 27.47 | 1.86 | 7% |
| 10% | 29.55 | 31.52 | 1.97 | 7% |
| 25% | 36.20 | 38.47 | 2.27 | 6% |
| 50% | 43.48 | 46.93 | 3.44 | 8% |
| 75% | 55.39 | 60.53 | 5.14 | 9% |
| 90% | 77.98 | 86.05 | 8.06 | 10% |
| 95% | 98.44 | 109.39 | 10.95 | 11% |
| 99% | 152.19 | 169.35 | 17.16 | 11% |

*Note: Own elaboration from the real daily wage at the start of a new job. Part-time jobs excluded.*

### 4.2 Job exits before and during the crisis

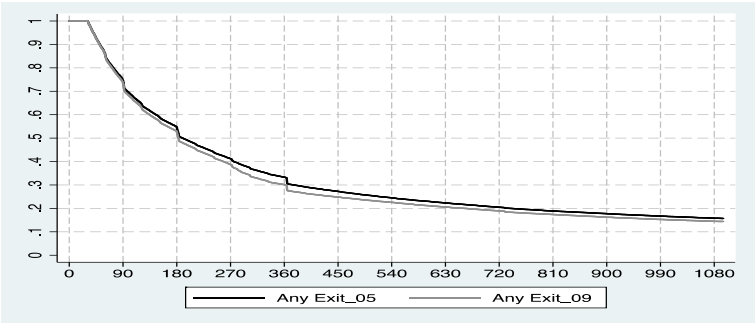
The fraction of job separations over the total observation window is high and rather similar in both periods: 77% of the new matches in 2005 and 82% in 2009 ended within three years. This reveals the importance of the job turnover in the Spanish labour market (Dolado et al. 2002), especially for new employees according to the LIFO (Last in, First Out) scheme.[15] The similarity of exit rates in the two years is also apparent from the Kaplan Meier survival function estimates in Figure 1. It appears to be driven by two opposite processes: the pro-cyclical nature of transitions to other jobs (29% in 2005 and 18% in 2009) and to non-employment (33% in 2005 and 30% in 2009), and the counter-cyclical nature of job-to-unemployment rates (16% in 2005 and 34% in 2009). Job-to-job exits dominate in the expansion period, while job-to-unemployment transitions dominate in the crisis. The aggregated job-to-any-exit hazard combines very distinct outflows correlating differently with the business cycle, hindering the interpretation and confirming the necessity to estimate job separation hazards by destination state.

Figure 2 shows separate Kaplan Meier survival functions for exits to another job, unemployment, and non-employment (treating other types of exits as right-censoring). For example, the probability that an employed changed to another job within a year fell from 34% in 2005 to 23% in 2009, but the probability to become unemployed within a year increased from 23% to 43%. Survival functions for exits to

[15] The LIFO scheme is due to the lower dismissal costs associated with shorter job tenures. Cueto and Rodriguez (2013) show that the use of the LIFO scheme is becoming slightly weaker since 2010, but it is not clear whether this is because of the 2010 labour market reform or the economic crisis.

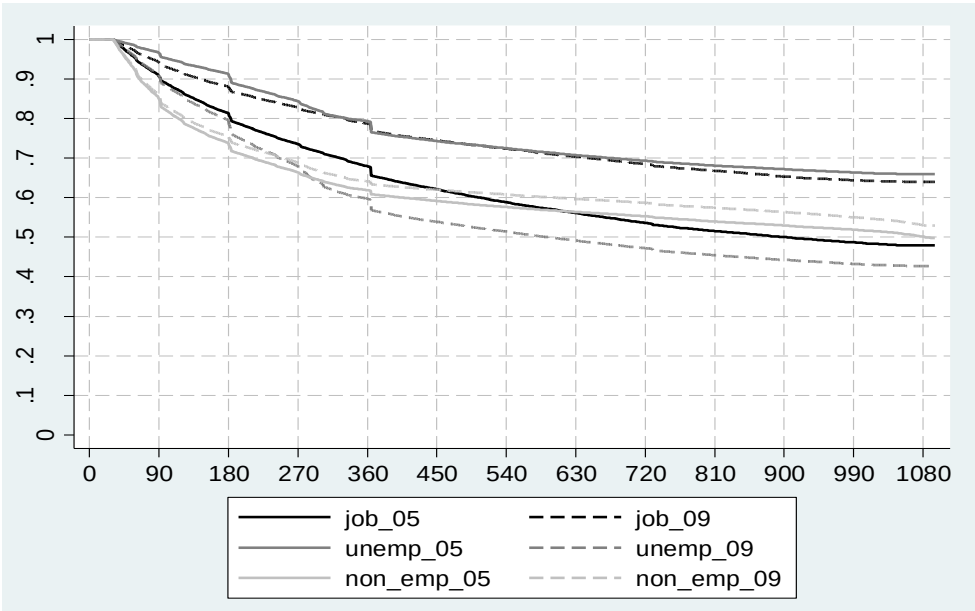
unemployment and other job show a greater decline after 180 and 360 days of employment, perhaps due to the higher incidence of temporary employment. The probability of a transition from a job to non-employment within one year fell from 41% to 38%. It is not clear what should be expected here due to the residual character of this exit, which combines voluntary exits from the labour market with involuntary exits of fired workers who are not entitled to unemployment benefits.

**Figure 1: Kaplan-Meier Survival estimates; exits from job spells to any destination state; 2005 and 2009 samples. Durations in days.**




*Source: Own elaboration from LWLS.*

**Figure 2: Kaplan Meier Survival estimates; Exits from employment to other job, unemployment and non-employment. 2005 and 2009 samples. Durations in days.**

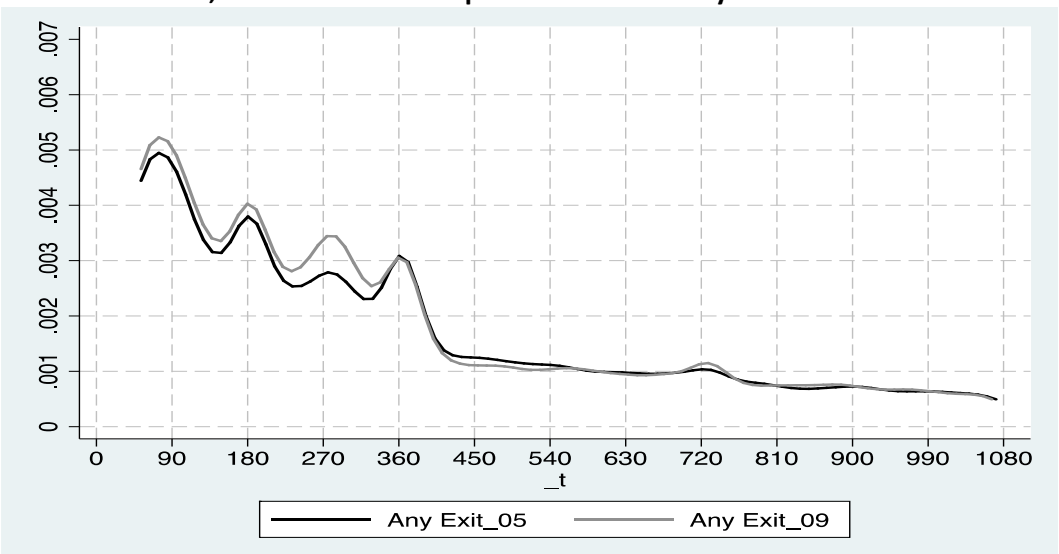



*Source: Own elaboration from LWLS.*

The hazard rates corresponding to these survival functions are sketched in Figures 3 and 4.[16] The empirical hazard rate at time *t* is the proportion of individuals employed for at least t days that leave the job on day *t+1*. Figure 3 shows that workers exhibit similar job separation patterns in both periods, with declining hazards until about 400 days of tenure. Some local peaks in the hazards are found, at 90, 180, 270 and 360 days. These peaks are also found in previous studies and correspond to the usual durations of temporary contracts. The hazard in Figure 3 is the sum of the hazards of the three exits in Figure 4: other job, unemployment and non-employment. The pattern of the overall hazard seems to follow that of the dominant destination in each sample.

The negative association between the hazard rate and the duration, with the exception of the peaks, is found for all exits. They may reflect both genuine negative state dependence and spurious negative state dependence due to heterogeneity and the changing nature of the pool of employed over time. These explanations will be disentangled in the econometric model.

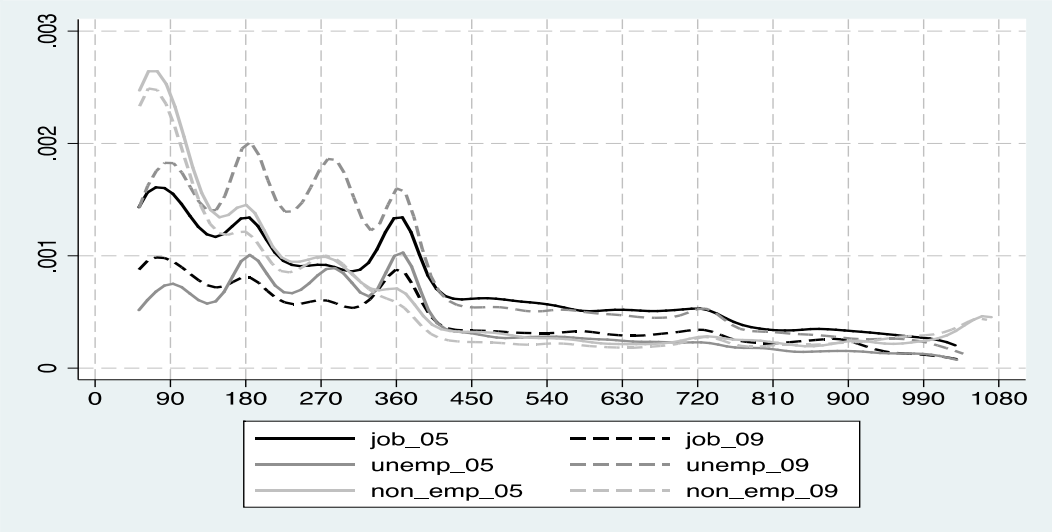
**Figure 3: Kaplan-Meier kernel smoothed hazard functions; exits from employment to any destination state; 2005 and 2009 samples. Durations in days.**




*Source: Own elaboration from LWLS.*

[16] The estimates use Kernel smoothing.

**Figure 4: Kaplan Meier kernel smoothed hazard functions; exits from employment to other job, unemployment and non-employment. 2005 and 2009 samples. Durations in days.**




*Source: Own elaboration from LWLS.*

## 5 Econometric framework for job stability analysis

To analyse the pattern and determinants of job stability we use a single risk model (job separation) and a competing risk model (distinguishing between exits to other job, unemployment and non-employment).

### Single risk model

Since job durations are measured in days, we consider the duration of each job spell as a continuous random variable. The hazard rate at duration *t* is the probability of job termination at spell length *t* conditional on the duration lasting up to *t*:

$$h(t)=f(t)/S(t) \quad (1)$$

Here *f(t)* represents the density function of the job durations and *S(t)* is the survival function given by *S(t)=1-F(t),* where *F(t)* is the cumulative density function. The interpretation is that the conditional probability of leaving employment in the short time interval *(t, t+Δ)* is approximately *h(t)Δ*.

We specify the hazard using the multiple-spell data extension of the Mixed Proportional Hazard (MPH) model, using gap time representation: time is reset to zero after each event (see, e.g., van den Berg, 2001). The conditional hazard function evaluated at spell duration *t* for the *s*-th spell of individual *i* is given by the product of the baseline hazard, $h_0(t)$, an observed heterogeneity factor, $X_{is}(t)'\beta$, including time-

varying covariates (and excluding the intercept, as a normalization needed to identify the model) and an unobserved heterogeneity ("frailty") component $u_{is}$:

$$h(t_{is}|X_{is}(t), u_{is}) = u_{is} \cdot h_0(t) \cdot \exp(X_{is}(t)'\beta) \quad (2)$$

We assume that the baseline hazard ($h_0(t)$) is piecewise constant (using mainly quarterly cut-points):

$$h_0(t) = \bar{h}_k \; t \in (\tau_{k-1}, \tau_k), k = 1, \dots, K \quad (3)$$

This specification has the advantage of not imposing a particular functional form, thus allowing for a flexible shape of duration dependence.

The main parameters of interest are in the vector $\beta$ indicating how the hazard varies with observed individual and job characteristics. A positive coefficient implies that, other things (covariates and unobserved heterogeneity) being equal, an increase in the covariate leads to an increase in the probability that the job ends. A way to interpret the size of the coefficients is through the percentage change in the hazard produced by a one unit change in the covariate, obtained as $(e^{\beta} - 1) \cdot 100$.

The proportional hazard assumption implies that the shape of the duration dependence ("baseline hazard") is the same for all individuals; the covariates change the hazard rates with the same proportion at each *t,* so the level of the hazard may change across individuals.

We assume that spells of the same individual share the same frailty. In other words, unobserved heterogeneity is at the level of person *i*: $u_{is} = u_i$. Conditional on observed heterogeneity $X_{is}(t)$ and unobserved heterogeneity $u_i$ different durations of the same individual are independent.

We assume that the distribution of the frailty term $u_i$ is Gamma[17] with mean normalized to 1 and with finite variance $\vartheta$. The parameter $\vartheta$ indicates the amount of unobserved heterogeneity but also drives the correlation between recurrent events of the same individuals. The choice of this frailty distribution is justified by the fact that it gives a higher maximum likelihood than other common frailty distributions.[18] Ignoring unobserved heterogeneity may lead to biases in the estimates of $\beta$ and would make the estimated duration dependence more negative (Nickell, 1979). The flexible

[17] The density of Gamma $(1/\vartheta, \vartheta)$ is: $g(\alpha) = \frac{\alpha^{1/\vartheta} \cdot e^{-\alpha/\vartheta}}{\Gamma(1/\vartheta)\vartheta^{1/\vartheta}}$

[18] Estimations assuming shared frailty heterogeneity fit better than estimations under unshared frailty for different distributions of the unobserved heterogeneity.

baseline hazard and the inclusion of frailty in the model make it possible to analyse genuine duration dependence before and during the crisis. The model can be estimated by maximum likelihood, using standard Stata commands.

**Multi-state (exit to other job, unemployment with benefits, or non-employment): Competing risks model**

To analyse the employment duration pattern and the determinants of transitions to another job, unemployment, and non-employment, we extend the single risk model using a competing risks framework (see, e.g., Kalbfleisch and Prentice, 2002, Chapter 8). A job spell can end with a transition to another job *(j=1)*, an unemployment with benefits *(j=2)*, or non-employment *(j=3).* This gives the total hazard

$$h(t) = h_1(t) + h_2(t) + h_3(t) \qquad (6)$$

Here $h(t)$ is the hazard to exit from the employment spell to any destination state at job duration *t,* and $h_1(t)$, $h_2(t)$ and $h_3(t)$ are the hazards for exits to the three competing exits. Conditional on observed and unobserved heterogeneity, the competing risks are assumed to be independent. We specify the following Multivariate Mixed Proportional Hazard (MMPH) model with gap-time representation with hazards $h_j\ (t|X_i(t), V_i^{\,j})$ for the three types of transitions *j=1-3,* of individual *i* conditional on observed and unobserved characteristics:

$$h_j\ (t|X_i(t), V_i^{\,j}) = h_0^j(t) \cdot \exp(X_i(t)'\beta^j) \cdot \exp(V_i^{\,j}) \qquad (7)$$

The baseline hazard for the transitions *j=1-3*, $h_0^j(t)$, is specified as piecewise constant, as for the single risk model. The parameters of main interest are the vectors $\beta^j, j = 1,2,3,$ which determine how the three hazards vary with individual and job characteristics. A positive coefficient in $\beta^j$ of a covariate implies that, conditional on other covariates and unobserved heterogeneity, an increase of the covariates increases the probability of exit *j.*

The unobserved heterogeneity terms are $V_i^{\,j}$. Following Heckman and Singer (1984), we use discrete frailty and allow $V_i^1, V_i^2$ and $V_i^3$ to be correlated**.** This discrete distribution is computationally easier than continuous distributions. Moreover, it is common in the literature on labour market transitions; see, for instance, Bover, Arellano and Bentolila (2002), Rebollo (2012), or Bijwaard and Wahba (2014).

Under a discrete frailty distribution, the population consists of several subpopulations with different risks. For instance, one group of more motivated individuals and with a larger social network could have higher probabilities of finding another job but a lower probability to become unemployed or non-employed. The group to which an individual belongs, however, is not observed. The population fractions of the groups are unknown parameters $p_k$[19]. The number of groups is finite and denoted by *K*, with $\sum_{k=1}^{K} p_k = 1$; *K* is also the number of mass points of the distribution of $(V_i^1, V_i^2, V_i^3)$.

We assume that unobserved heterogeneity is constant over time (within and across spells of the same individual). For identification, we also assume it is independent of observed characteristics, the standard assumption in this kind of duration models (van den Berg, 2001). Moreover, since we do not impose a normalization on the baseline hazard or on $X_i(t)'\beta^j$ , we need to impose *E(V$^j$)=0:* $\sum_{k=1}^{K} p_k V^j = 0$ for *j=1,2,3* as a normalization.

All parameters are estimated jointly by Maximum Likelihood. The likelihood function is, under the independence assumption, the product of the Likelihood function of all the individuals (i), $L = \prod_i L_i$. The likelihood contribution $L_i$ of individual *i* for three competing risks *(j=1,2,3)* can be written as the expected value of the conditional likelihood given $(V_i^1, V_i^2, V_i^3)$:$L_i = \sum_{k=1}^{K} P_k \cdot L_i(V^k)$, where$L_i(V^k)$ is the conditional likelihood contribution given$(V_i^1, V_i^2, V_i^3)$ is equal to the $k^{\text{th}}$ mass point $V^k = (V_k^1, V_k^2, V_k^3)$. This conditional likelihood contribution is a standard likelihood contribution in a model without unobserved heterogeneity; it includes the conditional density function for the observed exits of the completed spells and the conditional survival function for right-censored spells at each competing risks *(j)*:

$$L_i(V^k) = \prod_{j=1}^{3} \prod_{s=1}^{S} h_s^j\,(t_i|X_i(s), V_j^k)^{d_{i,j,s}}\; S_s^j\left(t_i\middle|X_i(s), V_j^k\right) \qquad (8)$$

[19] To ensure the probability is between zero and one we assume $p_k = \frac{\exp(a_k)}{(1+\sum_{l=1}^{K-1}\exp(a_l))}$

Here *s=1,…,S* are the spells of individual *i*, and $d_{i,j,s}$ is a dummy that is 1 if spell *s* ends in a transition of type *j* and 0 otherwise. Our estimation code is based upon the Stata code of Bijwaard (2014).

## 6 Estimation results

### 6.1 Job stability

Job search and matching theory imply that the valuation of labour market states by workers and firms depends on individual and job characteristics, as well as the state of the labour market (Frederiksen and Westergaard-Nielsen, 2007). Moreover, according to more recent models, tenure is explicitly the outcome of the interaction of the dynamics across jobs and workers (Davis and Haltiwanger, 1990, Burgess et al., 1999 and 2001). Empirical studies, for instance Hirsch and Schnabel (2012) and Frederiksen (2008) also point out the importance of considering these variables in workers' transition behaviour studies. We therefore include as explanatory variables in our job duration model individual and job characteristics as well as macroeconomic variables (see Section 3).

We estimated several specifications of the single and competing risk models. Table 4 presents the results for our benchmark models. Estimates for alternative specifications are presented in the appendix and briefly discussed below. The single risk benchmark model has a flexible piecewise constant baseline hazard and a shared Gamma distribution of unobserved heterogeneity, since this specification gave a better likelihood than several alternatives (such as unshared distributions or a shared inverse Gaussian distribution). For the competing risks model, the best likelihood is obtained using a discrete unobserved heterogeneity distribution with three mass points.

#### Coefficients on the covariates

Since the coefficients in the single risk model are difficult to interpret, we mainly focus on the coefficients of the competing risks model. One of the most important determinants of job stability is the quarterly regional unemployment rate. Consistent with the descriptive analysis, we find opposite signs: local unemployment is positively correlated with transitions into unemployment, in line with the findings of García-Pérez (1997) and Arranz and García-Serrano (2004) for layoffs, but negatively

with exits to other jobs. The latter is in contrast with Blazquez-Cuesta (2008, Table A5) who found a positive effect of the yearly unemployment rate coefficient on changing jobs. The effect of the unemployment rate is stronger in exits to unemployment than in switches to other job during the crisis, which is in line with the higher importance of employment destruction compared to the reduction of job creation during the crisis (Silva and Vázquez-Grenno, 2013).

Coefficients are smaller for the 2009 sample than for 2005, but given the higher unemployment rate, the average elasticity of transitions to unemployment for the regional unemployment rate has increased from 0.23 in 2005 sample to 0.28 in 2009 sample. On the other hand, the elasticity of the job-to-job hazard has changed from -0.23 to -0.14, maybe because regional mobility has increased during the crisis.
Higher regional unemployment rate reduces exits to non-employment especially in the expansion period.

Gender differences in job stability become smaller during the crisis. The main change is that men in the 2005 sample were much less likely to become unemployed than otherwise similar women, but this advantage shrunk substantially in 2009 (from 24% to 11%). Men are more mobile across jobs, especially in the expansion period (8.2% more than women). During the economic boom, women were more likely (4.6%) to exit to non-employment, but this difference disappeared in 2009, perhaps because of an added worker effect (fewer women give up their job because their husbands are unemployed or at risk to become unemployed). Previous evidence is mixed: in Blazquez-Cuesta (2008) the male coefficient is not significant in transitions to other job and to non-employment. In Arranz and García-Serrano (2004) and García-Serrano and Malo (1996) men are less likely to become unemployed than their female counterparts, but according to García-Pérez and Muñoz-Bullón (2005) as well as García-Pérez (1997), the gender impact is reversed for longer spell durations.

For both samples, the hazard for other job (except 16-19 aged workers) and non-employment is negatively correlated with age. This is in line with Blazquez-Cuesta (2008) who finds that transitions to another job or non-employment are more likely among young workers. In general, according with job search and matching theory, older workers have had more time to find a better match that will typically last longer. The job-to-job pattern is consistent with job-shopping (Stigler, 1962). Younger workers

are more likely than older ones to try a variety of jobs to learn about the labour market and get a better match. As far as non-employment exits are concerned, younger workers may not be entitled to unemployment benefits, and those without family responsibilities can more easily emigrate or go back to education than older groups. In contrast, the probability to become unemployed (with benefits) increases with age until about age 30. To sum up, in the downturn, workers of ages 35-55 years become more mobile, while the group of 16-29 years old seems to be hit hardest by the crisis in terms of a substantial increase in the probability of unemployment or non-employment.

Immigrants exhibit more job mobility and fewer transitions to unemployment than natives during the expansion period. The latter may be due to their lower unemployment coverage given their less stable careers. However, in the downturn, the probability of an unemployment exit for Spanish speaking immigrants is similar to that of natives. The job-to-job mobility for both groups of immigrants is reduced, also becoming similar to that of natives. Immigrants show more transitions to non-employment than natives in both periods, probably due to return migration (Dustmann et al., 2010). In conclusion, specifically Spanish speaking immigrants, have suffered the highest increase in job instability in the contraction period.

There is no clear pattern in the effects of having dependent children on the hazards, with changing signs and significance levels. In both periods, individuals living in larger cities show lower job mobility and a lower exit probability to non-employment, but they are more likely (2.7%) to enter unemployment than others.

A higher level of education is important to reduce the probability to become unemployed in both periods. The difference between primary and lower secondary education is significant during the crisis only. This is in line with the theory predicting that during the crisis, firms fire the more replaceable low educated employees. On the other hand, the higher educated have a higher probability to exit to non-employment in both periods. During the crisis, job mobility is rising with education level. This may reveal a preference on the firm side for recruiting higher educated workers. To conclude, it seems that the least educated workers are the most adversely affected by the economic crisis, both in terms of job-to-job mobility and in the chances of unemployment.

**Table 4: Estimation results of single risk (any exit) and correlated competing risks (exit to other job, unemployment and non-employment) models for 2005 and 2009 samples.**

| | 2005 sample | | | | 2009 sample | | | |
|---|---|---|---|---|---|---|---|---|
| | **Any exit** | **Job** | **Unemployment** | **Non-employment** | **Any exit** | **Job** | **Unemployment** | **Non-employment** |
| **Unemployment rate** | -0.341*** | -2.454*** | 2.482*** | -0.367*** | 0.361*** | -0.819*** | 1.528*** | -0.240** |
| | (0.0808) | (0.150) | (0.172) | (0.126) | (0.0534) | (0.126) | (0.0881) | (0.0972) |
| **Male** | -0.0360*** | 0.0773*** | -0.275*** | -0.0462*** | -0.0142** | 0.0541*** | -0.116*** | 0.0116 |
| | (0.00697) | (0.0122) | (0.0161) | (0.0111) | (0.00632) | (0.0144) | (0.0108) | (0.0110) |
| **Aged_16_19** | 0.307*** | -0.326*** | -1.105*** | 0.840*** | 0.320*** | -0.479*** | -0.883*** | 0.933*** |
| | (0.0125) | (0.0265) | (0.0526) | (0.0170) | (0.0172) | (0.0558) | (0.0487) | (0.0232) |
| **Aged_20_24** | 0.140*** | -0.0442*** | -0.258*** | 0.417*** | 0.131*** | -0.111*** | -0.167*** | 0.463*** |
| | (0.00766) | (0.0131) | (0.0197) | (0.0121) | (0.00918) | (0.0215) | (0.0170) | (0.0150) |
| **Aged_30_34** | -0.0564*** | -0.0698*** | 0.0996*** | -0.140*** | -0.0553*** | -0.0697*** | 0.0531*** | -0.184*** |
| | (0.00799) | (0.0129) | (0.0177) | (0.0138) | (0.00887) | (0.0191) | (0.0146) | (0.0164) |
| **Aged_35_39** | -0.0942*** | -0.163*** | 0.103*** | -0.154*** | -0.0670*** | -0.131*** | 0.0714*** | -0.203*** |
| | (0.00917) | (0.0152) | (0.0196) | (0.0158) | (0.00963) | (0.0212) | (0.0156) | (0.0182) |
| **Aged_40_44** | -0.114*** | -0.234*** | 0.0930*** | -0.153*** | -0.0629*** | -0.170*** | 0.0988*** | -0.219*** |
| | (0.0101) | (0.0171) | (0.0211) | (0.0174) | (0.0104) | (0.0236) | (0.0166) | (0.0199) |
| **Aged_45_49** | -0.189*** | -0.342*** | 0.0769*** | -0.251*** | -0.0691*** | -0.216*** | 0.111*** | -0.255*** |
| | (0.0112) | (0.0193) | (0.0225) | (0.0194) | (0.0112) | (0.0261) | (0.0174) | (0.0217) |
| **Aged_50_55** | -0.203*** | -0.471*** | 0.136*** | -0.241*** | -0.0815*** | -0.324*** | 0.116*** | -0.260*** |
| | (0.0138) | (0.0250) | (0.0266) | (0.0242) | (0.0131) | (0.0319) | (0.0200) | (0.0258) |
| **Spanish speakers** | 0.130*** | 0.164*** | -0.342*** | 0.304*** | 0.109*** | -0.0104 | 0.0165 | 0.314*** |
| | (0.0119) | (0.0194) | (0.0312) | (0.0190) | (0.0121) | (0.0288) | (0.0204) | (0.0212) |
| **Non Spanish speakers** | 0.139*** | 0.0689*** | -0.119*** | 0.326*** | 0.0637*** | 0.0258 | -0.124*** | 0.316*** |
| | (0.0112) | (0.0188) | (0.0269) | (0.0182) | (0.00927) | (0.0216) | (0.0158) | (0.0162) |
| **children_4** | 0.00571 | -0.0287** | 0.0868*** | -0.00813 | -0.000198 | -0.0346* | 0.0795*** | -0.0759*** |
| | (0.00821) | (0.0137) | (0.0175) | (0.0139) | (0.00854) | (0.0193) | (0.0134) | (0.0161) |
| **children_15** | -0.0161** | -0.0121 | 0.0367** | -0.0646*** | 0.000440 | 0.0273* | 0.0594*** | -0.115*** |
| | (0.00709) | (0.0120) | (0.0143) | (0.0123) | (0.00721) | (0.0166) | (0.0110) | (0.0142) |
| **Primary_education** | 0.0313*** | -0.0217* | 0.0239 | 0.0979*** | 0.0349*** | -0.0463** | 0.0922*** | 0.0186 |
| | (0.00705) | (0.0123) | (0.0152) | (0.0117) | (0.00753) | (0.0188) | (0.0118) | (0.0140) |
| **Upper-Secondary** | 0.0148** | -0.0252** | -0.150*** | 0.106*** | 0.00397 | 0.0180 | -0.151*** | 0.131*** |
| | (0.00678) | (0.0116) | (0.0154) | (0.0111) | (0.00733) | (0.0169) | (0.0124) | (0.0130) |
| **Post-secondary** | 0.0354*** | 0.0200 | -0.505*** | 0.214*** | -0.0675*** | 0.0581*** | -0.490*** | 0.155*** |
| | (0.00864) | (0.0149) | (0.0220) | (0.0135) | (0.00951) | (0.0207) | (0.0176) | (0.0161) |

## Table 4, continued

| | 2005 | | | | 2009 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Any exit** | **Job** | **Unemp.** | **Non-emp.** | **Any exit** | **Job** | **Unemp.** | **Non-emp.** |
| **Inhabitants>40,000** | -0.0390*** | -0.0369*** | 0.0241** | -0.0703*** | -0.0190*** | -0.0571*** | 0.0173* | -0.0435*** |
| | (0.00518) | (0.00875) | (0.0112) | (0.00843) | (0.00562) | (0.0128) | (0.00892) | (0.00982) |
| **Non manual** | -0.164*** | -0.0623*** | -0.256*** | -0.200*** | -0.159*** | -0.0309* | -0.300*** | -0.106*** |
| | (0.00657) | (0.0113) | (0.0145) | (0.0103) | (0.00700) | (0.0159) | (0.0116) | (0.0117) |
| **Construction** | -0.207*** | -0.0552*** | -0.338*** | -0.316*** | 0.0118 | -0.138*** | 0.202*** | -0.241*** |
| | (0.00778) | (0.0125) | (0.0177) | (0.0133) | (0.00875) | (0.0202) | (0.0132) | (0.0170) |
| **Manufacturing** | -0.219*** | -0.324*** | -0.00685 | -0.274*** | -0.114*** | -0.250*** | 0.00699 | -0.240*** |
| | (0.00939) | (0.0161) | (0.0183) | (0.0157) | (0.0113) | (0.0261) | (0.0166) | (0.0217) |
| **High_technology** | -0.0242** | 0.0790*** | -0.122*** | -0.0700*** | -0.0529*** | 0.0608* | -0.0653** | -0.135*** |
| | (0.0101) | (0.0165) | (0.0228) | (0.0166) | (0.0181) | (0.0357) | (0.0296) | (0.0336) |
| **size_10_19** | -0.0780*** | -0.0538*** | -0.156*** | -0.0826*** | -0.130*** | -0.105*** | -0.177*** | -0.119*** |
| | (0.00873) | (0.0145) | (0.0189) | (0.0143) | (0.00936) | (0.0210) | (0.0146) | (0.0168) |
| **size_20_49** | -0.131*** | -0.116*** | -0.249*** | -0.124*** | -0.166*** | -0.175*** | -0.224*** | -0.143*** |
| | (0.00809) | (0.0135) | (0.0175) | (0.0133) | (0.00878) | (0.0198) | (0.0138) | (0.0156) |
| **size_50_249** | -0.177*** | -0.250*** | -0.256*** | -0.127*** | -0.234*** | -0.330*** | -0.296*** | -0.177*** |
| | (0.00770) | (0.0132) | (0.0164) | (0.0124) | (0.00825) | (0.0189) | (0.0130) | (0.0143) |
| **size_250** | -0.244*** | -0.386*** | -0.357*** | -0.123*** | -0.337*** | -0.539*** | -0.389*** | -0.233*** |
| | (0.00858) | (0.0150) | (0.0188) | (0.0136) | (0.00945) | (0.0217) | (0.0152) | (0.0160) |
| **Open-ended** | 0.0121 | -0.886*** | 0.723*** | -0.321*** | -0.0162 | -0.878*** | 0.314*** | -0.313*** |
| | (0.0143) | (0.0387) | (0.0214) | (0.0253) | (0.0123) | (0.0417) | (0.0166) | (0.0227) |
| **Permanent** | -1.717*** | -1.434*** | -2.089*** | -1.980*** | -1.554*** | -1.163*** | -1.775*** | -1.816*** |
| | (0.00887) | (0.0130) | (0.0222) | (0.0152) | (0.00959) | (0.0177) | (0.0151) | (0.0170) |
| **On-call Temporary** | -0.0851*** | -0.126*** | -0.301*** | 0.0730*** | -0.00171 | 0.0198 | -0.154*** | 0.214*** |
| | (0.0122) | (0.0224) | (0.0252) | (0.0192) | (0.0116) | (0.0267) | (0.0195) | (0.0197) |
| **Dummy missing firm size** | 0.661*** | 0.941*** | 0.436*** | 0.438*** | 0.693*** | 0.951*** | 0.601*** | 0.562*** |
| | (0.0109) | (0.0173) | (0.0269) | (0.0182) | (0.0142) | (0.0309) | (0.0237) | (0.0236) |
| **Temporary Agency** | 0.625*** | 1.082*** | 0.168*** | 0.359*** | 0.529*** | 1.110*** | 0.233*** | 0.368*** |
| | (0.0112) | (0.0182) | (0.0306) | (0.0185) | (0.0140) | (0.0283) | (0.0259) | (0.0239) |
| **Public Sector** | -0.120*** | -0.532*** | 0.198*** | -0.0185 | -0.00812 | -0.282*** | 0.158*** | -0.0181 |
| | (0.0113) | (0.0228) | (0.0217) | (0.0175) | (0.0105) | (0.0260) | (0.0165) | (0.0178) |
| **ln_daily_salary** | -0.0167** | 0.175*** | 0.144*** | -0.231*** | 0.0129* | 0.237*** | 0.0570*** | -0.145*** |
| | (0.00720) | (0.0124) | (0.0155) | (0.0114) | (0.00734) | (0.0166) | (0.0119) | (0.0122) |
| **Part time coef.** | -0.188*** | 0.142*** | 0.733*** | -0.596*** | -0.189*** | -0.135*** | 0.563*** | -0.720*** |
| | (0.0159) | (0.0298) | (0.0382) | (0.0241) | (0.0160) | (0.0379) | (0.0279) | (0.0261) |

**Table 4, continued**

| | 2005 | | | | 2009 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Any exit** | **Job** | **Unemp.** | **Non-emp.** | **Any exit** | **Job** | **Unemp.** | **Non-emp.** |
| **Ln Theta** | -2.995*** | | | | -4.237*** | | | |
| | ( 0.0812793) | | | | (0.305) | | | |
| **V1** | | -0.590*** | -0.134** | 0.706*** | | -0.461*** | 0.0558*** | 0.765 |
| | | (0.0931) | (0.0581) | (0.0464) | | (0.0733) | (0.0204) | |
| **V2** | | 0.394*** | 0.158*** | -0.125*** | | -1.026*** | -2.256*** | -13.22 |
| | | (0.0269) | (0.0236) | (0.0372) | | (0.156) | (0.328) | |
| **a1** | | 1.779*** | | | | 0.326* | | |
| | | (0.181) | | | | (0.194) | | |
| **a2** | | 2.477*** | | | | -2.592*** | | |
| | | (0.161) | | | | (0.196) | | |
| **Observations** | 903,147 | 903,147 | 903,147 | 903,147 | 715,705 | 715,705 | 715,705 | 715,705 |
| **Log Likelihood** | -282,342 | -1,303,000 | | | -225,704 | -1,049,000 | | |
| **Number of ids** | 176,419 | 176,419 | 176,419 | 176,419 | 141,153 | 141,153 | 141,153 | 141,153 |
| **Number of exits** | 171,806 | 63,314 | 35,476 | 73,016 | 138,467 | 29,627 | 57,825 | 51,015 |
| **Terms of mass points** | | **1** | **2** | **3** | | **1** | **2** | **3** |
| **Probability** | | 0.31 | 0.63 | 0.05 | | 0.56 | 0.03 | 0.41 |
| **V job** | | -0.59 | 0.39 | -1.19 | | -0.46 | -1.03 | 0.72 |
| **V unemployment** | | -0.13 | 0.16 | -1.09 | | 0.06 | -2.26 | 0.09 |
| **V non-employment** | | 0.71 | -0.12 | -2.69 | | 0.77 | -13.22 | -2.59 |
| **Rho** | | **Unemployment** | **Non-emp.** | | | **Unemployment** | **Non-emp.** | |
| **Job** | | 0.86 | 0.02 | | | 0.34 | -0.31 | |
| **Unemployment** | | | 0.53 | | | | 0.72 | |

*Notes: Single risk estimation: piecewise baseline and shared frailty assuming Gamma distribution for unobserved heterogeneity. Both in 2005 and 2009 LR test show that frailty is significant (p-value=0.000). Correlated Competing risks estimation: piecewise baseline and discrete distribution of unobserved heterogeneity with three mass points. References categories: female, Aged_25_29, , lower secondary education level, Native Spanish, manual occupation, services sector,non-high technology sector, size_1_9, temporary contract, , Private sector. Age, daily wage, and quarterly unemployment rate are time-varying variables. Significance levels:* *** p<0.01, ** p<0.05, * p<0.1.
Standard Errors for some unobserved heterogeneity parameters could not be computed for 2009 since parameters tend to -∞.

Workers in non-manual occupations have more stable jobs than manual workers, with lower hazards in both periods for all destinations, particularly to unemployment. Arranz and García-Serrano (2004) found that non-manual workers have a lower probability of job termination than manual workers due to temporary contracts.

In order to interpret coefficients of current job characteristics it is important to note that they may capture causal effects but also (time-persistent) heterogeneity. The influence of the industry on job duration varies over the business cycle and destination states. The results shows that different industries are affected differently by the crisis. For example, the burst of the housing bubble severely hit the construction sector so that workers in construction suffered a substantial increase in the probability to become unemployed, going from the lowest to the highest unemployment exit probability, and a fall in job-to-job rotation. Jobs in sectors more intensive technology where human capital accumulation is more relevant, seem to be more stable than those in other sectors, showing lower incidence in unemployment and non-employment, but higher job mobility in both periods.

The estimated coefficients on firm size all confirm that job stability increases with firm size. This is in line with the findings of Blázquez-Cuesta (2008) for the period 1995-2001. During the crisis, the probability of job ending to any exit has decreased compared to the reference category (firm size 1-9). Especially workers in the largest firms exhibit a decline in all the hazard rates compared to those in the smallest firms, particularly in transitions to other jobs and non-employment. Firms for which firm size is missing are often unstable firms that have disappeared, explaining why workers in these firms exhibit higher exit chances. This effect is stronger during the downturn.

Larger firms tend to provide better working conditions, implying higher separation costs for employers and higher opportunity cost of quitting. Higher investment in the hiring process ensures a better matching between employee and employer. In contrast, small firms usually offer short-term jobs due to a lower capability of internal labour market adjustments.

As expected, the type of contract influences job stability. Employees with open-ended contracts exhibit the highest unemployment hazard in both samples, followed

by temporary, on-call and permanent contracts. During the crisis, particularly the hazards of on-call temporary contracts to all destination states have increased substantially. The higher job-to-job hazard rates of workers with fixed-term contracts may be related to their possibility of anticipating the end of the contract to search early and avoid unemployment. The lower exit hazards of permanent contracts, also found in Blazquez-Cuesta (2008), might be explained by the fact that permanent contracts tend to be signed by workers in primary jobs that are hard to replace. Workers from temporary help agencies (THA workers) exhibit less stable careers, especially during the crisis, with higher job rotation, unemployment risk and non-employment hazard rates than those hired directly. The higher unemployment incidence is confirmed by García-Pérez and Muñoz-Bullón (2005), who argue that THA contracts are used for temporarily adjusting capacity to the economic situation.

Public sector workers are less likely to change jobs but more likely to become unemployed than those in the private sector. Both groups show the same exit probability to non-employment. Previous evidence on this is mixed: García-Pérez and Muñoz-Bullón (2005) find a positive impact of public sector on the hazard from employment to unemployment, not including job characteristics such as type of contract, firm size or industry. Blázquez-Cuesta (2008) finds that working in the public sector reduces the hazard of changing job or moving towards non-employment.

Following Blazquez-Cuesta (2008)[20] we also consider the wage level as a job characteristic (exogenously given). The influence of the wage level[21] on the separation rates differs across economic periods. Workers with higher wages exhibit higher job mobility (especially in the downturn), more chances to become unemployed (mainly during the expansion period), and lower separation rates to non-employment. Unlike our results, Arranz and García-Serrano (2004) found a disincentive effect of wages on the hazard rate for involuntary job termination (layoff and end of temporary contract) for the period 1987-1997; they did not include characteristics of the current job such a type of contract, industry, firm size and part time coefficient.

[20] Blazquez-Cuesta(2008) demonstrates that low pay can be assumed to be exogenous to job mobility.

[21] Since in the LWLS information about hours worked is not available we are not able to compute hourly wages. The possible distortion, already mentioned by Arranz and García-Serrano (2012), due to the use of daily wage instead of hourly wage in workers with different number of hours worked is mitigated by the small proportion of part-time jobs in Spanish labour market and the inclusion of part-time coefficient as an explanatory variable.

The positive relationship between earnings and the hazard of unemployment in the expansion period might be explained by the strategic use of unemployment benefits by firms and workers with consecutive employment spells and unemployment benefit spells (Alba et al., 2012). In the downturn this seems to be less relevant.

Job starters with a higher part time coefficient have higher job mobility and unemployment risk, specially in 2005, although lower probability to exit into non-employment. During the downturn, job instability has increased for part time workers who have lower opportunity costs to leave the labour market.

**Unobserved heterogeneity**

In the single risk specifications, the variance of unobserved heterogeneity is higher in the 2005 than in the 2009 sample (5% *versus* 1.4%). In the competing risks estimations, it is also significantly present in both periods, demonstrating the importance of unobserved characteristics such as motivation, effort, social pressure, etc. to remain in the same job.

According to the estimated discrete distribution, the correlation between the unobserved heterogeneity terms changes over the business cycle. The most interesting one is the correlation between job-to-job and unemployment hazards, which is 0.86 in 2005 and 0.34 in 2009 and significant. This implies that someone who is likely to become unemployed also has higher chances of exiting to another job, particularly during the expansion period. This could point at the strategic use of unemployment benefits during the expansion period.

Most individuals (63% in 2005 and 41% in 2009) belong to a group in which exit hazard rates to unemployment and to other job are both higher than the average, but while hazard rates to non-employment are relatively low. A second group (31% in 2005 and 56% in 2009) has lower chances to exit to another job (45% and 37% lower than average) but high chances to exit to non-employment. The smallest proportion of individuals belong to the most stable group (5% in 2005 and 3% in 2009) in which all exit hazard rates are lower than the average.

**Baseline Hazard Estimates**

Figure 5 shows the survival and hazard functions of the competing risks model for a benchmarck person. Unlike Figures 1 to 4, observed and unobserved heterogeneity are controlled for through the covariates and frailty terms, so that slopes can be interpreted as true state dependence. The top panel shows, for instance, that in the benchmarck group in 2005, 43% would move to another job within 1 year, 21% would become unemployed and 41% non-employed, so that the probability of ending the current job would be 73% (1-0.56*0.78*0.59)*100). In 2009, the probability to switch to another job has fallen by 11% points, while the probability to become unemployed has increased by 18% points and the likelihood to become non-employed has slightly fallen. Adding up these three, the bechmarck group's probability to ending the job remains virtually constant, in line with the flat separation pattern over the business cycle found by Bachman (2005). Correspondingly, while the overall median job duration (not shown) was approximately seven months in both periods, the median job durations (assuming other competing risks do not exist) for exits to other jobs increased from 14 to 19 months and for non-employment from 16 to 19 months, but decreased from 25 to 15 months for unemployment transitions.

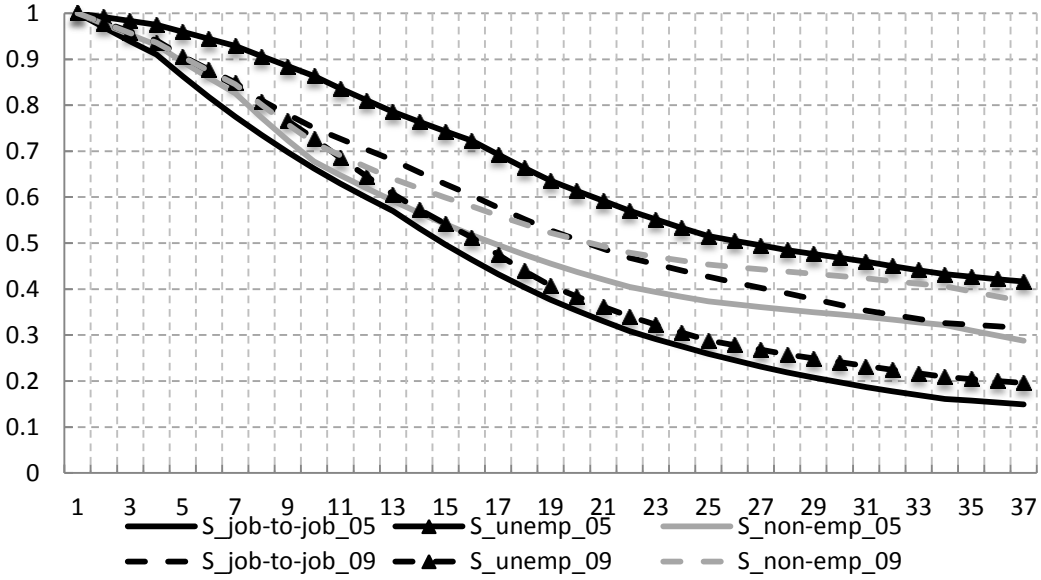
The botton panel shows the corresponding hazard rates. Exits to other jobs are more likely than exits to unemployment during the expansion period, while the opposite is found in the downturn (except for 7-9 months). This confirms that hazard rates into unemployment are countercyclical while hazard rates for job-to-job exits or into non-employment are procyclical, resulting in an almost constant overall hazard over the business cycle.

García-Perez and Muñoz-Bullón (2005) found that the hazard into unemployment is counter-cyclical only for short employment spells (under 5 months) and García-Pérez (1997), for the period 1978-1993, found weakly pro-cyclical pattern for short jobs and a-cyclical patterns for jobs longer than six months. The international evidence, however, reveals strong counter-cyclicality.

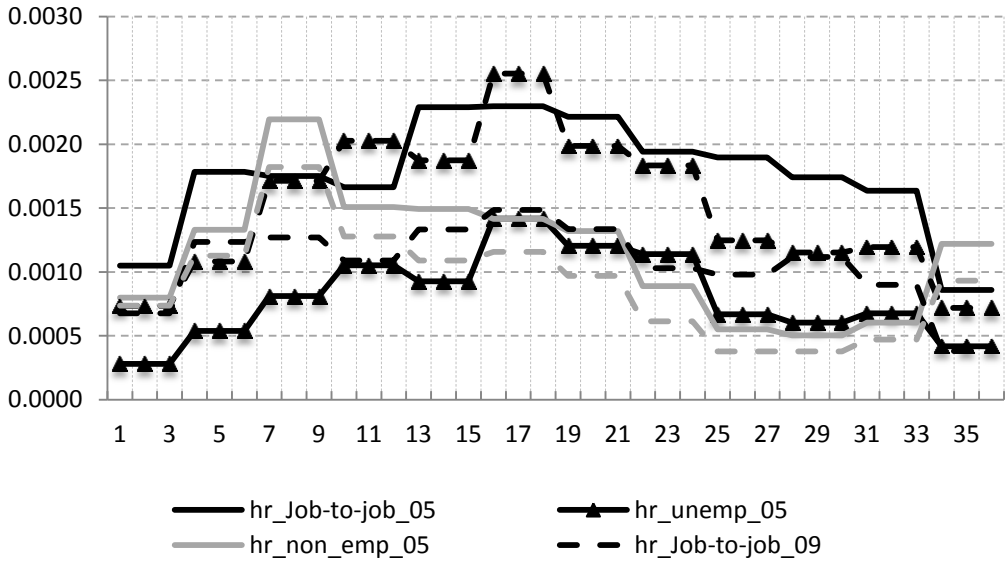
For exits to other job and unemployment, we find slight positive duration dependence during the first 1.5 years of employment, stronger in exits to unemployment in 2009 and in transitions to other job in 2005, that subsequently turns

negative. These patterns might be explained by job matching theory. In a first stage hazard rates increase since employers and employees are learning from the matching quality; thereafter job exits decline and good matches survive. Since job-to-job exits dominate in 2005 and job-to-unemployment exits in 2009, the job separation process is more an employee decision in 2005 (given that in the expansion period workers have more chances to leave poor matches), while in 2009 job separations are more driven by employer decisions and workers are willing to remain in a poor match due to the lack of job oportunities. The initially increasing pattern of the job-to-unemployment hazard may also be explained by the lower number of workers entitled to unemployment benefits[22] after a few days of contribution.

**Figure 5. Survival functions (top panel) and hazard rates (bottom panel) benchmark person for job, unemployment and non-employment transitions; 2005 and 2009 samples; competing risks model**




[22] The minimum contributory period required to be entitled to the unemployment insurance benefit is 12 months in the last 6 years. For the means tested assistance benefits, it is 3 (with family responsibilities) or 6 months in the last 6 years for individuals without family responsibilities.




*Note: Benchmarck individual: male, low-skilled, non-manual occupation, native, 25-29 Aged, No children, services sector, Non-High-Technology, temporary contract, firm size 1-9, No through temporary Agency, private sector. For continuous variables mean value is taken.*

**Sensitivity analysis**

Table A3 in the Appendix shows the results of a competing risks model for exits to stable and unstable jobs in which the two shared frailty terms follow independent Gamma distributions. Comparing to the correlated competing risks model in Table 4 shows that the coefficients retain the same sign and similar size. Significance levels are also similar; only four coefficients change the significant level.

### 6.2 The role of compositional variation and business cycle in job duration

Table 7 shows the results of decompositions[23] of the difference between the survival probabilities after 360 days in the periods before and during the crisis, in the spirit of, for example, Verho (2014). The first rows give the average survival probabilities for the two samples according to the model estimates[24] and the difference between these two. For example, according to the competing risk model

[23] The decomposition analysis is only studied for the competing risks model since it is not relevant for any exit given that job duration hardly change and is the result of a combination of very different risks (other job vs unemployment).

[24] Here for simplicity the time-varying variables are considered constant over time. We use the age and the daily wage at the moment of starting the new job. And the average regional unemployment rate in the period considered by gender.

the average probability of not switching to another job (assuming no other exit possibilities) was 71.76 percent, which increased to 80.44 percent in the 2009 sample, a difference of 8.69 percentage points. In the same line, the average of not exiting to non-employment increased from 61.76 percent in 2005 to 72.6 percent in 2009. In contrast, the probability of not becoming unemployed decreased substantially from 83.8 percent in 2005 sample to 66.38 percent in 2009 sample.

The remaining rows show the decomposition of these differences. First, we take the 2005 estimates and the 2005 regional unemployment rates, but compute the average probabilities for the new job starters in the 2009 sample. Comparing with the 2005 probabilities in row 3 gives the composition effect: the difference explained by the fact that individual and job characteristics in the 2009 and 2005 samples are different.

Despite the significant changes in the sample characteristics examined in section 3, the composition effect explains partially the substantial changes in transitions to other jobs and to unemployment, only about 6 percent of the differences. In contrast, sample composition differences explain almost half of the total differences in non-employment.

**Table 7 Decomposition analysis for exits from the current job to other job, unemployment and non-employment.**

| | Other job | | Unemployment | | Non-employment | |
|---|---|---|---|---|---|---|
| **Total Effect** | **8.69%** | **100%** | **-17.51%** | **100%** | **10.91%** | **100%** |
| $\overline{S^{09}_{09,,09}}$ | 80.44% | | 66.38% | | 72.67% | |
| $S^{05}_{05,,05}$ | 71.76% | | 83.89% | | 61.76% | |
| **Composition effects** | **0.56%** | **6%** | **-1.31%** | **7%** | **5.22%** | **48%** |
| **Business cycle effects** | **8.12%** | **94%** | **-16.20%** | **93%** | **5.69%** | **52%** |

*Note: For composition effects we fix 2005 model and for the business cycle effect we fix 2009 sample.* For notation, $\overline{S^{m}_{,s,p}}$ as the average survival probability at month 12, under the model m (2005, 2009), for the sample *s* (2005, 2009), using the average regional unemployment rate of the period *p* (2005, 2009).
*Source: Own elaboration from LWLS.*

## 5 Conclusions

In this paper we have analysed the nature and job stability of new job matches starting before (2005) and during the recent recession (2009). Job transitions were

explored for an observed window of three years distinguishing several destination states, with single and competing risk models using a large administrative data set from the Spanish Social Security Administration.

Changes in the sample composition of new job matches reveal substantial variation in the characteristics of new match starters and jobs over the business cycle, due to both supply and demand factors. For example, in a context of excess supply of labour, more experienced workers start a new job. The proportion of immigrants, specifically non-Spanish speaker immigrants, also increases. The crisis leads to a fall of construction and manufacturing jobs implying, in turn, a reduction of new matches in the group of males that are overrepresented in these sectors. .

Comparing new jobs tenure in the expansion and recession period, we find that the distribution of durations in new jobs remains steady over the business cycle. Interestingly, this hides two opposing forces that cancel out: the procyclicality of job turnover and job-to-non-employment transitions and the countercyclicality of hazard rates to unemployment. Exits to other jobs and to non-employment (more supply driven) are more likely than exits to unemployment (more demand driven) in a period of economic growth. The opposite is true in the downturn.

Job hazards to unemployment and other jobs confirm the matching theory pattern: they show a first stage of positive duration dependence (first 1.5 years) that subsequently turns negative.

The current study has the limitation that neither the quality of a match nor the job options at the separation time are directly observed. Both depend on the business cycle and influence job duration. For instance, we cannot determine whether the reduction in the hazard of exits to other jobs in the recession period is due to better matching or a scarcity of job offers that make individuals keep their job even if the match is rather poor.

A decomposition analysis shows that changing characteristics of the pool of new job starters explain virtually nothing of the substantial changes of exits to other jobs or unemployment. However, changes in average survival functions of non-employment are equally explained by both sample composition effects and business cycle effects.

Job exits to unemployment are the most worrying issue for policy purposes, because of their implications: the unemployment rate, welfare, human capital accumulation, social and health problems.[25] This makes identifying those individuals hit hardest by the financial crisis essential. These are males and young workers (16-29), those with primary education level, those working in manual occupations, Spanish speaking immigrants, and workers in the construction sector.

During the economic crisis, the disproportionally higher growth in the number of transitions to unemployment for less qualified workers might be explained by their higher replaceability and lower training and hiring costs compared to higher qualified individuals. In order to enhance job stability of low-qualified and more vulnerable workers, trapped in secondary jobs, active labour market policies need to be provided, such as facilities for on the job training[26] accompanied with specific social protection measures.

The proportion of workers starting a new job in large firms in 2009 is slightly lower than in 2005, but new jobs starters have more stable jobs in larger firms especially during the downturn. From a worker perspective, this result sheds light upon the current policy debate of the necessity of stimulating the growth of Spanish firm size to increase the productivity and employment stability, in line with the strategy of Europe 2020 of sustainable growth.

Current policy proposals also point out to boost firms to introduce into new emergent sectors. Our results show that during the crisis fewer new hirings were signed by firms intensive in high technology but those new jobs are more stable than those starting in non-intensive technology sector during both economic periods. In a sector intensive in knowledge, human capital accumulation is crucial what should lead to enhance job stability.

[25] According to Silva and Vázquez-Grenno (2013), from a macroeconomic perspective, the contributions of the employment-unemployment rate is much more important than that of the job finding rate in explaining fluctuations in Spain's unemployment rate. Transitions from unemployment to employment, that also explain the unemployment rate, were already analyzed in Nagore and van Soest (2014).

[26] Currently among active labour market policies, dual training and employment programs are already provided to unemployed combining employment and training in a training center (Royal Decree 1529/2012, of 9 November). On the other hand, qualified dual vocational training programs are boosted.

## Appendix A

## Table A1: Definitions of explanatory variables.

| | |
|---|---|
| **Individual characteristics** | |
| **Male** | 1 if male. |
| **Age at the moment of exiting the current job** | 16-19; 20-24; 25-29; 30-34; 35-39; 40-44; 45-49; 50-55. It is a time varying covariate. |
| **Spanish-speaking immigrants** | 1 if immigrant comes from a Spanish-speaking country. |
| **Non-Spanish speaking immigrants** | 1 if immigrant comes from a non-Spanish-speaking country. |
| **Dummy children_4** | 1 if the individual has children younger than 4 years old. It is a time-varying covariate. |
| **Dummy children_15** | 1 if the individual has children between 4 and 15 years old. It is a time-varying covariate. |
| **Primary education** | 1 if none and elementary education level. |
| **Lower secondary** | 1 if lower secondary education level (middle school) |
| **Upper secondary** | 1 if upper secondary education level (high school) |
| **Post-secondary** | 1 if tertiary education level |
| **Macroeconomic variables** | |
| **Unemployment rate** | Quarterly unemployment rate by gender and region of residence (time-varying); source: Economically Active Population Survey (EPA). Time varying covariate. |
| **Inhabitants>40,000** | 1 if the number of inhabitants of the municipality where the individual is living is greater than 40.000. Time-varying covariate. |
| **Current job spell variables** | |
| **Non-manual occupation** | 1 if non-manual occupation |
| **Sector of activity** | Manufacturing, construction and services. |
| **High Technology** | 1 if sector of activity in high technology according with the classification of industries by technologic level. |
| **Type of contract** | Permanent, on-call temporary, temporary, open-ended. |
| **Part-time coefficient** | Hours worked as a fraction of full time work (1 in a full time job) |
| **Temporary Agency** | 1 if the employment is signed through a temporary help agency. |
| **Size of the firm** | Dummies for 0 (missing), 1-19, 10-19,20-49,50-249, >250 |
| **Daily wage** | Real annual wage (gross salary) divided by the number of days worked in the year by employer. For reliability we have applied a filter in 1st and 99th percentile to this variable. It is a time-varying variable |
| **Public Sector** | 1 if the employer is Public Sector. |

*Source: Own elaboration*

*Note: Education level is constructed as a constant variable from the more recent LWLS given that from 2009 LWLS information for education level is more reliable.*

**Table A2: Sample selection**

| | Number of individuals | |
|---|---|---|
| **Filters** | **2005 sample** | **2009 sample** |
| Individuals starting any job spell in the year of reference between 16 and 53 years old | 328,641 | 282,670 |
| Drop individuals with lack of relevant information | 233 | 0 |
| Drop individuals from agriculture industry | 44,638 | 43,747 |
| After merging consecutive job spells, drop spells starting before the year of reference | 19,134 | 16,631 |
| Drop spells shorter than 32 days and not real labour relationships | 26,024 | 29,906 |
| Drop learning or apprenticeship contracts | 4,478 | 6,382 |
| Drop overlapped spells and incidences | 5,319 | 6,518 |
| Drop spells because of missing information of current type of contract(*) and salaries lower than the 1st percentile or higher than 99th percentile. | 52,396 | 38,333 |
| **Final sample (number of individuals)** | **176,419** | **141,153** |

*Source: Own elaboration from 2005-2007 LWLS and 2009-2011 LWLS.*

*Note: Data from fiscal module exclude information of Regime of household, individuals paying personal taxes in Basque Country and Navarra.*

**Table A3: Estimation results of single risk and competing risks model with independent shared frailty terms with gamma distribution; 2005 and 2009 samples.**

| | 2005 | | | | 2009 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Any exit** | **Job** | **Unemployment** | **Non-employment** | **Any exit** | **Job** | **Unemployment** | **Non-employment** |
| **Unemployment rate** | -0.335*** | -2.374*** | 2.283*** | -0.357*** | 0.353*** | -0.713*** | 1.393*** | -0.249*** |
| | (0.0806) | (0.149) | (0.163) | (0.124) | (0.0533) | (0.124) | (0.0822) | (0.0944) |
| **Male** | -0.0357*** | 0.0791*** | -0.271*** | -0.0458*** | -0.0143** | 0.0531*** | -0.116*** | 0.0135 |
| | (0.00697) | (0.0120) | (0.0153) | (0.0109) | (0.00632) | (0.0142) | (0.0102) | (0.0108) |
| **Aged_16_19** | 0.306*** | -0.319*** | -1.061*** | 0.850*** | 0.321*** | -0.478*** | -0.851*** | 0.943*** |
| | (0.0125) | (0.0264) | (0.0519) | (0.0169) | (0.0172) | (0.0554) | (0.0482) | (0.0231) |
| **Aged_20_24** | 0.140*** | -0.0400*** | -0.233*** | 0.416*** | 0.132*** | -0.109*** | -0.159*** | 0.458*** |
| | (0.00766) | (0.0130) | (0.0189) | (0.0119) | (0.00918) | (0.0212) | (0.0162) | (0.0147) |
| **Aged_30_34** | -0.0563*** | -0.0714*** | 0.0895*** | -0.138*** | -0.0550*** | -0.0724*** | 0.0423*** | -0.176*** |
| | (0.00799) | (0.0128) | (0.0168) | (0.0136) | (0.00887) | (0.0189) | (0.0139) | (0.0160) |
| **Aged_35_39** | -0.0941*** | -0.164*** | 0.0914*** | -0.154*** | -0.0668*** | -0.133*** | 0.0577*** | -0.198*** |
| | (0.00917) | (0.0150) | (0.0186) | (0.0156) | (0.00963) | (0.0210) | (0.0147) | (0.0177) |
| **Aged_40_44** | -0.114*** | -0.232*** | 0.0902*** | -0.149*** | -0.0626*** | -0.173*** | 0.0856*** | -0.214*** |
| | (0.0101) | (0.0170) | (0.0200) | (0.0171) | (0.0104) | (0.0234) | (0.0156) | (0.0194) |
| **Aged_45_49** | -0.190*** | -0.341*** | 0.0697*** | -0.249*** | -0.0684*** | -0.219*** | 0.0978*** | -0.247*** |
| | (0.0112) | (0.0191) | (0.0212) | (0.0190) | (0.0112) | (0.0257) | (0.0164) | (0.0211) |
| **Aged_50_55** | -0.203*** | -0.471*** | 0.124*** | -0.237*** | -0.0808*** | -0.330*** | 0.105*** | -0.251*** |
| | (0.0138) | (0.0247) | (0.0249) | (0.0237) | (0.0131) | (0.0315) | (0.0187) | (0.0250) |
| **Spanish speakers** | 0.130*** | 0.172*** | -0.317*** | 0.309*** | 0.108*** | 0.00551 | 0.0203 | 0.322*** |
| | (0.0119) | (0.0192) | (0.0301) | (0.0187) | (0.0121) | (0.0284) | (0.0192) | (0.0207) |
| **Non Spanish speakers** | 0.140*** | 0.0763*** | -0.101*** | 0.335*** | 0.0626*** | 0.0407* | -0.113*** | 0.317*** |
| | (0.0112) | (0.0187) | (0.0257) | (0.0179) | (0.00927) | (0.0214) | (0.0149) | (0.0158) |
| **Children_4** | 0.00584 | -0.0253* | 0.0849*** | -0.00682 | -0.000281 | -0.0344* | 0.0757*** | -0.0742*** |
| | (0.00821) | (0.0136) | (0.0166) | (0.0137) | (0.00854) | (0.0190) | (0.0126) | (0.0158) |
| **Children_15** | -0.0161** | -0.0115 | 0.0366*** | -0.0630*** | 0.000596 | 0.0263 | 0.0558*** | -0.112*** |
| | (0.00709) | (0.0119) | (0.0135) | (0.0121) | (0.00721) | (0.0163) | (0.0104) | (0.0138) |
| **Primary_education** | 0.0314*** | -0.0210* | 0.0258* | 0.0957*** | 0.0351*** | -0.0469** | 0.0911*** | 0.0209 |
| | (0.00705) | (0.0122) | (0.0143) | (0.0115) | (0.00753) | (0.0185) | (0.0110) | (0.0137) |
| **Upper-secondary** | 0.0148** | -0.0235** | -0.142*** | 0.107*** | 0.00370 | 0.0191 | -0.142*** | 0.131*** |
| | (0.00678) | (0.0115) | (0.0146) | (0.0109) | (0.00733) | (0.0166) | (0.0117) | (0.0127) |
| **Post-secondary** | 0.0354*** | 0.0229 | -0.480*** | 0.215*** | -0.0675*** | 0.0561*** | -0.462*** | 0.157*** |
| | (0.00864) | (0.0147) | (0.0210) | (0.0133) | (0.00951) | (0.0204) | (0.0169) | (0.0157) |

**Continuation Table A3**

| | 2005 | | | | 2009 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Any exit** | **Job** | **Unemployment** | **Non-employment** | **Any exit** | **Job** | **Unemployment** | **Non-employment** |
| **Inhabitants>40,000** | -0.0390*** | -0.0393*** | 0.0236** | -0.0708*** | -0.0190*** | -0.0584*** | 0.0176** | -0.0435*** |
| | (0.00518) | (0.00879) | (0.0110) | (0.00836) | (0.00562) | (0.0128) | (0.00872) | (0.00987) |
| **Non manual** | -0.164*** | -0.0613*** | -0.250*** | -0.198*** | -0.159*** | -0.0244 | -0.294*** | -0.102*** |
| | (0.00657) | (0.0113) | (0.0142) | (0.0103) | (0.00700) | (0.0158) | (0.0114) | (0.0118) |
| **Construction** | -0.207*** | -0.0508*** | -0.323*** | -0.310*** | 0.0118 | -0.142*** | 0.216*** | -0.235*** |
| | (0.00778) | (0.0124) | (0.0170) | (0.0131) | (0.00875) | (0.0202) | (0.0129) | (0.0169) |
| **Manufacturing** | -0.219*** | -0.324*** | 0.00492 | -0.272*** | -0.114*** | -0.253*** | 0.0139 | -0.245*** |
| | (0.00939) | (0.0162) | (0.0179) | (0.0156) | (0.0113) | (0.0261) | (0.0161) | (0.0216) |
| **High_technology** | -0.0242** | 0.0833*** | -0.119*** | -0.0691*** | -0.0529*** | 0.0610* | -0.0579** | -0.132*** |
| | (0.0101) | (0.0165) | (0.0224) | (0.0163) | (0.0181) | (0.0358) | (0.0290) | (0.0335) |
| **Dummy missing firm size** | 0.661*** | 0.969*** | 0.454*** | 0.479*** | 0.693*** | 0.980*** | 0.634*** | 0.615*** |
| | (0.0109) | (0.0172) | (0.0262) | (0.0179) | (0.0142) | (0.0310) | (0.0237) | (0.0241) |
| **size_10_19** | -0.0780*** | -0.0512*** | -0.148*** | -0.0802*** | -0.130*** | -0.107*** | -0.174*** | -0.121*** |
| | (0.00873) | (0.0145) | (0.0185) | (0.0142) | (0.00936) | (0.0210) | (0.0142) | (0.0168) |
| **size_20_49** | -0.131*** | -0.113*** | -0.237*** | -0.121*** | -0.166*** | -0.176*** | -0.219*** | -0.141*** |
| | (0.00809) | (0.0135) | (0.0171) | (0.0131) | (0.00878) | (0.0198) | (0.0135) | (0.0156) |
| **size_50_249** | -0.177*** | -0.247*** | -0.241*** | -0.125*** | -0.234*** | -0.332*** | -0.284*** | -0.175*** |
| | (0.00770) | (0.0132) | (0.0159) | (0.0123) | (0.00825) | (0.0189) | (0.0128) | (0.0143) |
| **size_250** | -0.244*** | -0.379*** | -0.338*** | -0.124*** | -0.337*** | -0.537*** | -0.370*** | -0.231*** |
| | (0.00858) | (0.0150) | (0.0182) | (0.0134) | (0.00945) | (0.0217) | (0.0150) | (0.0161) |
| **Open-ended** | 0.0121 | -0.891*** | 0.744*** | -0.304*** | -0.0162 | -0.886*** | 0.349*** | -0.296*** |
| | (0.0143) | (0.0389) | (0.0203) | (0.0253) | (0.0123) | (0.0417) | (0.0162) | (0.0231) |
| **Permanent** | -1.717*** | -1.439*** | -2.023*** | -1.973*** | -1.554*** | -1.183*** | -1.704*** | -1.803*** |
| | (0.00887) | (0.0127) | (0.0193) | (0.0150) | (0.00959) | (0.0172) | (0.0154) | (0.0171) |
| **On-call Temporary** | -0.0851*** | -0.124*** | -0.302*** | 0.0682*** | -0.00171 | 0.0263 | -0.178*** | 0.201*** |
| | (0.0122) | (0.0223) | (0.0247) | (0.0187) | (0.0116) | (0.0266) | (0.0187) | (0.0195) |
| **Temporary Agency** | 0.625*** | 1.097*** | 0.155*** | 0.390*** | 0.529*** | 1.133*** | 0.245*** | 0.414*** |
| | (0.0112) | (0.0178) | (0.0300) | (0.0180) | (0.0140) | (0.0277) | (0.0254) | (0.0241) |
| **Public Sector** | -0.120*** | -0.536*** | 0.211*** | -0.0186 | -0.00812 | -0.285*** | 0.166*** | -0.0165 |
| | (0.0113) | (0.0228) | (0.0212) | (0.0173) | (0.0105) | (0.0260) | (0.0162) | (0.0179) |
| **ln_daily_salary** | -0.0167** | 0.173*** | 0.138*** | -0.231*** | 0.0129* | 0.235*** | 0.0611*** | -0.137*** |
| | (0.00720) | (0.0124) | (0.0153) | (0.0113) | (0.00734) | (0.0166) | (0.0118) | (0.0123) |
| **Part time coef.** | -0.188*** | 0.127*** | 0.729*** | -0.611*** | -0.189*** | -0.154*** | 0.559*** | -0.757*** |
| | (0.0159) | (0.0298) | (0.0374) | (0.0237) | (0.0160) | (0.0377) | (0.0276) | (0.0261) |
| **Ln Theta** | -2.995*** | -1.459*** | -15.13 | -1.312*** | -4.237*** | -0.903*** | -3.478*** | -1.336*** |
| | ( 0.0812) | (0.0488) | (170.6) | (0.0425) | (0.305) | (0.0571) | (0.405) | (0.0557) |

**Continuation Table A3**

| | 2005 | | | | 2009 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Any exit** | **Job** | **Unemployment** | **Non-employment** | **Any exit** | **Job** | **Unemployment** | **Non-employment** |
| **Observations** | 903,147 | 903,147 | 903,147 | 903,147 | 715,705 | 715,705 | 715,705 | 715705 |
| **Number of groups** | 176,419 | 176,419 | 176,419 | 176,419 | 141,153 | 141,153 | 141,153 | 141153 |
| **Number of exits** | 171,806 | 63,314 | 35,476 | 73,016.00 | 138,467 | 29,627 | 57,825 | 51,015 |
| **LogLikelihood** | -282,342 | -161984 | -100688 | -183439 | -225,704 | -92,785 | -131,362 | -134258 |
| **theta** | 0.0500 | 0.232 | 2.70e-07 | 0.269 | 0.0144 | 0.405 | 0.0309 | 0.263 |

*Note: Single risk and competing risks estimation: piecewise baseline and shared frailty assuming Gamma distribution for unobserved heterogeneity. Both 2005 and 2009 LR test show that frailty is significant (p-value=0.000).*
*References categories: female, Native Spanish, low skilled level, manual occupation, Aged_25_29, services sector, size_1_9, temporary contract. Age, unemployment rate, dependent children and daily salary are time-varying variables.*
*Significant levels: ***p<0.01, ** p<0.05, * p<0.1*

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