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Business cycle and spillover effects on pre-retirement behavior in Spain

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Abstract

We test the hypothesis that exits from the labor market for pre-retirement individuals in Spain respond mainly to economic conditions and to incentives by analyzing two effects. First, we test the existence of spillover effects from a reform of the old-age pension system on transitions from employment to disability, unemployment and inactivity. We exploit the fact that the reform only affected individuals that had contributed between 15 and 25 years to the Social Security. Second, we estimate the effect of business cycle (BC) conditions at the local, sector and national level on these transitions. We find that both factors affect the exit timing and the choice of route out of the labor market.

JEL classification: J21, J22, R23

Keywords: Spillover effects; Business cycle conditions; Disability benefits

1. Introduction

During the 1970s and 1980s, European governments focused on the promotion of early retirement schemes for older workers in order to generate job opportunities and reduce unemployment for younger workers. These events prompted a reduction in employment rates of older individuals and an increase in the financial pressure of the social security systems which, coupled with the ageing of the society, triggered a shift in the policy focus towards ways of keeping older workers active in the labor market (Fischer et al. 2006). To achieve this goal, governments introduced several policies like monetary incentives for firms to hire older workers or limitations in the accession rules to the early retirement schemes. However, in many cases these efforts have not been translated into increases in activity rates of older workers because many of them are able to leave the labor market through alternative programs such as the disability or unemployment schemes.

A number of papers have documented these unforeseen spillover effects from a policy change in one Social Security program to the other schemes in the system. For example for the USA, Duggan et al. (2007) show that a reduction in the generosity of retirement benefits prompted an increase of the take-up rate of disability benefits. For The Netherlands, Borghans et al. (2010) also find significant evidence of spillover effects between social security programs when they report that 43% of those aged 45 or more that left the disability rolls due to a reform of the system, received an alternative form of social assistance benefits two years after the implementation of the reform.

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Also for The Netherlands, Bloemen et al. (2011) report that a reform that tightened searching conditions for older unemployed individuals increased the number of individuals that used DI benefits as an alternative exit route by 2.5 to 4 percentage points. Petrongolo (2009) examines a similar policy for the UK and also finds increased outflows from unemployment to disability benefits. Karlström et al. (2008) find that the abolition of Disability Insurance as a path to early retirement in Sweden led the group of individuals aged 60–64 to enroll in one of the other Social Assistance programs available in the country. Finally, specifically for the case of Spain, García-Pérez et al. (2013) found spillover effects from changes in the early retirement rules to the take up rate of unemployment in the pre-retirement age range.

Therefore, identifying these spillover effects between Social Security programs is crucial in order to ensure the effectiveness of policies that aim at keeping older workers active in the labor market. We contribute to this body of literature and estimate a difference-in-difference duration model to determine whether a reform of the old-age pension system that was introduced in Spain in 1997 had any effect on transitions into disability and unemployment benefits for pre-retirement employed workers. The reform introduced two main changes in the formula to calculate the old-age pension which could potentially generate an "income" and a "substitution" effect. We test whether individuals responded to these two policy changes by testing the existence of the substitution (which gives incentives to continue contributing and exiting less to disability) and the income effect (which increases the previous incentives to join the disability rolls once the individual reaches the eligibility requirement).[1]

A second aim of the paper is to identifying the role of business cycle conditions in explaining these labor market transitions for pre-retirement employed workers in Spain and how the BC conditions possibly interplay with policies. In many countries (see Benítez-Silva et al., 2010, for a comparative study), the disability and unemployment programs have been often used to cushion recessions and to alleviate transitions into and from economic inactivity in regions of high unemployment. In addition, disability and unemployment programs have often been used as an alternative to early retirement, either because of restrictions on early retirement itself, or because they offer more attractive after-tax benefit levels, which is particularly true in the case of disability benefits (Gruber and Wise, 1999, 2004; Jiménez-Martín et al. 2006; Blanco, 2000; Benitez-Silva et al2010). This alternative 'route' out of the labor market for older people proved particularly attractive when employers were seeking to shed older workers in periods of recession such as the early 1980s, early 1990s and late 2000s.

However, most of the literature that analyzes the effect of the business cycle on labor market participation rates approaches the topic from a macroeconomic point of view and time-series data is not enough to identify the causal effect behind an individual's behavior, as information on workers' characteristics and choices is not available. At the same time, the problem with microeconomic surveys is that they are not long enough so as to capture the effect of the business cycle[2] (Van Den Berg and Van Den Klaauw, 2001).

Therefore, the issue of the effect of the business cycle on labor force participation behavior has not received much attention in the literature due to the difficulty of combining macroeconomic and microeconomic data in a coherent way. However, workers' participation decisions during expansionary or recessionary periods are crucial for

understanding how labor markets adjust to macroeconomic fluctuations (Darby et al., 1998). Notable exceptions for the case of Spain are Bover et al.,2002, Jenkins and Garcia-Serrano, 2004, and, more recently, Garcia-Pérez et al., 2013. The first two papers find that favorable business cycle conditions in the country have a positive impact on re-employment rates of unemployed workers. The third paper estimates transitions from unemployment to employment and from employment to unemployment for individuals below age 60. The model in this paper includes the regional rate of growth of employment as a business cycle indicator, which in turn has the expected sign.

At the same time, the economic environment also affects the performance of the firms operating in the labor market and this effect is usually heterogeneous among economic sectors and regional units of a single country. In order to capture this heterogeneity, in this paper we construct a number of business cycle indicators at the national, regional and sector levels with monthly macroeconomic data and we combine it with individual labor market information from a large administrative database (monthly data also). This process results in a better identification of the causal effects of economic conditions on individual's behavior.

Our results show the strategic use of disability pensions by older workers approaching retirement as an alternative means of leaving the labor market when the economic situation of the country deteriorates as well as the spillovers from reforms in the old-age pension system to the disability scheme. In particular, we estimate that the policy change decreases the relative risk of receiving disability benefits (compared with continuing in employment) by a factor of 0.45 for individuals that have contributed 15–25 years to the Social Security system. The implied disability benefits savings of this reform amounts to about 19 million euros. When we include interactions between the policy variables and business cycle conditions we also find evidence of the existence of an income effect as more people that become eligible join the disability rolls. The variables that capture the effect of the business cycle at the national level also prove to be significant in all the specifications of our model.

The structure of the rest of the paper is as follows. Section 2 describes the key programs available for older workers. Section 3 presents the data sources and the sample employed in the analysis. It follows section 4 describing the econometric approach and the empirical specification. Section 5 describes the key results from the analysis while section 6 reports some robustness checks. Finally, section 7 concludes.

2. Social protection programs for older workers (45–59)

There are two basic programs available for workers before retirement benefits are first available at age 60: unemployment and disability benefits. In what follows we describe briefly these two programs.

2.1 Unemployment benefits

According to the current unemployment rules, there are two kinds of unemployment benefits. The first one is unemployment insurance (UI) which is available for eligible[3] workers that contributed while employed but that have been fired from the previous job. After the exhaustion of UI benefits, unemployment assistance (UA) is available for

individuals who have finished their UI contributory period. Individuals entering the UI scheme are entitled to receive 70% of the wages of the last job during the first six months and 60% after that. These quantities are subject to a minimum and a maximum amount. The minimum corresponds to 75% of the minimum wage and the maximum is not fixed and is proportional to the number of dependents. These benefits are paid for a period of one-third of the accumulated job tenure and are only paid for a maximum period of two years.

UA benefits are only paid to individuals with dependents and with an average family income below 75% of the minimum wage. There is a fixed amount paid which corresponds to 75% of the minimum wage. This benefit is only paid for a maximum period of two years[4]. There is, however, an exception to this rule for people aged 52 and more. They can receive 75% of the minimum wage until they reach the official retirement age and the years spent under this scheme are counted as contributive years towards an old-age pension (as the public employment agency, INEM, pays the contributions of the unemployed)[5, 6].

2.2 Disability

There are also two schemes of disability pensions, depending on whether the disability is temporary or permanent. If the disability is temporary and the risk covered is "common illness", a period of 180 days of contribution to the system during the last 5 years is required and benefits are granted for a maximum period of 18 months. After that, the individual has to either return to work or enter the scheme of permanent disability[7]. No minimum contribution is required for disabilities resulting from "work-related accidents".

For permanent disability situations, three levels of disability are identified which depend on the severity of the injury/illness and which involve different eligibility requirements and pension amounts. Included in the first level (inability to perform the usual job) there is a special provision for which workers with few qualifications, from disadvantaged socio-economic circumstances and who are older than 55 years[8] are eligible to receive a higher amount of disability benefits until retirement at age 65.

Between 5 and 15 years of contribution are required when the source of the disability is an ordinary illness and the benefit base is calculated in the same way as old-age pensions. No contributive requirement is needed if the disability is caused by a work related or unrelated accident or by a professional illness. In the case of a work-related accident or professional illness, the benefit base corresponds to the average wage in the last year of work and for a work-unrelated accident the benefit is calculated as the average annual wage for a 24 month-period that the individual can choose from the last seven years of work. Permanent disability benefits are automatically transferred to the old-age pension system when the individual turns 65 (Jiménez-Martín et al., 2006)[9].

2.3 Old-age pension system and the 1997 reform

One of our aims in this paper is to study the effects of a big reform in the old-age pension system in 1997 on transitions in the labor market for pre-retirement individuals aged 45–59. In this section, we briefly describe the characteristics of the old-age pension system before and after the reform in 1997.

Eligibility to the old-age pension benefits in Spain requires having contributed to the system by at least 15 years and you can enter the system at the normal retirement age of 65 if the individual does not have any job that requires affiliation to the Social Security system[10]. The pension amount is calculated by multiplying a benefit base[11] by a replacement rate which depends on the age of the individual and the number of years contributed to the system. Before the reform in 1997, at the normal retirement age of 65, the replacement rate was calculated as[12]:

$$\begin{cases} 0 & \text{if } n < 15 \\ 0.6 + 0.02(n\text{-}15) & \text{if } 15 \leq n < 35 \\ 1 & \text{if } 35 \leq n \end{cases}$$

The reform of 1997 increased the number of years used to compute the benefit base from 8 to 15 (one year increase for each calendar year until reaching 15 in 2003) and the formula used to calculate the replacement rate outlined above was also changed to:

$$\begin{cases} 0 & \text{if } n < 15 \\ 0.5 + 0.03(n\text{-}15) & \text{if } 15 \leq n \leq 25 \\ 0.8 + 0.02(n\text{-}25) & \text{if } 25 < n < 35 \\ 1 & \text{if } 35 \leq n \end{cases}$$

Where n is the number of years contributed to the Social Security system. The aim of the reform was to provide incentives for older individuals to stay employed for longer.

Apart from the reform in 1997, in 2002 there was another important reform in the old-age and in the unemployment systems. In this reform, early retirement was introduced at the age of 61 for individuals that had contributed for 30 years, that had been registered in the unemployment offices for at least 6 months and that were involuntarily unemployed. Before 2002 early retirement was only available at the age of sixty for individuals who had contributed to the system before 1967. (See García-Pérez et al., 2013, for an analysis of the effects of these reforms in transitions out of employment and unemployment).

The reform also provided incentives for both partial and flexible retirement. For partial retirement, the reform opened up the possibility to receive income from work while also receiving a percentage of the old-age benefits. For flexible retirement, the reform introduced incentives for individuals to retire after 65 as they could receive more than 100% of the regulatory base if they had contributed for at least 35 years to the system. We check the potential confounding effect of this additional reform for our results in the robustness check section.

2.4 Potential effect of the reform

As we have seen above, the aim of the 1997 reform was to provide incentives for older workers (below 60 in our sample) to stay employed for longer. However, we distinguish between two types of effects: an income effect and a substitution effect. The decrease in the fixed part of the formula from 0.6 to 0.5 for individuals that just fulfill the eligibility condition, that is, that have contributed exactly 15 years (n=15), can be interpreted as an income effect which would provide incentives for them to stop

contributing and move to disability as the relative payoff of the old-age pension option is decreased from 0.6 to 0.5 (effect A in Figure 1). Therefore, in the empirical model we will introduce a dummy variable to capture the effect of the eligibility condition for individuals that have contributed exactly 15 years before and after the reform. We expect more exits from employment to the disability rolls after the reform for this group of individuals due to the lower incentives to stay employed and contribute towards the old-age pension introduced by the reform.

Apart from this income effect, there is also a substitution effect, which is captured by the second part of the formula. For individuals that have contributed between 15+ and 25 years to the Social Security system, the reform in 1997 introduced an incentive to contribute for one more year to the system as the "prize" for this extra year contributed is higher now; 0.03 after the reform versus 0.02 before the reform (effect B in Figure 1).

Therefore, we expect that exits from employment to the disability system will be reduced for individuals that have contributed between 15+ and 25 years after the reform due to the increased incentives to stay employed introduced by the reform. On the contrary, the incentives for individuals which have contributed between 25+ and 35 years remain unchanged by the reform as the new formula provides the same replacement rate before and after the reform for this group of individuals. Consequently, we should not observe any relevant change in their behavior.

With respect to the effect of the reform on exits from employment to unemployment, it should be noted that the time spent receiving unemployment benefits are counted as contributed years towards an old-age pension as the public employment agency, INEM, pays the contributions of the unemployed. Therefore, both being employed and in the unemployment scheme increases the number of years of contribution so that the incentives of moving from employment to unemployment should not be changed by the reform. However, there is also a potential substitution effect for individuals that have contributed between 15+ and 25 years and that would have otherwise moved from employment to disability before the reform. These workers could be willing to move to unemployment instead of disability after the reform in order to keep contributing towards the old-age pension.

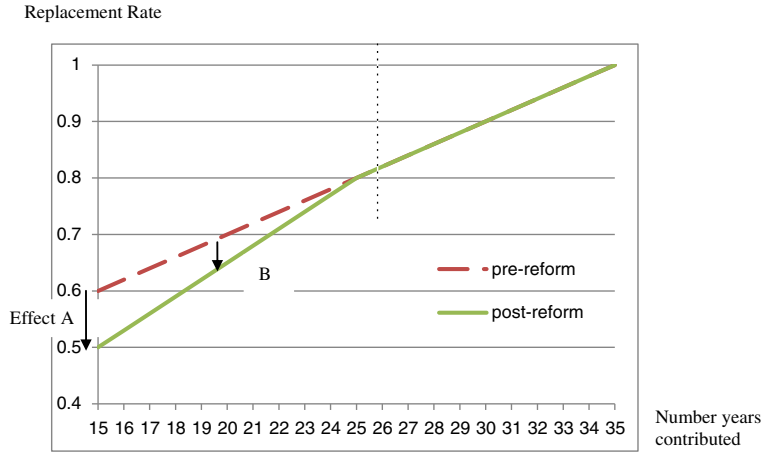

Figure 1 Changes A and B of the old-age pension reform in 1997.

Similarly, for individuals that are just fulfilling the eligibility condition and that have contributed 15 years to the system, we expect fewer exits to unemployment after the reform due to the lower incentive to continue contributing towards the old-age pension form the unemployment scheme.

In order to develop an hypothesis of the type of effect that the business cycle variables can have on labor market transitions in our sample we make the distinction between work disability, which is likely to be influenced by economic conditions, and health disability, which is affected by medical technology and demographic changes (Benitez-Silva et al., 2010). We have reasons to believe that, for the group of individuals aged 45–59 in Spain, the first type of disability is the predominant[13]. Therefore, we want to test the hypothesis that disability benefits are being used to alleviate the effects of economic recessions for pre-retirement individuals in Spain softening the rise in unemployment rates during bad economic times. Thus, if the hypothesis is correct, we expect to find a positive relationship between unemployment rates of the region and sector of the economy and transitions into disability benefits and a negative relationship between BC conditions at the national level (captured by the GDP growth) and these transitions.

3. Data and key empirical facts

3.1 Data

The study will use the Continuous Sample of Working Lives (Muestra Continua de Vidas Laborales, MCVL) which is a microeconomic data set based on administrative records compiled from three sources; the Spanish Social Security Administration, the Tax Office and the National Census. It contains a random sample of 4% of all the individuals who, at some point during 2007, had contributed towards the social security system (either by working or being in an unemployment scheme) or had received a contributory pension. The random sample selected contains over one million people[14].

There is information available on the entire employment history of the workers, including the exact duration of all previous employment, unemployment and pension spells, and for each spell, the firm's sector and region of activity, the type of contract held, the wages measured as contribution bases, the level of pension and unemployment benefits, among others. There is also some census information on personal characteristics such as age, gender, nationality and level of education.[15]

The macroeconomic variables used to capture the economic business cycle are constructed with information derived from the Spanish Instituto Nacional de Estadística (INE).

We measure growth and employability performance of different economic sectors and regions in Spain to capture the variation in the business cycle between times, sectors and regions.

We only consider men in our sample as women have a more interrupted professional career due to maternity and we do not have enough information in our administrative data in order to take all these additional issues into account. Therefore, we select all employment spells of men in the sample between 45 and 59[16] years old and we follow them until they exit from employment or until they are censored

(last month of age 59 or 2007), whichever occurs earlier. We do not consider spells of individuals who are unemployed, inactive or receiving disability pensions, as our focus is on transitions out of employment.

As the process of claiming disability benefits may take some time so that individuals may spend some time in inactivity or unemployment before they can fulfill all the administrative steps needed to receive the disability benefits, we consider individuals as exiting to disability benefits if they are observed as joining the disability rolls in the subsequent two years after leaving employment[17].

We have monthly observations from 1987 until 2005 and the sample selected contains 163.394 spells of employment for 89.698 individuals. 57.610 of these employment spells end in unemployment, 4.038 in disability, 38.797 in inactivity and 62.949 are censored. The exit to disability is considered to be an absorbing state[18]. Descriptive statistics of the variables used in the analysis can be found in Table 1.

3.2 Aggregate labor market evolution of workers 45–59 in Spain

Figure 2 shows the way in which the inflow into disability pensions reacts to business cycle conditions at the aggregate level in Spain as it plots the relation between the number of disability pensions granted to workers aged 45–59 and the GDP growth. It can be observed that there is a strong negative relation between these two variables so that whenever the GDP increases, the number of disability pensions for this group of workers decreases and vice versa.

At the same time, the number of new disability pensions granted has increased strongly and continuously since 1997, the year of the old-age pension reform, even if the fluctuations in the GDP were not that pronounced from 1997 and the growth of the GDP almost stabilized at the end of the period.

Therefore, some empirical evidence seems to exist at the aggregate level about two facts: first, changes in the number of disability pensions granted to the group of pre-retirement workers seem to respond to adjustments in the speed of economic growth. Second, the number of disability pensions granted to this group of individuals seems to accelerate after the introduction of the reform in 1997.

In the econometric part we will differentiate between these two effects by including two types of variables: the first ones will capture BC conditions at a more disaggregated regional and sector level and a second group of variables will capture the effect of the reform in 1997.

4. Modelling framework: competing-risk hazard regression model

Our main purpose is to measure the effect of the old-age pension reform and of the BC variables on transitions out of employment for older workers approaching retirement. We use duration models to estimate these effects and we consider three potential destination states once the individual leaves employment: unemployment; disability and inactivity. Therefore, we use a competing-risk model in which the discrete time hazard into one of the m states is equal to the probability of making a transition in interval t, conditional upon surviving up to the beginning of the interval.

Table 1 Mean and standard deviations

	Men	
	Mean	**St dev**
Covered wage	1345.9	706.91
High School dropouts	0.1999	0.3999
High School	0.5689	0.4952
Bachelor's and Higher	0.2109	0.4079
Number Workers Firm	857.21	5445.5
Madrid Region	0.1704	0.3760
Catalonia Region	0.2085	0.4062
Mediterranean Region	0.1218	0.3270
Northern Region	0.2019	0.4014
Castilla (Centre)	0.1331	0.3397
South Region	0.1633	0.3696
Primary Sector	0.0158	0.1247
Secondary Sector	0.4710	0.4991
Tertiary Sector	0.3235	0.4678
Public Administration	0.0735	0.2584
Education Sector	0.0180	0.1331
Social Services	0.0697	0.2547
Duration	47.800	41.139
Duration^2	3977.2	5892.3
Duration^3	419767	86011
Part-time Contract	0.0391	0.1940
Cohort born 1935-1940	0.1643	0.3705
Cohort born 1941-1946	0.3003	0.4583
Cohort born 1947-1951	0.2495	0.4327
Cohort born 1952-1956	0.1694	0.3751
Cohort born 1957-1961	0.0526	0.2232
Unempl Rate CCAA	15.510	6.4242
Unempl Rate Sector	6.9035	3.8634
GDP Growth	1.3152	1.0046
Age 52	0.0677	0.2513
Age 55	0.0570	0.2319
Age 58	0.0438	0.2046
#Observations	6.535.767	

Men aged 45–59.

We assume a specific form for the conditional destination-specific hazard rate h_{it}^{m} for individual i to destination m in interval t such that[19]:

$$\mathrm{h}_{\mathrm{it}}^{\mathrm{m}} = \frac{\exp\left(\beta_0^m + \beta_1^m X_{it} + \beta_2^m Z_{it} + \beta_3^m W_{it} + \theta_t^m\right)}{1 + \sum_{m=1}^{3} \exp\left(\beta_0^m + \beta_1^m X_{it} + \beta_2^m Z_{it} + \beta_3^m W_{it} + \theta_t^m\right)} \tag{9}$$

Where, X_{it} is a vector of personal and employment characteristics, Z_{it} is a vector of variables related to the BC, W_{it} is a vector of variables that capture the effect of the old-age

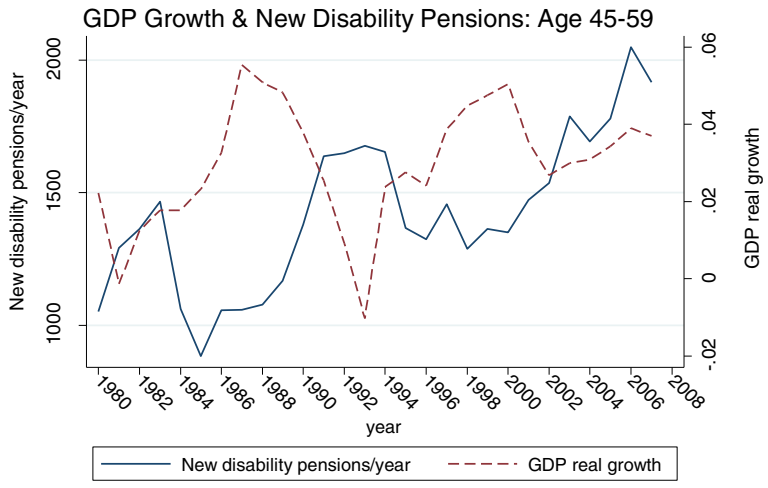

Figure 2 GDP growth and new disability pensions granted each year to individuals aged 45–59 in Spain, 1980–2008. Source: GDP growth: Spanish National Institute of Statistics, Number of disability pensions granted each year to individuals aged 45–59: Own calculations from MCVL.

pension reform in 1997 and θ_t^m is the baseline hazard function which is modeled as a cubic polynomial. We have chosen this specification of duration dependence because, together with the age dummies, it reproduces the shape of the empirical interval hazard rate reasonably close.[20]

For the given hazard rate described above, the individual worker's likelihood contribution has the same form than the likelihood of a standard multinomial logit model (Allison, 1982).

$$L_i = \left[\prod_{m=1}^{3} h_{it}^m\right]^{c_{ti}^m} \left[h_{it}^0\right]^{1-\sum_{m=1}^{3} c_{ti}^m} \left[\prod_{\tau=1}^{t-1} h_{i\tau}^0\right] \tag{10}$$

Where c_{it}^m is a destination-specific censoring indicator which equals 1 if worker i exits to state m in interval t, and h_{it}^0 is the conditional probability of making no transition (reference category).

$$h_{it}^0 = \frac{1}{1 + \sum_{m=1}^{3} \exp\left(\beta_0^m + \beta_1^m X_{it} + \beta_2^m Z_{it} + \beta_3^m W_{it} + \theta_t^m\right)} \tag{11}$$

$$c_{it}^m = \begin{cases} 1 \text{ if } c_{it}=m \\ 0 \text{ if } c_{it}=0 \end{cases} \Rightarrow c^m \tag{12}$$

4.1 Empirical Specification

Our empirical specification consists of three types of explanatory variables: a vector of personal and job characteristics, a vector of proxies of the state of the BC at the national, regional and sector level and a vector of variables that capture the effect of the old-age pension reform in 1997 (apart from the three variables of the baseline hazard). The first one includes a proxy for education[21], characteristics of the current

employment (number of workers in the firm, part-time job, voluntary/involuntary termination of the job) and region, cohort and age dummies at the key ages of the system (at 52, 55 and 58)[22]. The dummy at age 52 will capture the effect of the special scheme in the unemployment legislation explained above for which individuals can receive unemployment assistance benefits until retirement. The dummy at age 55 tests the effects of the special scheme in the disability system and the one at age 58 captures the strategic behavior of individuals getting the maximum of two years of unemployment benefits and moving to early retirement at the age of 60.

The vector of proxies of the state of the BC includes three variables constructed with macroeconomic data derived from the National Institute of Statistics. The first variable captures the unemployment rate of each of the 18 autonomous communities in Spain. We assign this value to each individual according to the autonomous community in which they work at each point in time. Depending on the economic sector in which the individual is reported to work, we also assign them the value of another variable that captures the unemployment rate in each of the 17 economic sectors in which we divide the Spanish economy. Finally, we also include a third variable, the GDP growth, in order to capture national business cycle trends that are not captured by the regional or sector variables. These macroeconomic variables are all varying over time.

In order to capture the effect of the old-age pension reform, we construct 7 variables that will allow us to capture the differential effect of the reform for individuals with different number of years contributed to the system as well as a variable that controls for the post-reform period. We distinguish from the variable that captures the eligibility condition and that represents the income effect showed in Figure 1 and the variable that captures the substitution effect:

$$\begin{cases} \text{CONTR15} = \text{YC} = 15 \\ \text{CONTR15POST1997} = [\text{YC} = 15] * [\text{YEAR} > 1997] \text{ (Income Effect)} \\ \text{CONTR1525} = 15 < \text{YC} \leq 25 \\ \text{CONTR1525POST1997} = [15 < \text{YC} \leq 25\,] * [\text{YEAR} > 1997] \text{ (Substitution E.)} \\ \text{CONTR2535} = 25 < \text{YC} < 35 \\ \text{CONTR2535POST1997} = [25 < \text{YC} < 35] * [\text{YEAR} > 1997] \\ \text{CONTR35} = \text{YC} \geq 35 \\ \text{YPOST1997} = \text{YEAR} > 1997 \end{cases}$$

where YC denotes years of contribution. Therefore, contr15post1997 is the variable that will capture the effect of the policy for individuals that have contributed 15 years to the social security system; that is what we call the income effect. At the same time, the variable contr1525post1997 will capture the effect of the policy for individuals that have contributed between 15 and 25 years to the social security system. This variable identifies what we have defined above as the substitution effect.

5. Results

We first focus on the non-parametric analysis by looking at the empirical hazard rates derived from our sample. The empirical hazard for a given number of months is calculated as the total number of exits from employment in each month divided by the population in employment at the beginning of that month. This summarizes the sample probability of leaving employment at each particular point in time. However, for simplicity purposes, we present this information compiled by age instead of months.

The first graph in Figure 3 shows the interval hazard rates from employment to all the other non-employment situations for men 45–59. The graph shows three peaks of the hazard rate at ages 52, 55 and 58, which are attributable to the special schemes of the unemployment and disability pension legislation outlined above. The mild peak at age 52 is due to eligibility to unemployment assistance for older unemployed workers. The age 55 peak is mainly due to changes in disability benefits. Finally, the age 58 peak is explained because of transitions to early retirement at age 60 after two years in contributive unemployment benefits (see García Pérez et al., 2013, for further details). The rest of the graphs in Figure 3 present the hazard rates differentiated for exits to unemployment, disability and inactivity. We can see the higher hazard at age 58 for exits to unemployment, the acceleration of the hazard at age 55 for exits to disability and a small peak at ages 52, 55 and 58 for exits to inactivity.

Table 2 presents the coefficients of the estimation of the difference-in-difference competing-risk model. Due to the non-linearity of the model and the inclusion of interaction terms, we only discuss these results in terms of sign and statistical significance of the coefficients of the explanatory variables. The size of the effects is discussed for the variables of interest by looking at relative risk ratios (commonly interpreted as odd ratios) in Table 3 and total changes in predicted annual exit probabilities in Table 4.

We can see in Table 2 that, for Spanish men, the policy proves the existence of the substitution effect as it decreases exits from employment into disability benefits for individuals that have contributed between 15+ and 25 years to the Social Security system. The results also show that the income effect due to the policy goes in the wrong direction as the coefficient for the eligibility condition is negative (and we expected it to be positive) although the coefficient becomes insignificant when we restrict the sample to exclude the years after the reform in 2002. Furthermore, when we include in the model

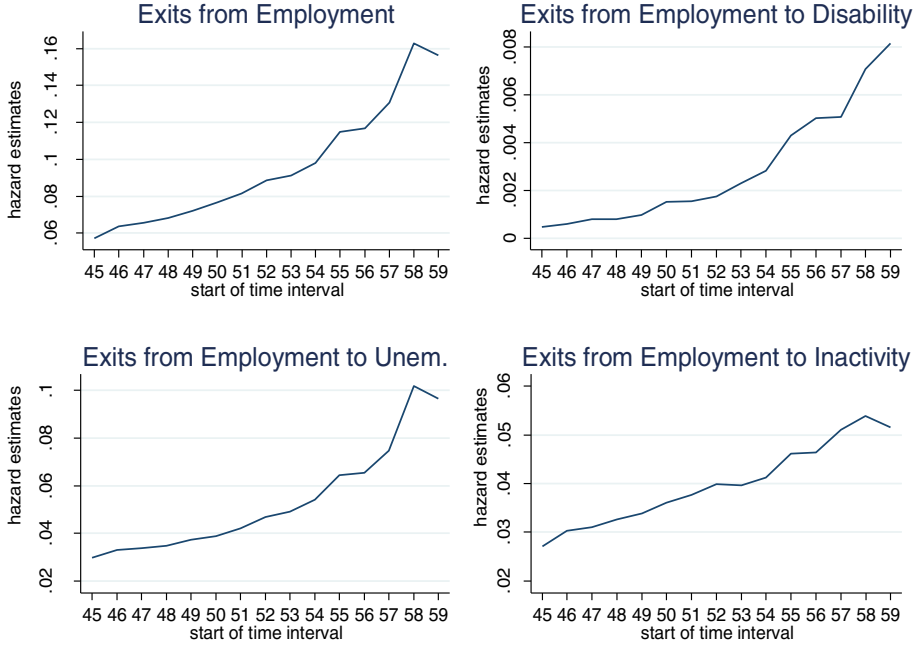

Figure 3 Interval hazard rate from employment to all other non-employment situations: men 45–59. Source: Own calculations from MCVL.

Table 2 Evaluation of the old-age pension reform in 1997 & business cycle variables, Spanish male 45–59; coefficients

	Disability	Unemployment	Inactivity
Covered Wages	−0.0018***	−0.0011***	−0.003***
	(0.000)	(0.000)	(0.000)
High School	−0.144***	−0.492***	−1.228***
	(0.053)	(0.057)	(0.047)
Bachelor's and Higher	−0.103	−1.382***	−0.782***
	(0.083)	(0.094)	(0.072)
Primary sector	0.163	−12.65***	−1.101***
	(0.168)	(1.015)	(0.144)
secondary sector	0.205**	−24.36***	−0.453***
	(0.102)	(0.620)	(0.080)
Tertiary sector	−0.0515	−17.85***	0.0594
	(0.091)	(0.567)	(0.058)
Education sector	−1.070***	−15.65***	−0.492***
	(0.304)	(0.125)	(0.164)
Social services	−0.511***	−3.805***	−0.650***
	(0.129)	(0.447)	(0.098)
Number Workers Firm	0.0001***	0.0003***	0.0001***
	(0.000)	(0.000)	(2.07e-05)
Catalonia Region	0.203**	1.115***	−0.297***
	(0.086)	(0.209)	(0.0788)
Mediterranean Region	−0.0323	1.302***	−0.291***
	(0.098)	(0.202)	(0.0762)
Northern Region (excl Catalonia)	0.682***	2.157***	−0.0484
	(0.079)	(0.194)	(0.0680)
Castilla: Centre (exclMadrid)	0.0991	2.261***	−0.253***
	(0.0953)	(0.195)	(0.0750)
South Region	0.502***	1.013***	−0.639***
	(0.099)	(0.208)	(0.0862)
Duration	0.0560***	−0.046***	0.0236***
	(0.004)	(0.002)	(0.002)
Duration^2	−0.0004***	0.0006***	−0.0002***
	(0.000)	(0.000)	(0.000)
Duration^3	0.000***	−0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Part-time Contract	−2.275***	−2.678***	−1.712***
	(0.279)	(0.395)	(0.150)
Cohort born 1941-1946	0.324***	0.838***	−0.342***
	(0.083)	(0.081)	(0.0635)
Cohort born 1947-1951	0.832***	1.558***	−0.605***
	(0.118)	(0.116)	(0.0924)
Cohort born 1952-1956	1.096***	2.632***	−1.140***
	(0.162)	(0.184)	(0.131)

Table 2 Evaluation of the old-age pension reform in 1997 & business cycle variables, Spanish male 45–59; coefficients *(Continued)*

Cohort born 1957-1961	1.951***	3.060***	−2.029***
	(0.223)	(0.212)	(0.268)
Year Post-1997	−0.127	0.970***	0.658***
	(0.150)	(0.181)	(0.112)
Year Contributed=15	0.498**	0.0841	−0.0631
	(0.224)	(0.081)	(0.140)
Year Contributed=15*Post1997	−2.644***	0.130	−0.406
	(1.026)	(0.264)	(0.369)
15<Year Contributed≤25	0.372***	−0.128**	−0.0776
	(0.129)	(0.058)	(0.0697)
15<Year Contributed≤25*Post1997	−0.796***	−0.322	0.0351
	(0.157)	(0.197)	(0.117)
25<Year Contributed<35	0.0373	0.254***	−0.314***
	(0.140)	(0.083)	(0.0933)
25<Year Contributed<35*Post1997	−0.063	−1.724***	0.449***
	(0.146)	(0.204)	(0.126)
Year Contributed≥35	0.0500	−0.625***	−0.0196
	(0.132)	(0.197)	(0.142)
Age	−0.799***	2.083***	0.379***
	(0.203)	(0.135)	(0.146)
Age^2	0.008***	−0.019***	−0.004***
	(0.001)	(0.001)	(0.001)
Unem.Rate CCAA	−0.001	0.066***	0.0449***
	(0.005)	(0.005)	(0.0045)
Unem.Rate Sector	0.002	2.182***	−0.0628***
	(0.009)	(0.063)	(0.0085)
GDP Growth	−0.049*	−0.295***	−0.397***
	(0.027)	(0.011)	(0.0255)
Age 52	−0.182*	0.0624	0.215***
	(0.102)	(0.049)	(0.0702)
Age 55	0.254***	−0.017	0.278***
	(0.080)	(0.054)	(0.0806)
Age 58	0.056	0.218***	0.447***
	(0.084)	(0.068)	(0.100)
Constant	9.562*	−73.11***	−11.22***
	(5.33)	(3.57)	(3.777)
Observations	6,442,191	6,442,191	6,442,191
Log-likelihood	−78823.93		

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Note: The omitted categories for the dummy variables are laborers without a high-school degree for the education dummies, public administration for the sector of the economy in which the individual works, Madrid for the regional dummies and the cohort of 1935–40.

the interactions between the policy and the business cycle variables, we find the correct sign for the income effect and the coefficient is very significant. We interpret this as evidence of the existence of an income effect conditional on business cycle conditions.

Table 3 Evaluation of the old-age pension reform in 1997 & business cycle variables, Spanish male 45–59; relative risk ratios

	Disability	Unemployment	Inactivity
Year Contributed=15	1.646**	1.088	0.939
	(0.369)	(0.088)	(0.131)
Year Contributed=15*Post1997	0.0711***	1.139	0.666
	(0.073)	(0.300)	(0.246)
15<Year Contributed≤25	1.451***	0.880**	0.925
	(0.187)	(0.051)	(0.064)
15<Year Contributed≤25*Post1997	0.451***	0.725	1.036
	(0.071)	(0.142)	(0.121)
25<Year Contributed<35	1.038	1.289***	0.731***
	(0.145)	(0.108)	(0.068)
25<Year Contributed<35*Post1997	0.939	0.178***	1.566***
	(0.137)	(0.036)	(0.198)
Year Contributed≥35	1.051	0.535***	0.981
	(0.138)	(0.106)	(0.140)
UnemRateCCAA	0.999	1.069***	1.046***
	(0.005)	(0.006)	(0.004)
UnemRateSector	1.003	8.862***	0.939***
	(0.009)	(0.563)	(0.008)
GDP Growth	0.951*	0.745***	0.672***
	(0.025)	(0.008)	(0.017)
Observations	6,442,191	6,442,191	6,442,191

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Note: We present only selected results for this model. The omitted categories for the dummy variables are laborers without a high-school degree for the education dummies, public administration for the sector of the economy in which the individual works, Madrid for the regional dummies and the cohort of 1935–40.

The coefficient for the unemployment exit for individuals that have contributed between 15+ and 25 years is not significant.

Therefore, it seems that the policy is effective in deterring the entrance into the disability system for individuals with 15+ to 25 years contributed so that they can earn the higher prize of contributing one more year introduced by the policy change and the policy is also inducing an entry effect into the disability system conditional on the business cycle by reducing the initial percentage of becoming eligible for the old-age pension from 0.6 to 0.5. As predicted in Table 5 above, there is no effect of the policy for the inflow into the disability system for individuals that have contributed between 25–35 years as the policy did not change the parameters to calculate the old-age pension for this group of workers.

In particular, we estimate in Table 3 a relative risk ratio (causal effect of the policy) for exits to disability relative to staying employed of 0.451 for individuals with 15+ to 25 years contributed (holding constant the other variables in the model). So after the policy, individuals in this group are less likely to exit to disability benefits than to stay

Table 4 Total change in exit probability to disability benefits due to the policy

	Years Contributed 15+ to25	Max-Min Unemp. Rate Sector	Min-Max GDP
Change in Probability	−0.19%	0.30%	−0.14%

Table 5 Expected spillover effects of the reform in 1997 on transitions from employment to disability and unemployment benefits

Departing State: Employment	Disability	Unemployment
Eligibility Condition (Individuals just having 15 years contributed)	Increase (+)	Decrease(–)
15+ to 25 years contributed	Decrease (–)	Increase (+)
25+ to 35 years contributed	No Effect	No Effect

employed than before the policy. The annual change in predicted exit probability to disability benefits due to the policy is −0.19% for 15+ to 25 years of contribution (see Table 4).

With respect to the variables that capture the effects of the business cycle, the results of the estimation confirm our hypothesis about the strategic use of disability benefits to alleviate the effects of economic recessions for pre-retirement men in Spain. We see in Table 2 that the coefficient for the GDP growth is negative and significant for men (and this results holds in all of our specifications) suggesting that exit to disability is also influenced by the economic cycle of the country as a whole. In Table 3 we estimate that when the GDP increases by one unit, the relative risk of joining the disability rolls decreases by a factor of 0.95. Similarly, the probability of receiving these benefits increases by 0.14% when the GDP changes from the maximum to the minimum value in our sample (from 5.6 to −0.4, see Table 4).

A further look to Table 2 reveals a positive relation between the unemployment rate of the sector of the economy and entries into the disability system although the coefficient is not significant. Therefore, when there is a negative economic situation in the sector of activity in which the individual works, he has a higher probability of joining the disability rolls. In particular, we estimate that for a unit increase in the unemployment rate of the sector, the relative risk of entering the disability rolls increases by a factor of 1.003 and our model predicts that the probability of going to disability benefits increases by 0.30% when the unemployment rate of the sector changes from the minimum to the maximum in our sample (0.1 versus 14.7). Both the unemployment rate of the sector of activity and the unemployment rate of the autonomous community appear to be non-significant in our specifications because their effect is already captured by the dummy variables of the region and the sector of activity. Both unemployment rates appear to be significant when we estimate the model without the dummies for autonomous community and sector of activity. However, we have included them in the model because we wanted to test whether there is a time-variant effect at the regional and sector level apart from the fixed-effect captured by the dummies.

Therefore, we have seen that the hypothesis that we made in section 2.4 about the potential expected effects are corroborated by our results both with respect to the effects of the policy as well as to the effects of business cycle conditions on transitions into disability benefits. With respect to the business cycle, we have seen that the medical requirements needed to access disability benefits are not as strict as to prevent workers from using this route as an alternative to claiming unemployment benefits during bad economic times. With respect to the effects of the policy change, we find that fewer men in the pre-retirement years left the labor market through the disability system after the reform was introduced in 1997 due to a substitution effect. This result is true for men that contributed between 15+ and 25 years in the Social Security system

as this was the group of workers for which the reform introduced an increased "prize" of accumulating one more year of contributions. Simultaneously, we find that more men that had contributed between 15–25 years joined unemployment after the reform (as expected) as the years spent under the unemployment scheme are also counted as contributed towards the old-age pension. Therefore, individuals can still benefit from the increased prize introduced by the reform for one more year of contributions when joining the unemployment rolls.

6. Robustness checks

As there was another reform of the old-age system introduced in 2002, the first robustness check that we perform consists in estimating the same competing-risk model excluding the years after this new reform in 2002 in order to make sure that we are only capturing the effects of the reform in 1997. The second robustness check that we perform tests for any differential effect of the policy for different business cycle conditions by introducing interaction effects between the policy and the state of the BC.

6.1 Restricting the sample to the years before the 2002 pension reform

Apart from the reform in 1997, we have seen in section 2 of the paper that there was another important reform in the old-age and in the unemployment systems in 2002. Therefore, in order to be sure that we are only capturing the real effect of the reform in 1997 free of the effect of the reform in 2002, we estimate the same competing risk model but restricting the sample to exclude the years after the reform in 2002.

The results of the competing risk model with the restricted sample are presented in Table 6 and we can see that the coefficient that capture the effect of the policy for entries in disability for individuals that have contributed between 15+ and 25 years keep their significance levels and have the same sign than the model with the full sample. The coefficients that capture the effect of the policy for entries into disability for the other group of workers are not significant (individuals that have contributed 15 years and between 25–35 years). The coefficients for the business cycle variables have also the same sign than in the baseline model.

6.2 Interactions policy variables with BC variables

Finally, we investigate whether the effect of the policy is different depending on the economic conditions of the region or the country. The aim of this section is to analyze the possibility that the effect of the policy, in terms of affecting the incentives of individuals to join the disability rolls, would be stronger in regions and times with less/more favorable economic conditions. We test whether economic conditions affect both the income and the substitution effects introduced by the policy. Therefore, in order to study the interplay between BC conditions and the 1997 policy change, we estimate the same competing risk model but adding some additional interaction terms of the policy and the BC variables.

The results are presented in Table 7 for the interactions between the policy variables and the unemployment rate of the region. We can see that the introduction of the interaction terms does not significantly change the coefficients and significance levels for the policy variables of interest except for the eligibility condition. The results show

Table 6 Robustness checks: restricted sample; 1987–2002; coefficients

	Disability	Unemployment	Inactivity
Year Contributed=15	0.285	0.0790	−0.072
	(0.221)	(0.082)	(0.140)
Year Contributed=15*Post1997	−1.633	−0.222	−0.096
	(1.037)	(0.308)	(0.374)
15<Year Contributed≤25	0.190	−0.155***	−0.096
	(0.124)	(0.058)	(0.069)
15<Year Contributed≤25*Post1997	−0.610***	−0.407*	0.148
	(0.228)	(0.218)	(0.133)
25<Year Contributed<35	−0.129	0.246***	−0.320***
	(0.137)	(0.083)	(0.0931)
25<Year Contributed<35*Post1997	0.0744	−1.861***	0.551***
	(0.215)	(0.225)	(0.142)
Year Contributed≥35	−0.703***	−0.604***	−0.181
	(0.225)	(0.213)	(0.169)
UnemRateCCAA	0.0095	0.063***	0.041***
	(0.006)	(0.006)	(0.004)
UnemRateSector	0.010	1.97***	−0.036***
	(0.013)	(0.06)	(0.008)
GDP Growth	−0.0616**	−0.275***	−0.388***
	(0.027)	(0.011)	(0.025)
Observations	4,627,689	4,627,689	4,627,689
Log-Likelihood	−64053.78		

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Note: We present only selected results for this model. The omitted categories for the dummy variables are laborers without a high-school degree for the education dummies, public administration for the sector of the economy in which the individual works, Madrid for the regional dummies and the cohort of 1935–40.

that there is now an income effect due to the policy as more individuals fulfilling the eligibility condition do enter the disability rolls to take advantage of the increase from 0.5 to 0.6. This is a very interesting result as now all the expected effects that we had predicted before the estimation are corroborated by our model. Furthermore, we also see that the effect of the unemployment rate of the region implies a differential effect of the policy. That is, for individuals that have contributed 15 years to the Social Security system, the reform in 1997 had a smaller impact in times and regions with a higher unemployment rate. Therefore, in times and regions with a higher unemployment rate, the income effect of the reform was lower for exits into disability benefits[23].

7. Concluding remarks

In this paper we have investigated the labor market behavior of pre-retirement employed workers in Spain. In particular, we have assessed the extent to which exits from employment into disability benefits can be attributable to economic instead of health reasons. Therefore, we explore the existence of spillover effects from a reform in the old-age pension system as well as the effects of business cycle conditions on labor market transitions from employment to disability, unemployment and inactivity for men aged 45–59 in Spain.

Table 7 Robustness checks: interactions between policy parameters and BC variables: UR

	Disability	Unemployment	Inactivity
Year Contributed=15	0.502**	0.0847	−0.0631
	(0.225)	(0.081)	(0.140)
Year Contributed=15*Post1997	3.383***	0.181	−0.531
	(1.065)	(0.533)	(0.574)
15<Year Contributed≤25	0.378***	−0.129**	−0.0751
	(0.129)	(0.058)	(0.069)
15<Year Contributed≤25*Post1997	−0.800***	−0.378	0.238
	(0.284)	(0.297)	(0.181)
25<Year Contributed<35	0.0412	0.253***	−0.313***
	(0.140)	(0.083)	(0.0934)
25<Year Contributed<35*Post1997	0.145	−2.002***	0.786***
	(0.192)	(0.270)	(0.174)
Year Contributed≥35	0.0606	−0.629***	−0.0066
	(0.131)	(0.198)	(0.142)
Year Contributed=15*Post1997*UnemRate	−0.648***	−0.003	0.00667
	(0.030)	(0.028)	(0.0256)
15<Year Contributed≤25*Post1997*UnemRate	−0.001	0.0044	−0.0129
	(0.0165)	(0.013)	(0.0079)
25<Year Contributed<35*Post1997*UnemRate	−0.0168*	0.0208*	−0.0225***
	(0.0101)	(0.010)	(0.0076)
UnemRateCCAA	0.0036	0.0628***	0.0522***
	(0.006)	(0.006)	(0.0053)
UnemRateSector	0.0022	2.184***	−0.0632***
	(0.0095)	(0.063)	(0.0085)
GDP Growth	−0.0471*	−0.295***	−0.396***
	(0.027)	(0.011)	(0.025)
Observations	6,442,191	6,442,191	6,442,191
Log-likelihood	−78806.08		

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Note: We present only selected results for this model. The omitted categories for the dummy variables are laborers without a high-school degree for the education dummies, public administration for the sector of the economy in which the individual works, Madrid for the regional dummies and the cohort of 1935–40.

We match administrative data from the Social Security records in Spain with macroeconomic information on business cycle conditions at the national, regional and sector level derived from the National Institute of Statistics to estimate a competing risk duration model. We also include in the model some personal and job characteristics as well as the diff-diff variables to capture the effect of the policy reform in 1997.

Our results confirm our hypothesis about the strategic use of disability benefits by older workers approaching retirement as an alternative means of leaving the labor market since both the business cycle variables and the policy variables prove to have the right sign and to be significant. With respect to the policy variables, we find that our hypothesis of the existence of a substitution effect is corroborated for individuals that have contributed 15+ to 25 years and the hypothesis of an income effect for individuals that become eligible is only confirmed conditional on business cycle conditions. We find that the old-age pension reform of 1997 decreased the relative risk of receiving

disability benefits by 0.45 for the group affected by the policy, that is, individuals that have contributed between 15+ and 25 years to the system. If we perform a simulation in order to give a monetary value to this decrease in the inflow into disability benefits, we estimate that the government saved approximately 19 million euros per year[24].

When estimating the effect of the business cycle on entries into disability benefits, we find that for a unit increase in the GDP, the relative risk of entering the disability rolls decreases by a factor of 0.95.

The income effect of the policy only appears with the correct sign when we introduce in the model interactions between the policy variables and business cycle conditions. Therefore, the income effect induced by the reform is conditional on the business cycle. Our results prove to be very robust to different specification tests that we perform.

Finally, from a policy point of view, we want to highlight the importance of taking into account the spillover effects of reforming one Social Protection program in the responses of agents to other programs. In order to ensure the effectiveness of our policy interventions, we need to understand the interactions between Social Security programs and take them into consideration when designing policy interventions.

Endnotes

[1]We are aware that what we call income and substitution effects are non-standard. As we shall define more precisely latter on, the "income" effect stems from the reduction in the pension points given to eligible individuals (those that have contributed 15 years) after the reform, likewise the substitution or price effect stems from the increase in the pension points given for each year contributed above the minimum required and up to 25.

[2]With microeconomic data, it is usually assumed that the duration of employment is independent of business cycle conditions when the number of periods analyzed is relatively small.

[3]They must have held the job for at least one year.

[4]There is also a special scheme in Andalucía and Extremadura for agricultural workers who have been employed for 40 days during the year. They are entitled to receive 75% of the minimum wage for 90 to 300 days each year. The number of days depends on their age and number of dependents.

[5]This rule was introduced in 1989.

[6]Furthermore there is a special unemployment subsidy for workers that have exhausted contributive benefits and have 45 years or more.

[7]This is provided on passing a medical examination that determines the "permanent disability" condition.

[8]The argument behind this special arrangement is the fact that this group of workers is considered to be in a particularly difficult position for finding a new job.

[9]On average, in monetary terms, this corresponds to an average disability pension of 700.05 euros per month in 2005; an average old-age pension of 686.61 euros per month in 2005 and an average unemployment benefit of 740.66 euros per month in 2005 (data taken from the annual social and labor statistics from the Spanish Ministry of Labor and Social Affairs).

[10]This condition was later relaxed in 2002 when partial retirement was introduced.

[11]The benefit base is a weighted average of monthly earnings over the last 8 years of work before retirement. This was changed to 15 years of work before retirement from 1997. However, this change was introduced gradually from 1997 until 2002 and it affected all individuals in the same way. Therefore, we have reasons to think that this change will not interfere in our results. See Boldrin and Jiménez-Martín (2007) for further details of the Spanish system and the reforms undertaken.

[12]For early retirement (ages 60–65) the replacement rate is multiplied by a penalization factor of 0.6 at age 60 increasing 0.08 each year until reaching 1 at age 65. This was also changed in 1997 to a factor of 0.65 and a yearly increase of 0.07 (Boldrin and Jiménez-Martín, 2007).

[13]We can see a graphical evidence of this hypothesis in Figure 2.

[14]For our analysis we take a 50% random sample of this Social Security data as the original sample was too large to be managed.

[15]We do not include the self-employed in our analysis as they may face different incentives than employed individuals.

[16]We do not include individuals aged 60 because, at that age, they can already access some early retirement schemes and this would constitute another possible exit route which is not the focus of our paper.

[17]Therefore, we cut the sample in 2005 as we cannot observe exits after two years in 2006 and 2007.

[18]We consider disability to be an absorbing state because the outflow from the permanent disability system is 0.003 (0.3%) in Spain.

[19]We do not explicitly model individual unobserved heterogeneity as the diff-diff approach should already control for unobserved time-invariant differences between eligible and ineligible workers (see Garcia Perez and Sánchez-Martín, 2009).

[20]We have also tried to estimate the model with a piece-wise constant specification of the baseline hazard in order to allow for greater flexibility. However, many of the duration variables were not identified for certain months as there was no exit observed to one of the routes for that particular month.

[21]We use the professional category of the job (individuals with a degree, administrative workers or clerical jobs) as a proxy for education because the education variable is obtained from the Spanish census which is only updated every 10 years.

[22]See the appendix for a detailed description of these variables.

[23]We have also tested a model introducing interaction terms between the policy variables and the GDP. These interactions terms prove not to be significant for the group of individuals affected by the policy and so results are not showed but are available on request.

[24]The total reduction in the number of disability pensions was about 1778 (888.800 pensions in total in 2007–0.19%). The mean disability pension was 760,71 in 2007 and it is paid 14 times a year, which gives an amount of 10.649,94 euros per person per year.

Appendix

List of explanatory variables

- **Duration dependence:** The baseline hazard is modeled as a cubic polynomial function of duration.

- **Education:** The level of education is incorporated with three dummy variables that describe the professional category of the individual, which act as a proxy of the highest level of education completed. The first professional category includes laborers, the second category includes assistants and administrative workers and the third category includes individuals with a bachelor degree or higher.
- **Regional and cohort dummies** are also included as regressors as well as dummies for ages 52, 55 and 58 to capture the effect of the special unemployment and disability schemes available at these ages on transitions out of employment. The dummy variable at age 58 is introduced in order to capture the effect of individuals who have contributed for enough years to receive two years of unemployment benefits at the age of 58 before joining the early retirement scheme when they turn 60.
- **Characteristics of the current employment:** There is a variable that describes the number of workers in the firm and two dummy variables that account for voluntary/involuntary termination of the contract and partial/full time employment.
- **Employment history:** We have constructed a variable that captures the number of years that the individual has contributed to the Social Security System from age 15 until the time of the spell. This variable is used in order to construct the policy variables.
- **Covered wages;** this variable is a double censored (from below and above) version of the wages (see Boldrin et al., 2004). We have information about this variable for each month that the individual is contributing to the Social Security Administration.

Competing interests
The IZA Journal of European Labor Studies is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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