



Great Recession and Disability in Spain

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Abstract

In this paper we evaluate the impact of the business cycle on participation in the Disability Insurance (DI) program in Spain in the context of the Great Recession, which has been particularly strong in this country. We follow two approaches. First, we use regional administrative data to estimate the effect of the regional unemployment rate on the number of applications, denials and allowances to the DI rolls. Second, we use longitudinal panel data to estimate the effect of the business cycle on transitions from different labor market states to the DI rolls. Our results show a pro-cyclical behavior of participation in DI during the years of the Great Recession. This is in contrast to the countercyclical response documented both for other countries as well as for Spain before 2008. We document some facts that partially explain why DI benefits have become pro instead of countercyclical during the Great Recession in Spain. Our results provide valuable evidence for policy-makers as they highlight that some of the disabled population may be left economically uncovered during the worst of times.

KEY WORDS: Disability, Great Recession, labour market transitions

JEL CLASSIFICATION: I13, I38, J14.

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1. Introduction

Disability Insurance programs are the largest Social Security programs devoted to working age individuals in most developed countries. In 2007, for the mean of OECD countries, DI programs represented 1,2% of GDP, 10% of social expenditure and 285% of unemployment benefits (OECD 2010). At the same time, during the last decades and until the beginning of the Great Recession in 2008, these programs have experienced steady increases in terms of beneficiaries in many of these countries, which has been translated into sharp increases in the costs of these programs. In the US, for example, some authors are raising concerns about the financial sustainability of the DI program (Burkhauser and Daily 2011; Board of Trustees 2012; Maestas, Muller and Strand 2013; Burkhauser et. al. 2014; Autor 2015). In this country, DI rolls have risen from 1,5 millions in 1970 to 8.9 millions in 2013⁵.

One of the factors that has been identified as contributing to the increase in DI rolls is the business cycle. Bad labor market conditions are assessed to be important determinants of the rise in applications and allowances to DI in recent decades. From a theoretical point of view, the increase in unemployment associated with recessionary periods (which is potentially higher for disabled individuals) results in a decline in the labor market expectations of individuals who lose their jobs or foresee higher difficulties in finding one. In this situation, DI becomes an appealing option to maintain a certain permanent level of income, which translates into increases in the numbers of DI claimants. If DI agencies do not change the stringency of the system, this, in turn, translates into an increase in the number of individuals in the DI rolls. Furthermore, recessionary periods can be associated with a deterioration in health conditions (either objective or self-assessed health) and with an increase in work-related illnesses or accidents (as a result of a deterioration in working conditions). These two mechanisms further contribute to the increase in the number of disabled individuals and, consequently, lead to higher DI beneficiary rates.

This theoretical countercyclical behavior of participation in DI is well documented in the empirical literature. There is a considerable amount of studies documenting an increase in the number of DI applications and awards in periods of bad economic conditions. Some of them, using administrative data on applications and awards for DI, show a positive and significant

⁵ These numbers refer only to the Social Security Disability Insurance (SSDI) program in the US and they exclude participants in the Supplemental Security Income (SSI) program.

impact of the unemployment rate on the number of applications and awards for DI (see, for example, Rupp and Stapleton 1995; Lindner and Burdick 2013; Maestas, Mullen and Strand 2015). Other studies deep further in this issue and try to determine the mechanism driving this relationship. Bratsberg, Fevang and Road (2013) show a causal relationship between job loss and applications for DI in Norway. Korkeamäki and Kyyrä (2012) show that transitions to disability are used by employers as a strategy to reduce the workforce in periods of bad economic conditions. The countercyclical behavior of DI participation is also documented for Spain. Jiménez-Martín et al (2006), show that, keeping constant the objective health requirements to receive a disability benefit as defined by the Social Security Administration in Spain, the probability of receiving a disability benefit is higher in regions with a higher unemployment rate. Two other studies, Benitez-Silva et al (2010) and Jimenez-Martin and Vall (2009), use administrative data for Spain for the years before 2008 and find a positive (negative) and significant effect of the unemployment rate (GDP growth rate) on the inflow to DI. In this line, other authors point that permanent disability benefits were used extensively as an early retirement mechanism for workers in restructuring industries or as substitutes for long-term unemployment subsidies in depressed Spanish regions during the late 1970s and 1980s (see Boldrin et al, 1999 and García-Gomez et al, 2012). Recent descriptive evidence, however, points to a reversal of this historical countercyclical behavior of DI participation in Spain and this change in trends seems to coincide with the beginning of the Great Recession in 2008. In view of this recent descriptive evidence, the aim of this paper is to estimate the effect of business cycle conditions on DI participation in Spain during a period of a strong deterioration of labor market conditions, the 2008-2013 Great Recession.

None of the above-mentioned studies for Spain includes the period of the Great Recession in the analysis. As for the literature focusing on other countries, there is only one paper by Maestas et al. (2015) which analyzes the relationship between business cycle conditions and DI participation during the current economic crisis. In the paper, the authors estimate regional regressions of the number of applications and allowances to DI on the regional (state) unemployment rate, differentiating between the periods before and after the Great Recession in the US. They find a statistically significant countercyclical behavior of applications both before and during the Great Recession, and a statistically significant procyclical behavior of allowances also in both periods, although it becomes non-significant during the Great Recession.

To estimate the effect of business cycle conditions on participation in the DI program in Spain we follow two complementary strategies. First, we use aggregate administrative data to estimate regressions at the regional level of the number of applications, denials and allowances for DI on

the regional unemployment rate. Second, we estimate the effect of the cycle on the individual probability to transit from either employment or unemployment to the DI rolls using a panel dataset constructed with administrative records from the Spanish Social Security Administration. Panel data models allow us to improve the consistency of our estimates, reduce the possible biases, and look deeper at the heterogeneity of our findings.

The results for the aggregate regional regressions show that applications for DI are countercyclical. However, the coefficients are not statistically significant and of a small size, suggesting that applications are little responsive to the business cycle in the case of Spain, in contrast to the vast majority of other countries. On the other hand, the number of allowed applications to DI becomes procyclical after the onset of the Great Recession, and the number of denied applications becomes strongly countercyclical. This procyclicality of the inflow to DI during the years of the Great Recession in Spain contrasts with the evidence for a large number of countries before the Great Recession. Furthermore, this change of behavior in the years of the Great Recession, with allowances turning procyclical and denials turning strongly countercyclical, is not found in the US (see Maestas et al 2015). There are several arguments that could be used to explain these new findings and we document two of them. First, we show that the reduction of the weight of the industry and construction sectors in total employment, which are sectors that have been characterized by high indices of illnesses and accidents, partly contributed to the reduction of the inflow to DI during the years of the crisis. Second, although the stringency of DI entry was not officially modified during the years of the Great Recession, the Spanish government implemented a strong program of public expenditure cuts. Thus, our results provide partial evidence supporting the hypothesis that the Social Security Administration (in charge of the DI granting process) may have informally reduced the relative number of disability benefits granted in order to reduce public expenditure during the years of the Great Recession.

To the best of our knowledge, this is the first paper that reports changes from a counter to a procyclical behavior of DI participation in a period of extreme recessionary conditions. Thus, the previously reported countercyclical behavior of DI benefits may only apply during mild changes in business cycle conditions but may not be relevant when the economy faces strong economic crisis. Our results provide valuable evidence for policy-makers as they highlight that some of the disabled population may be left economically uncovered during the worst of times.

The rest of the paper is organized as follows. Section 2 describes the Disability Insurance program in Spain. Section 3 provides aggregate evidence on the evolution of DI participation and the business cycle phase in Spain and presents the results of the estimation of regional

regressions using aggregate administrative data on DI participation. Section 4 describes the data and the econometric approach used to identify the effect of business cycle conditions on the DI inflow rate using individual panel data. Section 5 presents the results of the individual models and section 6 concludes.

2. The Disability Insurance Program in Spain.

In Spain, there are two types of permanent disability benefits: i) contributory, which are given to individuals who have generally contributed to the Social Security system before the onset of the disabling condition and; ii) non-contributory, which are given to individuals who are assessed to be disabled but have never contributed to the Social Security system (or do not reach the minimum contributory requirement period to access the contributory system). Non-contributory disability benefits are means-tested and managed at the regional level.⁶

The size of the non-contributory system is relatively small compared to the contributory one. In 2012, the number of beneficiaries was 940843 in the contributory system and 194896 in the non-contributory one. In the same year, the mean monthly benefit (paid in 14 installments) was 891,24 euros in the contributory system and 383,12 euros in the non-contributory. In this paper we focus on the contributory system as it represents the largest part of the DI system expenditures and it is the only program included in the administrative database that we use.

The Social Security defines the permanent contributive disability benefit as the income used to compensate the individual for losing a certain amount of wage or professional earnings when affected by a permanent reduction or complete loss of his/her working ability due to the impact of a pathologic or a traumatic process derived from an illness or an accident.

In order to capture the different situations in which a person can be after suffering from a disabling condition, the Spanish Social Security Administration uses a classification of three degrees of disability that depend on the working capacity lost⁷:

⁶ Income is evaluated yearly. The income threshold in 2010 was set at 4755.8 euro per year for an individual living alone. This amount is adjusted if the individual lives with other members.

⁷ Historically there was also a fourth degree, permanent limited disability for the usual job, which has practically fallen into disuse. Very few disabled individuals currently belong to this category. Among all individuals that were receiving a disability benefit at some point during the years 2008 to 2013, only 0.11% of them are classified into this degree. Individuals in this level of disability only receive a one-time lump sum payment.

- (i) Partial disability: the individual is impaired to develop all or the fundamental tasks of his/her usual job or professional activity, but he/she is still capable of developing a different job or professional activity.
- (ii) Total disability: the individual is impaired for the development of any kind of job or professional activity.
- (iii) Severe Disability: Individuals who, as a result of anatomic or functional losses, need the assistance of a third person to develop essential activities of daily living such as eating, moving, etc...

The eligibility requirements and the benefit amount depend on the source of the disability (ordinary illness, work related or unrelated accident, or occupational illness), the level of the disability and the age at disability onset. Table 1 summarizes the main parameters of both the eligibility criteria and the benefit formula. The total amount of the benefit is obtained by multiplying a percentage (which varies depending on the type and degree of the disability, as shown in the last row of Table 1, as well as on the number of years contributed to the system and the age at onset) to the regulatory base, which depends on the source of the disability and on previous salaries. The number of years used to compute the regulatory base depends on the source of the disability.

3. The DI System and the Business Cycle: Aggregate Evidence

Figure 1 shows the evolution of the number of new disability benefits granted each year (or inflow to DI) and the unemployment rate during the years 1976-2014 in Spain. Several things are worth mentioning. First, in contrast to other industrialized countries, the DI inflow in Spain does not show a continuous increase during the last decades (see, for example, Rupp and Stapleton 1995 or Autor and Duggan 2003 for the case of the USA; see OECD 2010 for other OECD countries). As stated before, this low historical increase in the inflow could be a result of the stringency of the Spanish system. More specifically, the government implemented a reform of the system in 1985 that increased the requirements to be granted a disability benefit. As clearly shown in Figure 1, this reform seems to have immediately reduced the inflow to DI and kept it at a low level since then. Second and most importantly, we observe a clear reversal of the cyclical behavior of the inflow since the beginning of the Great Recession in 2008. Before that year, the inflow shows a clear positive relationship with the unemployment rate. This

relationship sharply reverses since the beginning of the crisis in 2008, turning strongly negative. This apparent pro-cyclicality of the inflow to DI during the years of the Great Recession is surprising in light of the large evidence showing a countercyclical response of DI participation before the years of the Great Recession in the majority of developed countries (including Spain). Figure 2 shows the total number of applications for DI together with the unemployment rate during the years 1991-2014. The behavior of applications seems quite similar to that of the inflow, again showing a strong negative relationship with the unemployment rate during the years of the Great Recession.

To quantify the direct effect of the business cycle on DI participation in Spain, we first follow a similar approach to several studies in the literature and estimate regional regressions of the number of applications, allowances and denials for DI on the regional unemployment rate. With the inclusion of fixed effects in the regressions that control for region and national time trends affecting the outcome variable, the regional and temporal variation of the unemployment rate should capture the effect of changes in local labor market conditions on the participation in the DI system. A similar exercise has been done in Benitez et al (2010) for the case of Spain in the period before the Great Recession and in Maestas et al. (2015) for the case of the United States but including also the period of the Great Recession⁸.

It is worth noting that the Great Recession has been particularly harsh and singular in Spain. The unemployment rate has experienced a rapid and continuous increase from 8,57% in the fourth quarter of 2007 to a pick of 26,94% in the first quarter of 2013, tripling the pre-crisis level. From 2013 the unemployment rate has kept a more or less constant evolution until a level of 23,78% in the first quarter of 2015, the moment in which it begins to decrease slightly. In the United States, the unemployment rate was 4,7% in October 2007. It started increasing since then to a pick of 10% in October 2009, doubling the pre-crisis level. From the end of 2009 it has kept a relatively constant level until the third quarter of 2011. It has been decreasing since then, reaching an almost pre-crisis level of 5.1% in September 2015⁹. Although in both countries the unemployment rate has more than doubled the pre-crisis level in the picks of the recession, in Spain this pick is considerably higher. Furthermore, the recovery in the United States has started much earlier and has yielded unemployment rates similar to pre-crisis levels, while in Spain the unemployment rate has not started to fall until 2015 and is still very far from the pre-crisis level. The crisis has also been singular in Spain for the risk of bailout in 2011/2012 and the strong

⁸ To the best of our knowledge, Maestas et al. (2015) is the only paper that uses data of the Great Recession period to estimate regional regressions in order to identify the effect of labor market conditions on participation in Disability Insurance programs.

⁹ Figures for unemployment rates are taken from the Encuesta de Población Activa (EPA) for the case of Spain and from the Bureau of Labor Statistics for the case of USA.

social protection expenditure cuts experienced since then¹⁰. For these reasons, it is particularly interesting to see if the cyclical behavior of DI participation has changed during the period of the Great Recession in Spain.

To estimate the effect of labor market conditions on participation in DI we use aggregate administrative data provided by the Spanish Social Security Administration. The data correspond to the total number of applications, denials and allowances to the DI system by region¹¹ and year. We estimate the following regressions:

$$\ln(I_{rt}) = \beta_0 + \beta_1 UR_{rt} + \delta_r + \gamma_t + u_{rt}$$

Where I_{rt} is the outcome (either number of applications, number of denials or number of allowances) in year t and region r , UR_{rt} is the unemployment rate in year t and region r , δ_r are region fixed effects, γ_t are year fixed effects and u_{rt} is an error term. To account for the size of the different regions, regressions are weighted by the population aged 16-64 in each region and year. In this specification, β_1 measures the percentage increase in the outcome variable resulting from a 1 percentage point increase in the unemployment rate. In order to understand if there is a different reaction during the years of the Great Recession, we estimate a regression for each outcome for the years 1996-2014, 1996-2007 and 2008-2014.

Table 2 presents the results of the estimation, showing only the coefficient of interest, β_1 , for each regression. Several facts stand out. First, almost all coefficients are not statistically significant. Second, applications are countercyclical, and there is almost no difference in the coefficients before and during the Great Recession. Third, the effect on the number of allowed applications is positive before the start of the Great Recession, and becomes negative during the Great Recession. Finally, the effect on the number of denied applications, which is positive before the Great Recession, becomes considerably larger and statistically significant during the years of the Great Recession.

These results point to two relevant observations regarding the effect of labor market conditions on participation in DI in Spain. First, the absence of statistical significance and the low magnitude of the coefficients indicate that participation in DI (specially in terms of total

¹⁰ See <http://www.oecd.org/els/soc/OECD2014-Social-Expenditure-Update-Nov2014-8pages.pdf> for a recent update of Social Spending in OECD countries.

¹¹ The regions correspond to the 17 Spanish Autonomous Communities, which are the administrative divisions corresponding to the first level of administrative decentralization in Spain. Two of the administrative divisions (Ceuta and Melilla) have been excluded from the analysis due to their small size and their idiosyncratic characteristics.

applications) is little responsive to the business cycle in Spain, both before and after the Great Recession, in contrast to the strong countercyclical behavior found for other countries before the Great Recession (Benitez et al. 2010) and for the US also during the Great Recession (Maestas et al. 2015). Second, the results indicate a change in the behavior of allowed and denied applications during the period of the Great Recession compared to the years just before the start of the crisis. It seems that, during the period of strong deterioration of economic conditions in Spain, worse labor market conditions result in lower levels of allowed applications (and higher levels of denied applications), even when total applications increase. This negative reaction in the number of granted applications was not present in the years before the Great Recession. Furthermore, this change of behavior in the Great Recession is not observed in the United States. These results, therefore, are consistent with the strong financial restraint in the public sector budget experienced in Spain in the aftermath of the onset of the Great Recession. Although there has been no formal political action in the direction of increasing the stringency of the system, it is possible that disability agencies are informally but effectively being less generous in the number of disability benefits granted.

4. Individual Transitions to DI and the Business Cycle during the Great Recession.

In this section we further analyze the relationship between the business cycle and participation in DI using individual panel data for the years of the Great Recession. This strategy improves the previous analysis in section 3 in several dimensions. First, we use administrative data with a large number of observations. Second, we are able to control for a set of variables reflecting personal and labor market characteristics of individuals potentially correlated with their propensity to transit to the DI rolls. Third, the use of individual data allows us to differentiate between transitions from different labor market states (employment and non-employment). Finally, we are able to explore heterogeneity of the results along several dimensions, such as the sector of employment or the skill level of the individual.

4.1. Data and sample

We use the Muestra Continua de Vidas Laborales (MCVL) which is an administrative dataset constructed from the registers of the Spanish Social Security Administration. For each year since its first implementation in 2006, the dataset contains information on 4% of all individuals that have had at least one relationship with the Social Security Administration by being

employed, receiving contributory benefits (old-age, disability, orphan, widow, etc..) or receiving unemployment benefits. The dataset provides information on the characteristics of the employment situation of the individual if he is employed (type of contract, sector of activity, number of employees in the firm, etc.), on the characteristics of the benefits if he is receiving contributory benefits (type and amount of the benefit, etc.), and information on a set of demographic characteristics such as age, gender and education level. Furthermore, for each individual in any given year, we are able to reconstruct its entire labor market history from his first contributory spell.¹²

From this dataset between the years 2007-2013, we construct a balanced panel with quarterly information between the second quarter of 2007 (pre-crisis) and the fourth quarter of 2013. We restrict the sample to individuals aged 16-64 in order to focus the analysis on working age individuals susceptible of facing a decision between working and applying for DI.¹³ We differentiate between transitions of individuals that are employed and individuals that are non-employed. Therefore, we construct two separate samples for employed and non-employed individuals. The sample of employed individuals consists of all working age employees in each quarter during the period of analysis. Regarding the sample of non-employed, it is worth mentioning that our data does not allow us to distinguish whether the individual is actively looking for a job or not. Thus, we cannot differentiate between active and inactive individuals. Consequently, the sample of non-employed individuals corresponds to all individuals that are not working (irrespective of their activity status) in each quarter during the period of analysis.¹⁴ However, we make a restriction in order to exclude very inactive individuals that would be very insensitive to the business cycle. In the sample of non-employed individuals, we include only individuals that have had at least one previous employment spell before the period of analysis. This excludes individuals that for some reason will never enter the labor market, and young individuals that still have not had their first job. Additionally, we provide results relaxing this restriction and including therefore individuals with no previous labor market experience in order to test the sensitivity of the results to the definition of the non-employment state.

¹² To keep the sample at a reasonable size, we only consider a random sample of 40% of the initial database.

¹³ Individuals receiving disability benefits are automatically transferred to old-age benefits when they turn 65 years old.

¹⁴ We do not know whether the individual is receiving unemployment benefits. However, if we observe that the individual is not receiving unemployment benefits, we cannot assess whether he/she is looking for a job or not.

The final dataset has 419813 individuals observed during 28 quarters (from the second quarter of 2007 to the fourth quarter of 2013)¹⁵. From those individuals, 407435 do not receive disability benefits during the period considered while 12378 receive disability benefits at some point during the period. Table 3 shows descriptive statistics of both the sample of employees and the sample of non-employed individuals for the 28 quarters considered.

4.2. Econometric approach

Our empirical strategy consists in modeling individual transitions from different labor market states to disability. We estimate two conditional transition models: (i) Transitions from employment to either non-employment or disability (receiving permanent disability benefits). (ii) Transitions from non-employment to either employment or disability. These possible transitions are faced by the individual in every quarter. We estimate a competing risk model with a logit specification. Our baseline specifications are the following:

- (i) Transitions from employment:

$$h_{ij} = F(\beta_{0j} + \beta_{1j}X_{it} + \beta_{2j}E_{it} + \beta_{3j}R_{it} + \beta_{4j}UR_{rt} + \gamma_{tj} + \delta_{rj} + \eta_{ij}) \quad (1) \quad \text{where } j = (en, ed)$$

- (ii) Transitions from non-employment:

$$h_{ij} = F(\beta_{0j} + \beta_{1j}X_{it} + \beta_{2j}N_{it} + \beta_{3j}R_{it} + \beta_{4j}UR_{rt} + \gamma_{tj} + \delta_{rj} + \eta_{ij}) \quad (2) \quad \text{where } j = (ne, nd)$$

Where F is assumed to be the logistic function, “en” refers to the alternative in which the individual transits from employment to non-employment, “ed” from employment to disability, “ne” from non-employment to employment and “nd” from non-employment to disability. X_{it} is a vector of demographic characteristics of individual i in period t, E_{it} is a vector of characteristics describing the employment situation of individual i in period t, N_{it} is a vector of characteristics describing the non-employment situation of individual i in period t, R_{it} is a vector of variables capturing the employment history of individual i and variables describing characteristics of the local labor market that the individual faces, UR_{rt} is the unemployment rate in region r and period t, γ_t are time fixed effects at the year level, δ_r are region fixed effects at

¹⁵ Some of those individuals have their first employment spell at some point during the period of analysis, and therefore they are only included in the sample from that period onwards. These individuals will enter the non-employed sample also from the first period (second quarter of 2007) until their first employment spell when we test for the sensitivity of the results to the definition of the non-employment state, as explained before.

the level of the Autonomous Communities (CCAA)¹⁶ and η_t are quarterly dummies (a dummy for each quarter within any given year).

The regressions control for a broad set of variables potentially correlated with the propensity of individuals to transit to the DI status. We control for demographic variables (age and skill level), characteristics of the employment situation of the individual for the transitions from employment (wage, company's size, sector of employment and an indicator for working in the public sector), characteristics of the non-employment situation of the individual for the transitions from non-employment (last wage, last sector of employment and type of unemployment benefit), variables reflecting the (accumulated) labor market history of the individual such as labor market experience, and variables reflecting the state of the local labor market the individual faces (educational mismatch and wage rigidity).¹⁷ Additionally, we estimate separate regressions differentiating by gender and age groups.

The particular pattern of the crisis in Spain makes it unclear how to properly identify the effect of the business cycle on transitions to the DI rolls. In Spain, there has been a strong national component of the crisis affecting all regions during all periods considered in our analysis (2007-2013). In this context, the challenge resides in isolating the effect of pure labor market conditions from other national trends potentially correlated with the business cycle. For this reason, in the next section we use several variants of regressions (1) and (2), and interpret the results accordingly. More specifically, in some of the regressions we include/exclude the regional unemployment rate and time fixed effects, explaining in each case our interpretation of the results. Finally, we estimate the results for different subgroups of the population. In section 4.3 we present general results differentiating by gender and age. In Section 4.4, we gain deeper insight by looking at the heterogeneity of the results by sector of employment and skill level.

4.3. General results

Table 5 shows the competing risk estimation of the model for transitions from employment (equation 1). The models are estimated separately for both genders and for ages 16-64 and 50-64. In the specification of Table 5 we measure the effect of the business cycle using year dummies for the years 2008-2013 (2007 is the omitted category), without the inclusion of the regional unemployment rate. Thus, we identify the effect of business cycle variations at the

¹⁶ Autonomous Communities are the 17 administrative divisions corresponding to the first level of administrative decentralization in Spain. Two of these administrative divisions, Ceuta and Melilla, have been excluded from the analysis due to their idiosyncratic characteristics and their small size.

¹⁷ See table 3 for descriptive statistics of all the covariates included in the regressions and Table 4 for the definition of those covariates.

national level by looking at the coefficients of the year dummies and comparing the levels of the transitions in each year during the crisis (2008-2013) with the pre-crisis year 2007.

The year dummy coefficients show the effect of the crisis in terms of employment destruction. In general, the coefficients show a continuous and statistically significant increase in the probability of transiting from employment to non-employment with respect to the pre-crisis period (2007) and until 2013, an increase that is more pronounced for men. In contrast, we do not see a significant change in the probability of transiting from employment to DI in the years of the Great Recession compared with the pre-crisis period for men. The behavior is very different for women, for which we observe a significant reduction in the probability of transiting from employment to DI. This reduction is especially strong for older women.

Table 6 shows the multinomial Logit models for the transitions from non-employment. The coefficients of the year dummies show a very significant and steady reduction in the probability of transiting to employment during the years of the Great Recession, a reduction present in all groups but more pronounced for men and younger individuals. Although the crisis has been harsh in destroying employment, it seems to have been even tougher with respect to the creation of new jobs. Regarding transitions to DI, Table 6 shows a very pronounced and significant reduction in the probability of transiting from non-employment to disability. This reduction is much more pronounced than the one observed from employment. The reduction is sizeable and statistically significant for all groups, although it is slightly more pronounced for women, particularly for older women.¹⁸

To see in more detail the behavior of the DI inflow rate during the crisis period, Figure 3 shows the estimated predicted probabilities from the previous models for the transitions to disability (both from employment and from non-employment). The probabilities are the proportion of individuals in each labor market state that transit to the DI rolls, that is, the inflow rate to DI. The quarterly inflow rates predicted from the models are annualized to form the yearly inflow rates¹⁹. From Figure 3 we can see that, in general, the inflow rate decreases during the years of the crisis. The reduction, however, is concentrated in older individuals, especially in non-employed older individuals, the groups with the highest probability of transiting to DI in the pre-crisis year 2007. For female older employees, the yearly transition rate to DI drops a 36,8%

¹⁸ In Table 7, we present the results of the same models of Tables 5 and 6 but substituting the year dummies for the regional unemployment rate. We can see how the coefficients on the regional unemployment rate show a very similar behavior than the pattern shown by the year dummies in the baseline regressions, indicating that the regional unemployment rate is capturing to a large extent the same national business cycle.

¹⁹ We annualize the quarterly inflow rate using the formula $y=qt+(1-qt)*qt+(2-qt)*qt^2+(1-(2-qt)*qt^2)*qt$, where qt is the quarterly inflow rate.

between the years 2007 and 2013, a similar reduction to the one observed for non-employed older women, which amounts to 28,6%. For older male employees, there is a small reduction of 6,5%, compared to a large drop of 51,3% for non-employed older men, the group with the highest transition rate in the pre-crisis year 2007.

The higher reduction of the inflow rate to DI observed for individuals in the non-employment state (as compared to employed individuals) suggests that the reduction is not due to an improvement in the general health of the population. If that were the case, the decrease in transitions to DI would be present irrespective of the individual's initial labor market state. As there is no reform in the DI system during the period analyzed (that could explain the strong drop in the DI inflow rate) the decrease in the transitions to disability is probably due to other political or budgetary reasons. Furthermore, as shown in section 3, the number of applications to the system remains stable. Thus, it seems reasonable to think that disability agencies may have non-officially increased the stringency of the system due to the strong budgetary cuts implemented in the public system.

Although there has been variation across regions in the severity of the crisis, the recession has had a very strong national component common to all regions, and therefore the regional unemployment rate will be highly correlated with the national deterioration of economic conditions. However, we estimate an additional specification in which we include both year dummies and the regional unemployment rate to try to isolate any remaining impact of local differences in labor market conditions on transitions into DI. Table 8 shows that the inclusion of both the year dummies and the unemployment rate at the regional level in the same regression does not allow the identification of the incidence of the economic crisis at the regional level on the inflow to DI (as the coefficient of the unemployment rate for transitions to DI is not significant in almost all the specifications²⁰).

Finally, in order to test the sensitivity of the results to the definition of the non-employment state used in our analysis, we estimate the model for transitions from non-employment additionally including in the non-employed sample individuals with no previous labor market experience, that is, individuals that for some reason have never entered the labor market and young individuals that still haven't had their first employment spell. Table 9 estimates the same model as in Table 6 but with this new definition of non-employment. We see that, with very few differences, the magnitude and significance of the coefficients on the year dummies does not

²⁰ Although those coefficients that keep their significance levels maintain their negative signs.

change, yielding the same interpretation of the effect of the crisis on the transitions to DI and between labor market states.

4.4. Heterogeneity of the results by employment sector and skill level.

In order to get additional insights on the relationship between business cycle conditions and the inflow rate to DI, in this section we differentiate the results by sector of employment and by skill group of the individual.²¹

Panel A of table 10 presents the results for transitions from employment differentiating by sector of employment (industry, construction and services).²² To better appreciate the behavior of transitions, Figure 4 shows the predicted probabilities for the transitions to non-employment and to disability. Several things stand out. On the one hand, the figure shows the well-known evidence that the destruction of employment during the years of the Great Recession has been concentrated in the construction sector (and to a lower extent in the industry sector). The yearly transition rate from employment to non-employment in the construction sector increases strongly during the years of the crisis, from 15.6% in 2007 to 36% in 2013 (a rise of 130.8%). This transition rate increases considerably also in the industry sector, from 6.6% in 2007 to 10.2% in 2013 (a rise of 54.5%). The rise in the probability of becoming non-employed in the services sector is less pronounced, going from 11.8% in 2007 to 15.7% in 2013 (an increase of 33.1%). These sector-specific patterns of employment destruction are more or less similar for both genders and for different age groups (detailed results are available upon request from the authors). Consequently, the strong concentration of employment destruction in the industry and construction sectors has reduced the share of these two sectors in total employment. Figure 5 shows the evolution of the proportional weight of the industry and construction sectors in total employment in Spain during the years of the Great Recession. The weight has declined from 31.5% in 2007 to 19.6% in 2013 (a reduction of 11.9 percentage points). The figure shows that the reduction has been much more pronounced for men, because men represent a large fraction of employment in these sectors.

On the other hand, during the years of the crisis, the industry and construction sectors present higher transition rates to the DI system than the services sector. This can be appreciated in the predicted probabilities in Figure 4. The difference in the tendency of sending individuals to the DI system between these sectors widens during the Great Recession, possibly due to the higher

²¹ In this section, all regressions are estimated without the regional unemployment rate.

²² We exclude the agriculture sector from the analysis because it represents a very few proportion of employed workers. The low number of observations complicates the identification of the coefficients in the regressions.

frequency of working illnesses and accidents that characterizes these two sectors. Overall, these sector patterns of transitions help explain the reduction of the inflow rate to DI from total employment during the years of the crisis (observed in Table 5). The decrease in the importance of the sectors with the highest tendency to send individuals to the DI rolls during the years of the crisis has contributed to explain the reduction of the inflow rate from total employment during those years.

Panel B of table 10 shows the results for transitions from non-employment, differentiated by sector of employment²³. Figure 6 shows the associated predicted probabilities. As seen before, the probability of becoming employed is strongly reduced during the years of the Great Recession. This reduction is concentrated in the industry and construction sectors, contributing to the drop in the weight of these two sectors in total employment shown in Figure 5. Similarly, the large drop in the inflow rate to disability from non-employment is strongly concentrated in the industry and construction sectors. The results are similar for the regressions differentiating between genders and age groups (results not shown).

Panel A of table 11 shows the results for transitions from employment, differentiating by skill level (high, medium and low skill)²⁴. In general, the increase in the transition rate to non-employment has been concentrated in low skilled workers²⁵. Regarding transitions from employment to DI, we can see that the reduction during the years of the crisis is concentrated in medium skilled workers. Panel B of table 11 shows the results for transitions from non-employment again differentiated by skill level. The transition rate to employment seems to decrease strongly for all skill groups, with no substantial differences between them. However, the strong reduction in the inflow rate from non-employment to DI is slightly more pronounced for low skilled workers.

5. Conclusion and discussion

A considerable amount of the literature documents a countercyclical behavior of DI participation. The contraction of labor market activity can increase the incentives for individuals to apply for DI and can reduce the incentives for employers to maintain disabled individuals in

²³ Here, sector of employment refers to the sector in which the individual was employed in his/her last job.

²⁴ Skill levels are defined according to the contributory group of the worker. Table 12 shows the corresponding contributory groups and the three skill levels. For the regressions from non-employment, the skill level refers to the contributory group in the last job.

²⁵ There are, however, important differences by gender. For men, who have suffered most of the destruction in employment, the reduction is focused in low skilled workers, while for women the reduction is concentrated in the high skilled group (results available upon request).

the workplace. Additionally, during bad economic times there could be a deterioration of health conditions as well as a worsening of working conditions. All these arguments would ultimately translate into higher numbers of applications and awards for DI in periods of bad economic conditions.

The Great Recession that started in 2008 in Spain, however, incorporates some elements that cast doubt on this previously well-established countercyclical nature of DI participation. The strength of the crisis, its high component of employment destruction particularly concentrated in some sectors of the economy and its incidence in public accounts may affect DI participation in different dimensions than what has been documented in the past.

Thus, in this paper we evaluate the relationship between business cycle conditions and DI participation in Spain during the years of the Great Recession. Spain, one of the countries in which the Great Recession has been strongest, offers an excellent context for this analysis. To determine the effect of the business cycle on DI participation, we follow two complementary approaches. First, we use aggregate administrative data to estimate regional regressions of the number of applications, denials and allowances for DI on the regional unemployment rate. Second, we use individual panel data to estimate the effect of the business cycle on the individual probability to transit from different labor market states to the DI system.

The results from the estimation of regional regressions show that applications for DI do not show a strong countercyclical behavior for the case of Spain, nor before the start of the crisis neither during the Great Recession. This result is in contrast with the considerable amount of literature documenting a strong positive effect of bad labor market conditions on applications for DI in most developed countries before the Great Recession as well as in the United States also during the Great Recession (see Benitez et. al. 2010 and Maestas et. al. 2015). Furthermore, the results indicate that the cyclical behavior of allowances and denials to DI changed after the onset of the crisis in Spain. The number of allowed applications (denied applications) becomes procyclical (strongly countercyclical) during the period of the Great Recession. This is a pattern not observed in other countries. Given the high incidence of expenditure cuts in Spain as a result of the crisis, this finding provides partial evidence on the hypothesis that disability agencies may have informally reduced the generosity in the number of disability benefits granted in order to comply with the required budgetary cuts.

The results from the models of individual transitions to DI confirm the procyclical behavior of allowances during the period of the Great Recession. Furthermore, they show that part of the reduction in the inflow rate to DI observed during the period of the crisis is due to other national

trends correlated with the deterioration of labor market conditions occurred in Spain during the Great Recession. On the one hand, the weight of the industry and construction sectors in total employment is reduced. These sectors are characterized by having particularly high levels of illnesses and accidents which translates into a higher tendency to send individuals to the DI rolls. Thus, if the weight of the sectors that send more individuals to DI is reduced as a share of total employment, the inflow to DI will automatically be reduced too. On the other hand, the reduction in DI inflow is concentrated in the non-employed population. As this is a period without relevant reforms in the DI system, if the reduction in inflow would be attributable to an improvement in the health status of individuals, we should expect to observe a similar reduction in the inflow both from the employment as well as from the non-employment status. Therefore, the hypothesis of a non-official increase in the stringency of the system becomes more relevant reinforcing the results obtained with the aggregated data.

To the best of our knowledge, this is the first paper that reports changes from a counter to a procyclical behavior of DI participation in a period of extreme recessionary conditions. Thus, the previously reported countercyclical behavior of DI benefits may only apply during mild changes in business cycle conditions but may not be relevant when the economy faces strong economic crisis. Our results provide valuable evidence for policy-makers as they highlight that some of the disabled population may be left economically uncovered during the worst of times.

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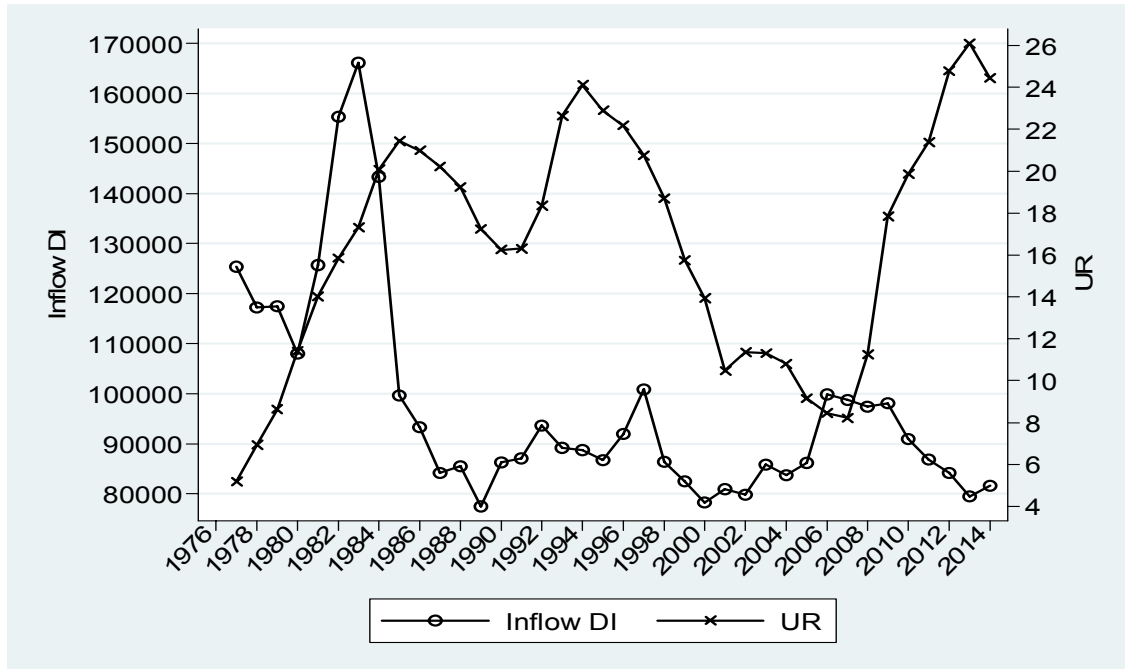
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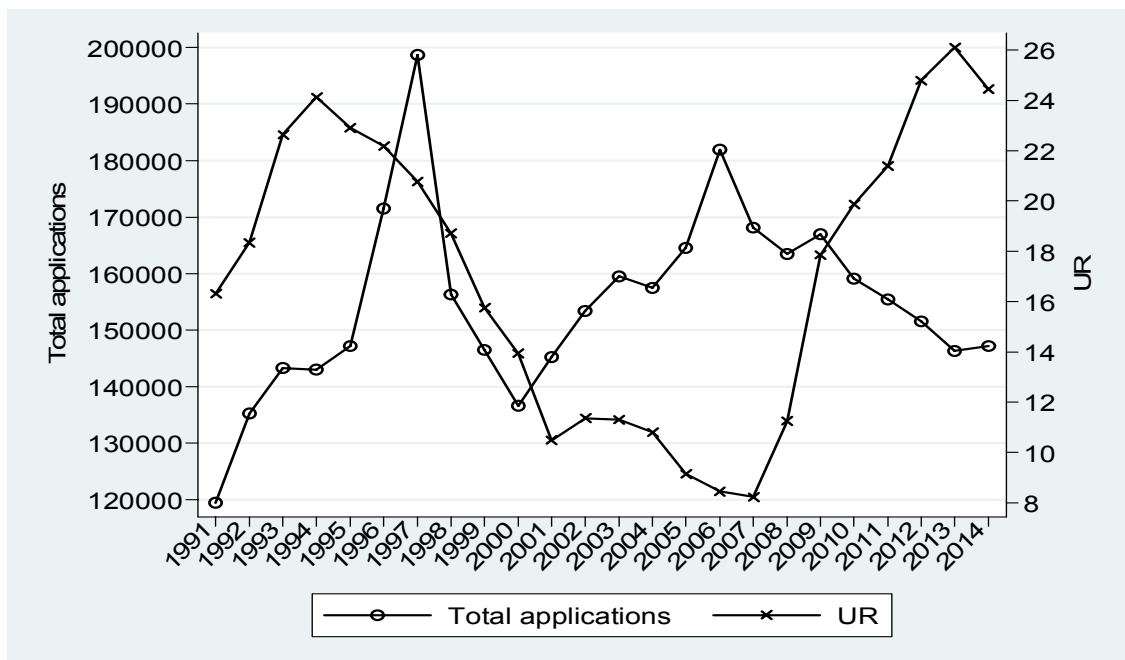
FIGURES AND TABLES

Figure 1. New contributory disability benefits granted each year and unemployment rate. Years 1977-2014.



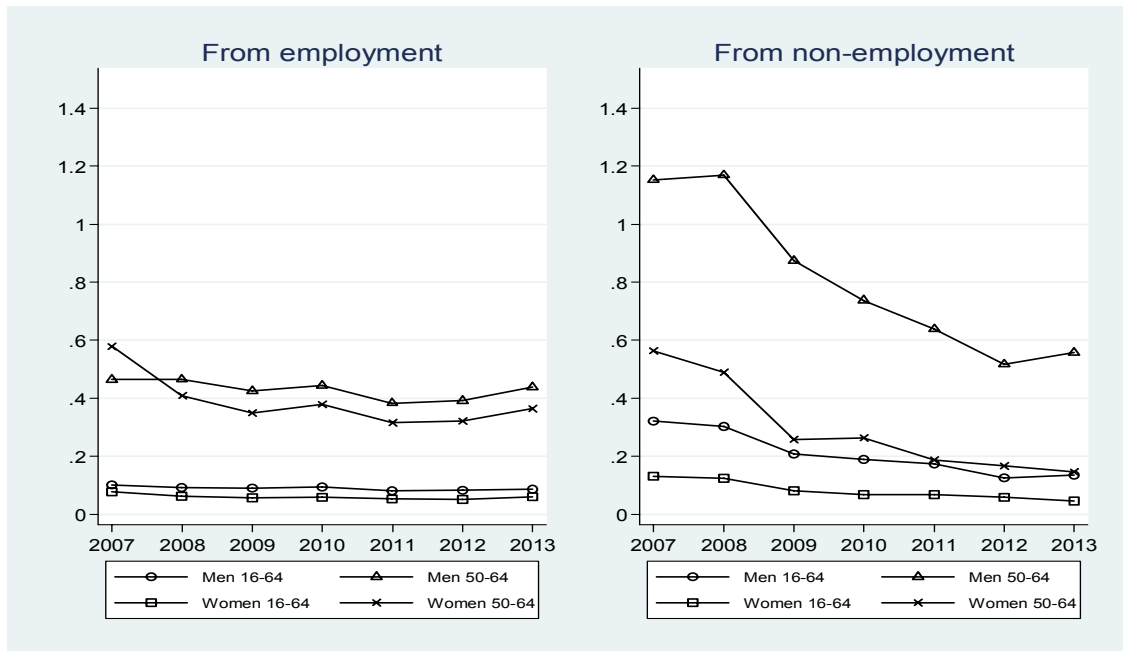
Source: Inflow to DI: Spanish Social Security Administration; Unemployment Rate: Spanish National Institute of Statistics.

Figure 2. Number of total applications for contributory DI and Unemployment Rate. Years 1991-2014.



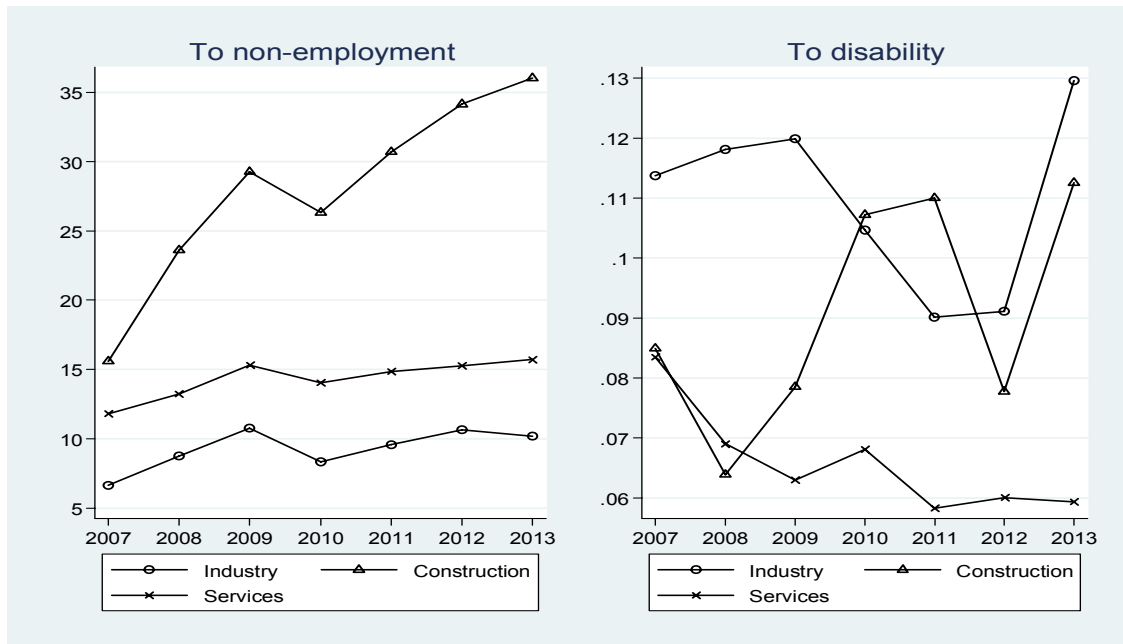
Source: Applications for DI: Spanish Social Security Administration; UR: Spanish National Institute of Statistics.

Figure 3. Predicted probabilities. Annualized quarterly transition rate to disability by initial labor market state. In percentage points.



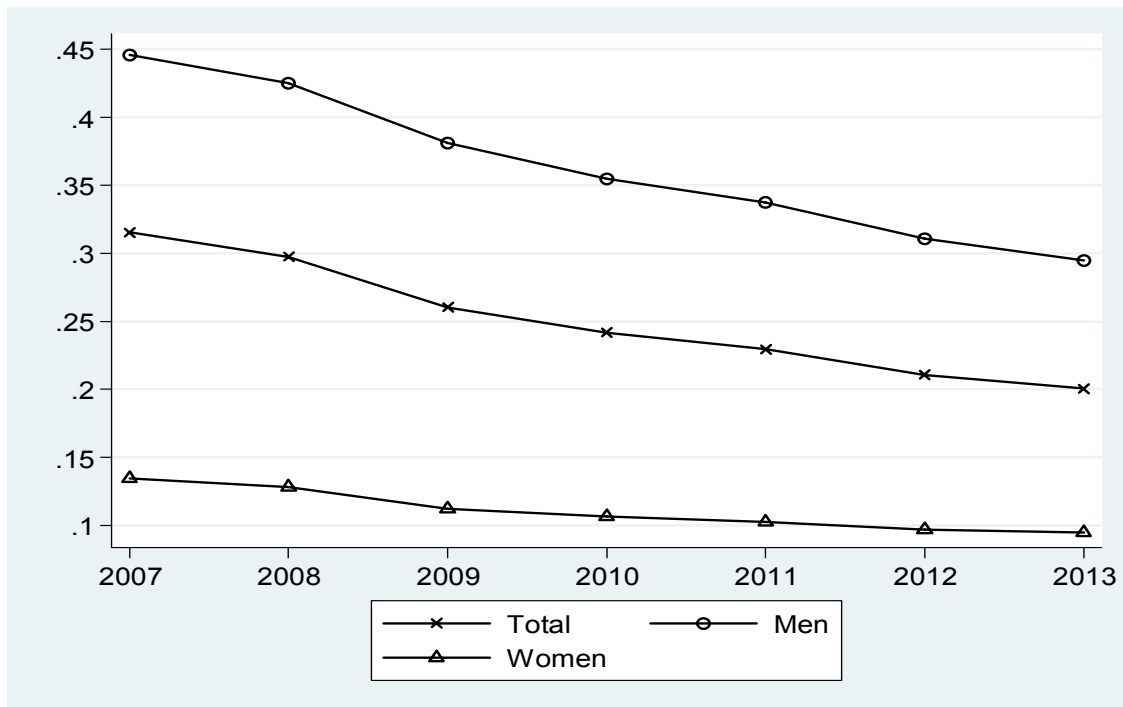
Notes: The predicted quarterly transition rates are annualized using the formula $y=qt+(1-qt)*qt+(2-qt)*qt^2+(1-(2-qt)*qt^2)*qt$, where qt is the predicted quarterly transition rate. The predictions are calculated at the mean of all covariates. For the sake of exposition, the figure is presented without confidence intervals (available upon demand from the authors). However, all predicted probabilities are significantly different from 0 at the 1% level.

Figure 4. Predicted probabilities. Annualized quarterly transition rate from employment to non-employment and to disability by sector of employment. In percentage points.



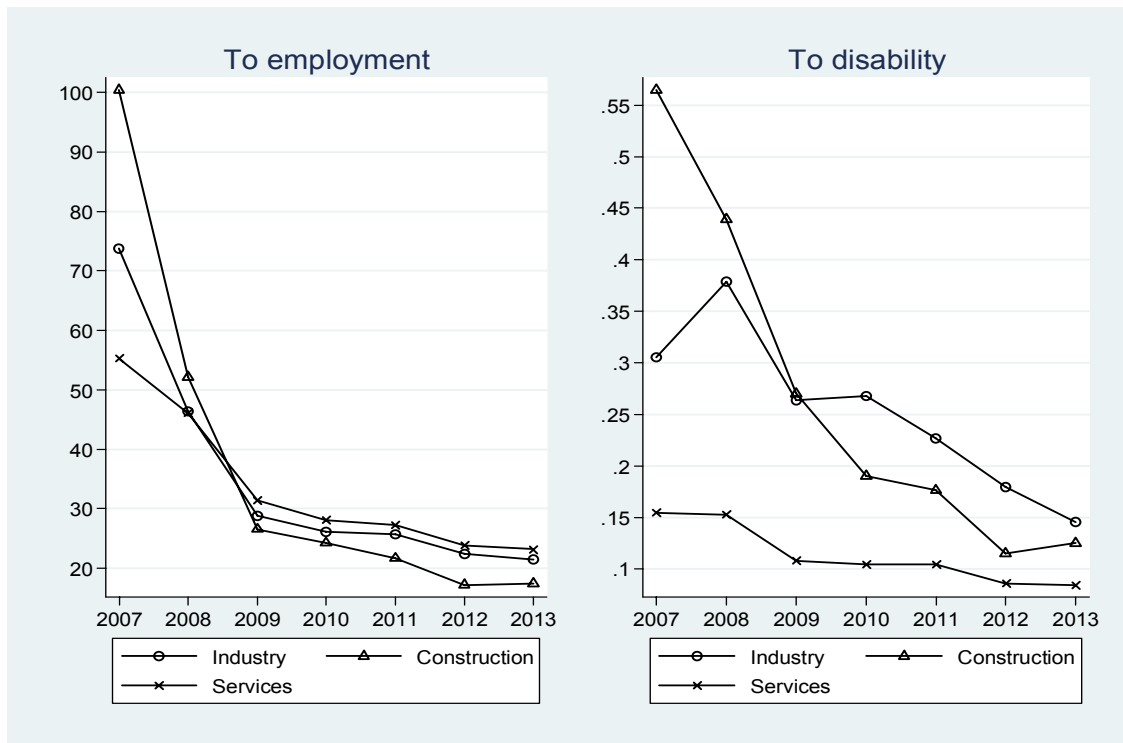
Notes: The predicted quarterly transition rates are annualized using the formula $y=qt+(1-qt)*qt+(2-qt)*qt^2+(1-(2-qt)*qt^2)*qt$, where qt is the predicted quarterly transition rate. The predictions are calculated at the mean of all covariates. For the sake of exposition, the figure is presented without confidence intervals (available upon demand from the authors). However, all predicted probabilities are significantly different from 0 at the 1% level.

Figure 5. Weight of industry and construction sectors in total employment.



Source. Own elaboration from the MCVL.

Figure 6. Predicted probabilities. Annualized quarterly transition rate from non-employment to employment and to disability. In percentage points.



Notes: The predicted quarterly transition rates are annualized using the formula $y=qt+(1-qt)*qt+(2-qt)*qt^2+(1-(2-qt)*qt^2)*qt$, where qt is the predicted quarterly transition rate. The predictions are calculated at the mean of all covariates. For the sake of exposition, the figure is presented without confidence intervals (available upon demand from the authors). However, all predicted probabilities are significantly different from 0 at the 1% level.

Table 1. Eligibility requirements and benefit amount of permanent contributory Disability Insurance in Spain.

| | Ordinary Illness | Work-unrelated Accident | Work-related Accident or Professional Illness |
|--|---|--|---|
| Eligibility | Age \geq 31: Contributed 1/4 time between 20 years old and disabling condition. Minimum of 5 years | No minimum contributory period required | No minimum contributory period required |
| | Age < 31: Contributed 1/3 time between 16 years old and disabling condition. No minimum number of years required | | |
| Regulatory Base | Age > 52 and < 65: Average wage last 8 years of work* Age < 52: Average wage calculated over the number of minimum contributory years required* | Average annual wage of 24 months within the last 7 years of work | Average wage last year of work |
| Percentage applied to the regulatory base | Partial Disability: 55% | | |
| | Individuals older than 55 with difficulties to find a job due to lack of education or characteristics of the social and labor market of the region where they live: 75% | | |
| | Total Disability: 100% | | |
| | Severe Disability: 100%+50% | | |

*To form the regulatory base, this average wage is multiplied by a percentage that depends on the number of years contributed at the onset of the disability (considering as contributed the number of years remaining from the onset of the disability to the ordinary retirement age).

Table 2. Effect of Unemployment Rate on the logarithm of total applications, denied applications and allowed applications for contributory Disability Insurance.

| Dependent variable | 1996-2014 | 1996-2007 | 2008-2014 |
|----------------------|--------------------|--------------------|---------------------|
| All DI Applications | 0.0020 (0.0046) | 0.0046 (0.0043) | 0.0046 (0.0068) |
| Denied Applications | 0.0010 (0.0075) | 0.0022 (0.0086) | 0.0160* (0.0090) |
| Allowed Applications | 0.0054 (0.0064) | 0.0080 (0.0098) | -0.0024 (0.0082) |
| Observations | 323 | 204 | 119 |

Standard errors in parenthesis

* Significant at the 10% level

Notes: Standard errors clustered at the autonomous community level and regressions are weighted by population aged 16-64. Regressions include year fixed effect and fixed effects at the level of the autonomous communities.

Table 3. Descriptive statistics of the sample of employees and the sample of non-employed. All observations between the second quarter of 2007 and the fourth quarter of 2013.

| Variable | Sample of employees | | Sample of non-employed | |
|-------------------------|---------------------|-------------|------------------------|-------------|
| | Mean | Stand. Dev. | Mean | Stand. Dev. |
| Woman | 46.70% | 49.89% | 46.53% | 49.88% |
| Age | 40 | 11 | 39 | 12 |
| High skill | 26.37% | 44.06% | 9.66% | 29.54% |
| Medium skill | 31.75% | 46.55% | 20.99% | 40.72% |
| Low skill | 41.88% | 49.34% | 69.35% | 46.10% |
| 1-49 employees | 48.88% | 49.99% | | |
| 50-199 employees | 19.39% | 39.53% | | |
| 200+ employees | 31.73% | 46.54% | | |
| Public Sector | 7.56% | 26.43% | | |
| Wage | 1762 | 864 | 912 | 696 |
| Agriculture | 1.01% | 10.01% | 4.77% | 21.31% |
| Industry | 16.24% | 36.88% | 9.67% | 29.56% |
| Construction | 6.65% | 24.92% | 17.10% | 37.65% |
| Services | 76.09% | 42.65% | 68.45% | 46.47% |
| No UB | 72.57% | 44.62% | | |
| Contributive UB | 16.02% | 36.68% | | |
| Noncontributive UB | 11.41% | 31.80% | | |
| Wage rigidity | 0.42 | 0.16 | 0.42 | 0.17 |
| Education mismatch | 0.02 | 0.01 | 0.03 | 0.01 |
| Labor market experience | 2.53 | 0.90 | | |
| Unemp. Rate | 17.92% | 8.04% | 20.45% | 7.96% |
| Observations | 4604920 | | 3648554 | |

Note: For the sample of non-employed individuals, the skill level, the sector of employment and the wage correspond to the situation of the individual in his/her last employment spell.

Table 4. Description of covariates.

| Variable | Description |
|-------------------------|--|
| Woman | Dummy equal to 1 if the individual is a woman. |
| Age | Age of the individual in years. |
| High skill | Dummy equal to 1 if the individual pertains to a "high skill" contribution group. ²⁶ |
| Medium skill | Dummy equal to 1 if the individual pertains to a "medium skill" contribution group. |
| Low skill | Dummy equal to 1 if the individual pertains to a "low skill" contribution group. |
| 1-49 employees | Dummy equal to 1 if the individual works in a company with between 1 and 49 employees. |
| 50-199 employees | Dummy equal to 1 if the individual works in a company with between 50 and 199 employees. |
| 200+ employees | Dummy equal to 1 if the individual works in a company with 200 or more employees. |
| Public Sector | Dummy equal to 1 if the individual works in the Public Sector. |
| Wage | Salary base for Social Security contributions. The amount is subject to a ceiling, and therefore the variable is censored. This is irrelevant for workers in the inferior part of the wage distribution. |
| Agriculture | Dummy equal to 1 if the individual works in the agriculture sector. |
| Industry | Dummy equal to 1 if the individual works in the industry sector. |
| Construction | Dummy equal to 1 if the individual works in the construction sector. |
| Services | Dummy equal to 1 if the individual works in the services sector |
| No UB | Dummy equal to 1 if the individual is not receiving unemployment benefits. |
| Contributive UB | Dummy equal to 1 if the individual is receiving contributive unemployment benefits. |
| Noncontributive UB | Dummy equal to 1 if the individual is receiving noncontributive unemployment benefits. |
| Wage rigidity | Difference between the 20th and the 50th percentile of the wage distribution at the regional level. It is an indicator of the degree of wage compression in the lower part of the distribution. |
| Education mismatch | <p>Education mismatch-indicator defined as:</p> $EMI_{i,t} = \sum_{j=1}^3 (S_{j,t} - D_{i,j,t})^2$ <p>where $S_{j,t}$ is the share of unemployed in region j with educational attainment i in period t while $D_{i,j,t}$ denotes the corresponding share of workers with the same educational attainment among the employed in period t in region j. In the exercise we distinguish between three levels of education as we have grouped the persons with at most primary and lower-secondary education in one group.</p> |
| Labor market experience | Accumulated labor market experience. |
| Unemp. Rate | Unemployment rate in the region of residence of the individual. |

Note: For the sample of non-employed individuals, the skill level, the sector of employment and the wage correspond to the situation of the individual in his/her last employment spell.

²⁶ Skill levels are defined according to the contribution group of the worker. Table 12 shows the corresponding contribution groups that form each of the three skill level groups.

Table 5. Multinomial logit models for transitions from employment.

| | MEN | | | | WOMEN | | | |
|------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|
| | AGES 16-64 | | AGES 50-64 | | AGES 16-64 | | AGES 50-64 | |
| | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | | | |
| 2008 | 0.266*** (0.010) | -0.082 (0.108) | 0.295*** (0.032) | 0.007 (0.137) | 0.113*** (0.010) | -0.222 (0.135) | 0.088*** (0.029) | -0.347** (0.174) |
| 2009 | 0.474*** (0.012) | -0.100 (0.112) | 0.489*** (0.035) | -0.078 (0.144) | 0.249*** (0.011) | -0.292** (0.144) | 0.156*** (0.034) | -0.500*** (0.184) |
| 2010 | 0.358*** (0.014) | -0.055 (0.120) | 0.461*** (0.040) | -0.036 (0.151) | 0.158*** (0.014) | -0.255* (0.153) | 0.146*** (0.040) | -0.418** (0.191) |
| 2011 | 0.449*** (0.015) | -0.206* (0.125) | 0.557*** (0.043) | -0.180 (0.157) | 0.220*** (0.015) | -0.368** (0.162) | 0.214*** (0.043) | -0.599*** (0.204) |
| 2012 | 0.498*** (0.017) | -0.174 (0.131) | 0.594*** (0.046) | -0.158 (0.165) | 0.257*** (0.016) | -0.412** (0.172) | 0.205*** (0.048) | -0.582*** (0.213) |
| 2013 | 0.564*** (0.018) | -0.141 (0.144) | 0.705*** (0.049) | -0.041 (0.180) | 0.285*** (0.018) | -0.236 (0.182) | 0.239*** (0.052) | -0.458** (0.222) |
| Age | 0.016*** (0.000) | 0.084*** (0.004) | 0.034*** (0.003) | 0.076*** (0.008) | 0.011*** (0.001) | 0.098*** (0.004) | 0.015*** (0.003) | 0.093*** (0.011) |
| Medium skill | 0.231*** (0.014) | 0.812*** (0.099) | 0.032 (0.036) | 0.696*** (0.120) | 0.188*** (0.012) | 0.715*** (0.108) | 0.305*** (0.043) | 0.697*** (0.137) |
| Low skill | 0.702*** (0.013) | 1.383*** (0.089) | 0.533*** (0.031) | 1.358*** (0.106) | 0.630*** (0.013) | 1.327*** (0.118) | 0.691*** (0.046) | 1.336*** (0.148) |
| ln (wage) | -0.502*** (0.007) | 0.217*** (0.047) | -0.292*** (0.018) | 0.437*** (0.059) | -0.312*** (0.007) | 0.048 (0.056) | -0.224*** (0.020) | 0.253*** (0.076) |
| 50-199 employees | 0.033*** (0.011) | 0.130* (0.070) | -0.147*** (0.029) | 0.050 (0.089) | 0.186*** (0.011) | 0.270*** (0.095) | 0.210*** (0.034) | 0.136 (0.122) |
| 200+ employees | 0.009 (0.011) | 0.036 (0.069) | -0.333*** (0.030) | -0.043 (0.085) | 0.221*** (0.010) | 0.361*** (0.084) | 0.158*** (0.031) | 0.202* (0.106) |
| Industry | -0.445*** (0.027) | -0.441** (0.201) | -0.854*** (0.074) | -0.475* (0.279) | | | | |
| Construction | 0.354*** (0.028) | -0.371* (0.220) | 0.046 (0.076) | -0.506* (0.304) | | | | |
| Services | -0.241*** (0.026) | -0.508*** (0.194) | -0.663*** (0.070) | -0.480* (0.271) | -0.004 (0.014) | 0.079 (0.118) | -0.151*** (0.047) | 0.042 (0.153) |
| Public Sector | -0.261*** (0.024) | 0.150 (0.120) | -0.416*** (0.061) | 0.135 (0.139) | -0.025 (0.020) | 0.238** (0.101) | -0.403*** (0.051) | 0.187 (0.124) |
| LM exp. | -0.864*** (0.006) | 0.259*** (0.042) | -0.811*** (0.013) | 0.180*** (0.056) | -0.957*** (0.006) | 0.186*** (0.044) | -0.922*** (0.016) | 0.078 (0.053) |
| Wage rigidity | 0.387*** (0.032) | 0.230 (0.224) | 0.192** (0.083) | 0.023 (0.282) | 0.297*** (0.029) | 0.166 (0.250) | 0.236*** (0.088) | 0.141 (0.311) |
| Educ. Mism. | -1.247*** (0.452) | 0.604 (2.953) | -1.896 (1.164) | -0.118 (3.587) | -0.224 (0.452) | 2.592 (4.179) | 0.167 (1.290) | 4.723 (5.025) |
| Constant | 1.471*** (0.065) | -13.812*** (0.500) | -0.347 (0.249) | -14.398*** (0.837) | 0.264*** (0.060) | -13.506*** (0.535) | -0.650*** (0.244) | -13.874*** (0.953) |
| Observations | 2,333,212 | 2,333,212 | 513,506 | 513,506 | 2,060,159 | 2,060,159 | 385,056 | 385,056 |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parenthesis) are clustered at the individual level. The base category corresponds to the case in which the individual remains employed. Regressions include region dummies at the CCAA level and quarterly dummies. Because of problems in the calculation of the standard errors, the sector of employment in the regressions for women is included with only one indicator variable for the services sector.

Table 6. Multinomial logit models for transitions from non-employment.

| | MEN | | | | WOMEN | | | |
|---------------|----------------------|-----------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|
| | AGES 16-64 | | AGES 50-64 | | AGES 16-64 | | AGES 50-64 | |
| | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | | | |
| 2008 | -0.358*** (0.010) | -0.126 (0.094) | -0.294*** (0.029) | -0.010 (0.138) | -0.213*** (0.009) | -0.095 (0.142) | -0.113*** (0.028) | -0.151 (0.205) |
| 2009 | -0.947*** (0.011) | -0.578*** (0.100) | -0.684*** (0.034) | -0.324** (0.144) | -0.627*** (0.011) | -0.568*** (0.159) | -0.422*** (0.034) | -0.812*** (0.239) |
| 2010 | -1.059*** (0.013) | -0.685*** (0.105) | -0.797*** (0.038) | -0.499*** (0.152) | -0.761*** (0.013) | -0.757*** (0.173) | -0.543*** (0.040) | -0.793*** (0.243) |
| 2011 | -1.123*** (0.014) | -0.775*** (0.110) | -0.921*** (0.040) | -0.649*** (0.159) | -0.797*** (0.014) | -0.765*** (0.179) | -0.551*** (0.042) | -1.134*** (0.259) |
| 2012 | -1.292*** (0.015) | -1.115*** (0.119) | -1.039*** (0.044) | -0.864*** (0.169) | -0.927*** (0.016) | -0.932*** (0.189) | -0.539*** (0.047) | -1.251*** (0.272) |
| 2013 | -1.297*** (0.016) | -1.039*** (0.127) | -1.159*** (0.046) | -0.794*** (0.179) | -0.983*** (0.017) | -1.175*** (0.218) | -0.781*** (0.051) | -1.390*** (0.304) |
| Age | -0.058*** (0.001) | 0.001 (0.003) | -0.141*** (0.003) | -0.088*** (0.007) | -0.043*** (0.001) | 0.022*** (0.004) | -0.101*** (0.003) | -0.044*** (0.013) |
| Medium skill | 0.065*** (0.016) | 0.558*** (0.110) | 0.150*** (0.045) | 0.326** (0.145) | -0.148*** (0.014) | 0.787*** (0.165) | 0.102* (0.054) | 0.461* (0.241) |
| Low skill | 0.076*** (0.014) | 1.007*** (0.091) | 0.361*** (0.036) | 0.888*** (0.112) | -0.142*** (0.014) | 1.088*** (0.163) | 0.343*** (0.052) | 0.937*** (0.234) |
| Contr. UB | 0.305*** (0.009) | -0.359*** (0.058) | 0.572*** (0.025) | -0.167** (0.085) | 0.401*** (0.010) | -0.332*** (0.099) | 1.035*** (0.031) | 0.000 (0.146) |
| Noncontr. UB | -0.004 (0.011) | -0.248*** (0.062) | -0.269*** (0.026) | -0.250*** (0.080) | -0.138*** (0.012) | -0.974*** (0.127) | -0.505*** (0.033) | -1.040*** (0.166) |
| ln (wage) | 0.000 (0.004) | 0.153*** (0.029) | -0.010 (0.012) | 0.229*** (0.047) | 0.054*** (0.004) | 0.388*** (0.050) | 0.086*** (0.011) | 0.448*** (0.079) |
| Industry | -0.235*** (0.021) | 0.531*** (0.160) | -0.536*** (0.058) | 0.162 (0.212) | 0.031 (0.027) | -0.041 (0.258) | -0.086 (0.077) | -0.375 (0.367) |
| Construction | -0.105*** (0.020) | 0.831*** (0.164) | -0.265*** (0.057) | 0.578*** (0.217) | -0.212*** (0.031) | -0.391 (0.358) | -0.149 (0.095) | -0.265 (0.500) |
| Services | -0.215*** (0.018) | 0.383*** (0.147) | -0.548*** (0.049) | 0.138 (0.195) | 0.047** (0.023) | -0.008 (0.227) | 0.080 (0.060) | -0.276 (0.327) |
| LM exp. | 0.539*** (0.006) | 1.154*** (0.035) | 0.275*** (0.015) | 0.852*** (0.042) | 0.324*** (0.007) | 0.966*** (0.048) | 0.110*** (0.015) | 0.760*** (0.064) |
| Wage rigidity | 0.501*** (0.029) | 0.342 (0.212) | 0.503*** (0.093) | 0.260 (0.309) | 0.837*** (0.028) | 0.732*** (0.251) | 1.252*** (0.084) | 0.747* (0.408) |
| Educ. Mism. | -4.352*** (0.425) | 4.873* (2.835) | -3.606*** (1.216) | 7.295* (3.952) | -2.808*** (0.443) | 1.960 (5.080) | -4.799*** (1.334) | 10.204 (6.687) |
| Constant | -0.051 (0.039) | -10.939*** (0.306) | 5.288*** (0.171) | -5.134*** (0.551) | -1.191*** (0.040) | -13.353*** (0.489) | 1.365*** (0.196) | -8.953*** (0.929) |
| Observations | 1,751,271 | 1,751,271 | 350,453 | 350,453 | 1,567,099 | 1,567,099 | 292,875 | 292,875 |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parenthesis) are clustered at the individual level. The base category corresponds to the case in which the individual remains non-employed. Regressions include region dummies at the CCAA level and quarterly dummies. The skill level, the sector of employment and the wage correspond to the situation of the individual in his/her last employment spell.

Table 7. Coefficients on unemployment rate in the multinomial logit models for transitions from employment and from non-employment.

| PANEL A: Multinomial logit models for transitions from employment. Men | | | | |
|--|-------------------|---------------|-------------------|---------------|
| | MEN AGES 16-64 | | MEN AGES 50-64 | |
| VARIABLES | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY |
| Unemp. Rate | 0.017*** | -0.005 | 0.020*** | -0.006 |
| | (0.001) | (0.005) | (0.002) | (0.007) |
| PANEL B: Multinomial logit models for transitions from employment. Women | | | | |
| | WOMEN AGES 16-64 | | WOMEN AGES 50-64 | |
| VARIABLES | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY |
| Unemp. Rate | 0.005*** | -0.013 | -0.003 | -0.031*** |
| | (0.001) | (0.008) | (0.002) | (0.011) |
| PANEL C: Multinomial logit models for transitions from non-employment. Men | | | | |
| | MEN AGES 16-64 | | MEN AGES 50-64 | |
| VARIABLES | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Unemp. Rate | -0.049*** | -0.044*** | -0.040*** | -0.037*** |
| | (0.001) | (0.004) | (0.002) | (0.006) |
| PANEL D: Multinomial logit models for transitions from non-employment. Women | | | | |
| | WOMEN AGES 16-64 | | WOMEN AGES 50-64 | |
| VARIABLES | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Unemp. Rate | -0.038*** | -0.055*** | -0.025*** | -0.065*** |
| | (0.001) | (0.009) | (0.002) | (0.014) |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parentheses) are clustered at the individual level. The other covariates included in the regressions are the same as in Table 5 for Panels A and B and Table 6 for Panels C and D (except the year dummies).

Table 8. Coefficients on unemployment rate and year dummies in the multinomial logit models for transitions from employment and from non-employment.

| PANEL A: Multinomial logit models for transitions from employment. | | | | | | | | |
|--|----------------------|----------------------|----------------------|---------------------|----------------------|---------------------|----------------------|----------------------|
| | MEN | | | | WOMEN | | | |
| | AGES 16-64 | | AGES 50-64 | | AGES 16-64 | | AGES 50-64 | |
| | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY |
| Unemp. Rate | -0.009*** (0.002) | 0.005 (0.014) | -0.015*** (0.004) | -0.005 (0.018) | -0.034*** (0.002) | -0.024 (0.021) | -0.065*** (0.006) | -0.094*** (0.027) |
| Year dummies: | | | | | | | | |
| 2008 | 0.294*** (0.012) | -0.097 (0.117) | 0.341*** (0.036) | 0.022 (0.148) | 0.173*** (0.010) | -0.181 (0.141) | 0.196*** (0.031) | -0.180 (0.182) |
| 2009 | 0.573*** (0.022) | -0.157 (0.194) | 0.653*** (0.063) | -0.021 (0.247) | 0.511*** (0.019) | -0.112 (0.225) | 0.662*** (0.058) | 0.221 (0.289) |
| 2010 | 0.484*** (0.028) | -0.129 (0.237) | 0.671*** (0.077) | 0.038 (0.296) | 0.514*** (0.025) | -0.006 (0.274) | 0.831*** (0.075) | 0.574* (0.347) |
| 2011 | 0.587*** (0.030) | -0.288 (0.258) | 0.787*** (0.083) | -0.098 (0.324) | 0.629*** (0.028) | -0.081 (0.309) | 0.999*** (0.084) | 0.546 (0.389) |
| 2012 | 0.666*** (0.036) | -0.275 (0.305) | 0.875*** (0.099) | -0.058 (0.380) | 0.775*** (0.034) | -0.048 (0.372) | 1.198*** (0.103) | 0.864* (0.467) |
| 2013 | 0.751*** (0.040) | -0.255 (0.344) | 1.020*** (0.109) | 0.072 (0.429) | 0.891*** (0.039) | 0.194 (0.432) | 1.404*** (0.118) | 1.244** (0.539) |
| PANEL B: Multinomial logit models for transitions from non-employment. | | | | | | | | |
| | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Unemp. Rate | 0.011*** (0.001) | -0.005 (0.012) | 0.015*** (0.004) | -0.002 (0.018) | 0.029*** (0.002) | -0.010 (0.022) | 0.039*** (0.005) | 0.002 (0.033) |
| Year dummies: | | | | | | | | |
| 2008 | -0.393*** (0.011) | -0.111 (0.103) | -0.336*** (0.032) | -0.004 (0.149) | -0.264*** (0.010) | -0.078 (0.146) | -0.176*** (0.030) | -0.154 (0.212) |
| 2009 | -1.080*** (0.020) | -0.524*** (0.176) | -0.849*** (0.058) | -0.306 (0.246) | -0.853*** (0.018) | -0.490** (0.229) | -0.721*** (0.054) | -0.824** (0.343) |
| 2010 | -1.232*** (0.026) | -0.616*** (0.215) | -1.014*** (0.074) | -0.476 (0.305) | -1.071*** (0.023) | -0.651** (0.287) | -0.954*** (0.069) | -0.810* (0.416) |
| 2011 | -1.311*** (0.028) | -0.699*** (0.232) | -1.157*** (0.079) | -0.624* (0.331) | -1.155*** (0.026) | -0.643** (0.317) | -1.023*** (0.078) | -1.153** (0.467) |
| 2012 | -1.521*** (0.033) | -1.022*** (0.276) | -1.329*** (0.095) | -0.833** (0.392) | -1.380*** (0.031) | -0.775** (0.382) | -1.142*** (0.095) | -1.275** (0.563) |
| 2013 | -1.554*** (0.037) | -0.935*** (0.306) | -1.483*** (0.105) | -0.759* (0.433) | -1.514*** (0.036) | -0.991** (0.447) | -1.485*** (0.109) | -1.419** (0.650) |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parentheses) are clustered at the individual level. The other covariates included in the regressions are the same as in Table 5 for Panel A and Table 6 for Panel B.

Table 9. Multinomial logit models for transitions from non-employment. Alternative definition of the non-employment state.

| | MEN | | | | WOMEN | | | |
|---------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|
| | AGES 16-64 | | AGES 50-64 | | AGES 16-64 | | AGES 50-64 | |
| | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | | | |
| 2008 | -0.242*** (0.008) | -0.094 (0.094) | -0.237*** (0.028) | 0.016 (0.138) | -0.138*** (0.008) | -0.139 (0.137) | -0.082*** (0.027) | -0.205 (0.194) |
| 2009 | -0.819*** (0.010) | -0.530*** (0.100) | -0.626*** (0.032) | -0.287** (0.143) | -0.558*** (0.010) | -0.587*** (0.154) | -0.384*** (0.033) | -0.806*** (0.225) |
| 2010 | -0.911*** (0.012) | -0.626*** (0.104) | -0.732*** (0.036) | -0.447*** (0.150) | -0.667*** (0.012) | -0.796*** (0.167) | -0.521*** (0.038) | -0.838*** (0.229) |
| 2011 | -0.960*** (0.012) | -0.706*** (0.109) | -0.854*** (0.038) | -0.593*** (0.157) | -0.680*** (0.012) | -0.788*** (0.173) | -0.522*** (0.040) | -1.103*** (0.245) |
| 2012 | -1.127*** (0.014) | -1.032*** (0.117) | -0.958*** (0.042) | -0.788*** (0.166) | -0.801*** (0.014) | -0.996*** (0.183) | -0.515*** (0.044) | -1.307*** (0.258) |
| 2013 | -1.107*** (0.015) | -0.938*** (0.125) | -1.071*** (0.044) | -0.709*** (0.175) | -0.835*** (0.015) | -1.201*** (0.210) | -0.764*** (0.048) | -1.426*** (0.289) |
| Age | -0.046*** (0.000) | 0.002 (0.003) | -0.138*** (0.003) | -0.090*** (0.007) | -0.039*** (0.000) | 0.020*** (0.004) | -0.102*** (0.003) | -0.049*** (0.012) |
| High skill | -0.437*** (0.016) | -2.369*** (0.387) | -0.544*** (0.053) | -1.826*** (0.505) | -0.575*** (0.013) | -0.741*** (0.192) | -0.912*** (0.041) | -0.267 (0.213) |
| Medium skill | -0.143*** (0.013) | -1.049*** (0.090) | -0.393*** (0.035) | -0.919*** (0.111) | 0.145*** (0.013) | -1.124*** (0.161) | -0.303*** (0.051) | -0.972*** (0.230) |
| Low skill | -0.044*** (0.010) | -0.503*** (0.079) | -0.271*** (0.034) | -0.606*** (0.113) | 0.008 (0.009) | -0.321*** (0.085) | -0.215*** (0.031) | -0.501*** (0.137) |
| Contr. UB | 0.311*** (0.008) | -0.362*** (0.057) | 0.587*** (0.024) | -0.176** (0.084) | 0.417*** (0.010) | -0.362*** (0.098) | 1.050*** (0.029) | -0.041 (0.143) |
| Noncontr. UB | -0.031*** (0.011) | -0.239*** (0.062) | -0.270*** (0.026) | -0.242*** (0.080) | -0.138*** (0.012) | -0.987*** (0.126) | -0.497*** (0.032) | -1.067*** (0.165) |
| ln (wage) | 0.068*** (0.003) | 0.181*** (0.028) | -0.008 (0.008) | 0.240*** (0.044) | 0.096*** (0.002) | 0.416*** (0.045) | 0.111*** (0.007) | 0.451*** (0.072) |
| LM exp. | 0.392*** (0.006) | 1.139*** (0.034) | 0.222*** (0.014) | 0.841*** (0.042) | 0.250*** (0.006) | 1.030*** (0.045) | 0.112*** (0.013) | 0.879*** (0.060) |
| Wage rigidity | 0.451*** (0.021) | -0.644*** (0.155) | 0.163** (0.071) | -0.675*** (0.228) | 0.741*** (0.022) | 0.774*** (0.214) | 1.174*** (0.069) | 0.639* (0.345) |
| Educ. Mism. | -4.774*** (0.385) | 4.842* (2.826) | -4.464*** (1.194) | 7.051* (3.946) | -2.801*** (0.396) | 2.471 (4.933) | -5.225*** (1.270) | 10.188 (6.475) |
| Constant | -0.851*** (0.023) | -9.211*** (0.225) | 5.309*** (0.144) | -3.560*** (0.466) | -1.640*** (0.023) | -12.516*** (0.347) | 1.584*** (0.162) | -8.257*** (0.766) |
| Observations | 2,270,503 | 2,270,503 | 381,185 | 381,185 | 2,242,764 | 2,242,764 | 379,400 | 379,400 |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parenthesis) are clustered at the individual level. The base category corresponds to the case in which the individual remains non-employed. Regressions include region dummies at the CCAA level and quarterly dummies. The omitted category in the dummy variables for the contributory groups corresponds to the group of individuals with no previous labor market experience. The variable ln (wage) for this group of individuals takes value 0. For problems in the calculation of the standard errors of the coefficients, the sector of employment is not included in the regressions.

Table 10. Multinomial logit models for transitions from employment and from non-employment. By sector of employment. Both genders.

| PANEL A: Multinomial logit models for transitions from employment. | | | | | | |
|--|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|
| | INDUSTRY | | CONSTRUCTION | | SERVICES | |
| | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | |
| 2008 | 0.284*** (0.021) | 0.045 (0.170) | 0.437*** (0.021) | -0.257 (0.311) | 0.119*** (0.008) | -0.185* (0.103) |
| 2009 | 0.491*** (0.024) | 0.066 (0.179) | 0.669*** (0.025) | -0.031 (0.323) | 0.268*** (0.009) | -0.269** (0.108) |
| 2010 | 0.232*** (0.030) | -0.078 (0.202) | 0.555*** (0.032) | 0.271 (0.308) | 0.178*** (0.011) | -0.196* (0.114) |
| 2011 | 0.373*** (0.031) | -0.222 (0.210) | 0.721*** (0.035) | 0.312 (0.345) | 0.237*** (0.012) | -0.348*** (0.120) |
| 2012 | 0.481*** (0.035) | -0.208 (0.222) | 0.839*** (0.040) | -0.023 (0.399) | 0.268*** (0.013) | -0.317** (0.127) |
| 2013 | 0.438*** (0.039) | 0.143 (0.238) | 0.899*** (0.047) | 0.354 (0.487) | 0.297*** (0.014) | -0.328** (0.137) |
| Constant | 1.414*** (0.169) | -16.129*** (0.814) | 0.095 (0.270) | -13.858*** (1.844) | 0.888*** (0.054) | -14.215*** (0.465) |
| Observations | 716,112 | 716,112 | 295,940 | 295,940 | 3,342,038 | 3,342,038 |
| PANEL B: Multinomial logit models for transitions from non-employment. | | | | | | |
| | INDUSTRY | | CONSTRUCTION | | SERVICES | |
| | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | |
| 2008 | -0.578*** (0.024) | 0.104 (0.279) | -0.890*** (0.019) | -0.469*** (0.158) | -0.217*** (0.008) | -0.047 (0.099) |
| 2009 | -1.113*** (0.028) | -0.324 (0.286) | -1.651*** (0.022) | -1.050*** (0.163) | -0.649*** (0.009) | -0.447*** (0.111) |
| 2010 | -1.220*** (0.031) | -0.318 (0.296) | -1.748*** (0.024) | -1.409*** (0.172) | -0.771*** (0.011) | -0.491*** (0.117) |
| 2011 | -1.237*** (0.033) | -0.485 (0.307) | -1.868*** (0.025) | -1.493*** (0.179) | -0.806*** (0.012) | -0.497*** (0.122) |
| 2012 | -1.385*** (0.037) | -0.731** (0.327) | -2.116*** (0.028) | -1.937*** (0.193) | -0.948*** (0.013) | -0.704*** (0.130) |
| 2013 | -1.428*** (0.039) | -0.942*** (0.340) | -2.103*** (0.030) | -1.850*** (0.205) | -0.979*** (0.014) | -0.723*** (0.145) |
| Constant | 2.527*** (0.156) | -10.228*** (1.005) | 2.675*** (0.111) | -12.209*** (1.276) | 1.453*** (0.051) | -11.703*** (0.597) |
| Observations | 312,786 | 312,786 | 571,877 | 571,877 | 2,277,583 | 2,277,583 |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parentheses) are clustered at the individual level. The base category corresponds to the case in which the individual remains employed for Panel A, and to the case in which the individual remains non-employed for Panel B. Regressions include the same covariates as the regressions in Table 5 for Panel A and the regressions in Table 6 for Panel B (they do not include the regional unemployment rate).

Table 11. Multinomial logit models for transitions from employment and from non-employment. By skill group. Both genders.

| PANEL A: Multinomial logit models for transitions from employment. | | | | | | |
|--|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|
| | HIGH SKILL | | MEDIUM SKILL | | LOW SKILL | |
| | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY | TO NON-EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | |
| 2008 | 0.065*** (0.020) | -0.353 (0.258) | 0.101*** (0.014) | -0.092 (0.162) | 0.245*** (0.009) | -0.108 (0.106) |
| 2009 | 0.217*** (0.022) | -0.220 (0.257) | 0.281*** (0.016) | -0.190 (0.169) | 0.428*** (0.010) | -0.160 (0.114) |
| 2010 | 0.111*** (0.026) | -0.134 (0.268) | 0.132*** (0.020) | -0.364** (0.184) | 0.348*** (0.013) | -0.030 (0.120) |
| 2011 | 0.176*** (0.027) | -0.095 (0.277) | 0.196*** (0.021) | -0.603*** (0.191) | 0.434*** (0.014) | -0.161 (0.127) |
| 2012 | 0.251*** (0.030) | -0.033 (0.298) | 0.197*** (0.023) | -0.626*** (0.202) | 0.494*** (0.015) | -0.170 (0.134) |
| 2013 | 0.278*** (0.032) | -0.041 (0.314) | 0.229*** (0.025) | -0.607*** (0.218) | 0.543*** (0.016) | -0.021 (0.145) |
| Constant | 2.403*** (0.107) | -13.043*** (1.064) | 2.456*** (0.084) | -12.249*** (0.663) | 1.229*** (0.058) | -13.627*** (0.468) |
| Observations | 1,166,120 | 1,166,120 | 1,392,088 | 1,392,088 | 1,838,923 | 1,838,923 |
| PANEL B: Multinomial logit models for transitions from non-employment. | | | | | | |
| | HIGH SKILL | | MEDIUM SKILL | | LOW SKILL | |
| | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY | TO EMPLOYMENT | TO DISABILITY |
| Year dummies: | | | | | | |
| 2008 | -0.222*** (0.022) | -0.206 (0.312) | -0.244*** (0.014) | -0.001 (0.207) | -0.299*** (0.008) | -0.125 (0.088) |
| 2009 | -0.656*** (0.026) | -0.349 (0.331) | -0.667*** (0.017) | -0.170 (0.215) | -0.845*** (0.010) | -0.648*** (0.096) |
| 2010 | -0.817*** (0.030) | -0.440 (0.360) | -0.793*** (0.020) | -0.261 (0.230) | -0.956*** (0.011) | -0.780*** (0.101) |
| 2011 | -0.882*** (0.033) | -0.655* (0.384) | -0.805*** (0.021) | -0.358 (0.237) | -1.022*** (0.012) | -0.832*** (0.105) |
| 2012 | -1.132*** (0.037) | -0.636 (0.413) | -0.889*** (0.024) | -0.699*** (0.264) | -1.194*** (0.014) | -1.146*** (0.113) |
| 2013 | -1.026*** (0.039) | -0.636 (0.461) | -1.083*** (0.025) | -0.671** (0.283) | -1.187*** (0.014) | -1.154*** (0.122) |
| Constant | 2.136*** (0.113) | -8.889*** (1.136) | 0.782*** (0.072) | -10.266*** (0.759) | 0.959*** (0.043) | -11.097*** (0.399) |
| Observations | 323,188 | 323,188 | 704,120 | 704,120 | 2,292,884 | 2,292,884 |

*** p<0.01, ** p<0.05, * p<0.1.

Notes: Standard errors (in parentheses) are clustered at the individual level. The base category corresponds to the case in which the individual remains employed for Panel A and to the case in which the individual remains non-employed for Panel B. Regressions include the same covariates as the regressions in Table 5 for Panel A and the regressions in Table 6 for Panel B (they do not include the regional unemployment rate).

Table 12. Correspondence between contribution groups and skill groups in our dataset.

| Contributory group | Skill group |
|--|--------------|
| 1. Engineers, graduates and senior managers | High skill |
| 2. Technical engineers, experts and qualified assistants | |
| 3. Administrative and workshop managers | |
| 4. Unqualified assistants | |
| 5. Administrative officers | Medium skill |
| 6. Junior staff | |
| 7. Administrative assistants | |
| 8. First and second class officials | Low skill |
| 9. Third class officials and specialists | |
| 10. Unqualified workers older than 18 years old | |
| 11. Workers younger than 18 years old | |