

# Minimum Pension Reforms and Early Retirement Behavior: Is there a Gender Bias? The Case of Spain

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*This version: August 2012*

## ABSTRACT

This paper aims at investigating the distortionary effects of contributory minimum pension reforms on a crucial group of individuals: female workers. Despite being designed to respond to equity concerns, they do have significant distortionary effects, inducing early retirement. The empirical analysis is conducted on Spain, which is an interesting case since it combines a minimum pension scheme with population ageing and low female participation rates compared to the OECD average and has implemented several reforms concerning minimum pension benefits in the last decade. Using the *Muestra Continua de Vida Laborales*, I show that individuals who are more likely to opt for a minimum contributory pension are women and low educated. The household composition matters significantly, in particular the presence of a partner of retirement age, children less than 3 and people older than 75 years, especially if with disabilities. This paper investigates the effect of the 2007 Spanish reform which has significantly increased the generosity of the pension system. Empirical results show, despite being implemented for social equity reasons, the reform has distortionary effect and provides an incentive to leave the labor force which is particularly strong for female workers, compared to male individuals. Female are more reactive to increases in the degree of the generosity of the pension system. Minimum pension benefits are not mere redistribution tools: the policy question then is how to design a policy which responds to equity concerns without creating those distortions.

*Subject headings:* Retirement, minimum pensions, gender, public policy - JEL: H55, J14, J16, J26

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## 1. Introduction

Population ageing is a highly debated topic at the moment. The ongoing rise of the median age in many countries is a pervasive and global phenomenon and is expected to be one of the global demographic trends of the twenty-first century. It is an issue which has profound social, health and economic implications. Broadly speaking, it represents a challenge for public health systems and social security systems which, because of it, are required to serve a growing part of the overall population and are financed by fewer and fewer individuals. Population ageing is due to several factors, among which increased longevity, decline in fertility and mortality.

The issue of population ageing has been widely debated and has drawn attention to the question of pension systems' sustainability, the need for reforms and the issue of retirement and early retirement behavior. As a matter of fact, population ageing brings along concerns on the evolution of the elderly dependency ratio, namely the number of individuals of retirement age over the number of those of working age. This paper contributes to the debate by analysing the distortionary effects brought about by a contributory minimum pension policy reform implemented in Spain, focusing, in particular, on the effects on a crucial group of individuals, namely female workers. It also aims at carefully identify the peculiar characteristics of individuals who are very likely to end up on early retirement receiving contributory minimum pensions, by focusing on gender as one of the main determinants. As a result, the policy question which comes up is how to design and implement a policy which responds to equity concerns, as minimum pension reforms do, without creating distortionary effects.

However, despite their growing weight within pension expenditures in most European countries, little attention has been devoted to the overall distortive effect caused by the presence and or the increase of contributory minimum pensions both on individuals' decisions concerning labor supply and on their retirement plans. Even less research has been conducted on the precise features of people who are more likely to benefit from minimum pensions and to the specific effects that minimum pension reforms have.

Minimum pensions are relevant for a variety of reasons. First of all, they have an important social equity value and meaning, as they are designed for individuals who have not been able throughout their working life to collect enough pension contributions. In such cases, the government intervenes by topping up their contributions and guarantees them a minimum pension which is higher than the pension they would have accrued with their own contributions. On the other hand, due to their very nature, minimum pensions are often associated with early retirement behavior. Hence, their mere existence puts financial pressure on pension system sustainability, since the government actually supplements the contributed pension benefits that are considered below a "vital minimum" threshold.

Secondly, minimum pensions are a common component to most pension systems. Table 1 shows that they exist in most OECD countries. The table shows a list of countries which have resource-tested programs as well. Resource-tested plans, also called targeted plans, grant a higher benefit to poorer pensioners and lower benefits to wealthier retirees. The amount of the benefits depends also on income from other sources, savings and assets. Compared to resource-tested plans, minimum pensions display some noticeable peculiarities: beside being more widespread among European countries (they can be found in 18 OECD countries, whereas resource-tested plans are present only in 12 OECD countries), the value of their benefit is independent from the pensioner’s income stemming from savings or other assets: they take into consideration only the pension income that has been accrued throughout the individual’s working life.

Table 1: Pensions at a Glance 2011: Retirement-income Systems in OECD and G20 Countries. Source: OECD (2011)

	MP	Resource-tested		MP	Resource-tested
Australia		✓	Israel		✓
Austria	✓		Italy	✓	✓
Belgium	✓	✓	Luxembourg	✓	
Canada		✓	Mexico	✓	
Chile	✓	✓	Norway	✓	
Czech Republic	✓		Poland	✓	
Denmark		✓	Portugal	✓	
Estonia	✓		Slovakia	✓	
Finland	✓		Slovenia	✓	
France	✓		Spain	✓	
Germany		✓	Sweden	✓	
Greece	✓		Switzerland	✓	✓
Hungary	✓		Turkey	✓	
Ireland		✓	UK		

As for the relevance of minimum pension benefits, Spain is a case in point. This is why this paper deals with the Spanish case. First of all, Spain is no exception at all as for the ongoing global population ageing process. Figure 1 depicts the Spanish population composition by age groups, showing its evolution from 1950 to the projections of 2050. The increase in the median age takes place in a context in which the overall population is supposed to decrease in 2025 and 2050. By decomposing the population in different age groups, it comes out that the weight of the age groups older than 65 (this is an important threshold age for the Spanish pension system as it will be explained in Section 1) is dramatically increasing, especially that of people older than 70. This trend has no gender: data clearly confirm that it can be traced out both for men and women. Panels a and b of Figure 1 show the ageing index, which is computed as the number of people 60 years old or over per hundred people

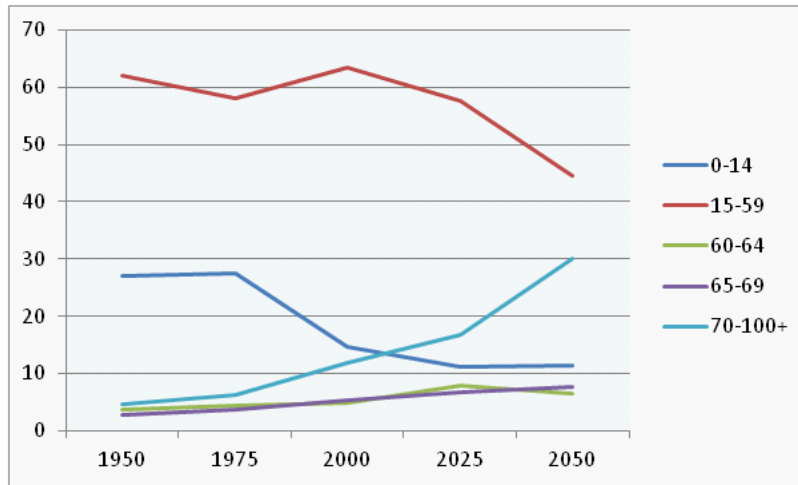


Fig. 1.— Spanish Population by Age Groups, 1950-2050. Source: World Population Ageing, 1950-2010.

under age 15. It was equal to 147.9 in 2000 and it is thought of rising up to 386.4 in 2050: this means that in Spain, every 100 people under 15, there will be more almost fourfold people older than 60. As for the sustainability of the overall Spanish pension system, it is of high interest to observe the evolution of the potential support ratio, which is the number of people aged 15 to 64 per every person aged 65 or older. The Spanish pension system operates on a pay-as-you-go basis. This means that pensions paid to current pensioners are financed from contributions paid by current workers. This creates potential problems when the number of pensioners rises relative to the numbers of workers. Thus, the potential support ratio is very informative about the capability of the pension system to sustain itself.

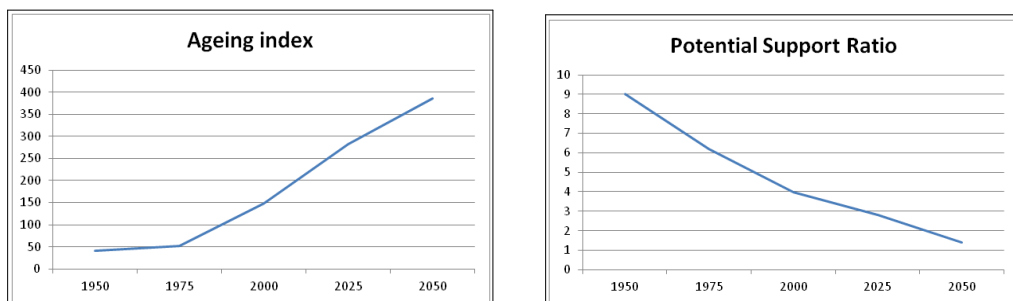


Figure 1 a, b: Ageing Index and Potential Support Ratio, 1950-2050.  
Source: World Population Ageing, 1950-2010.

Beside ageing population, another aspect which makes Spain a highly interesting country in the context of pension analysis is the tremendous increase in pension expenditure as a percentage of GDP which the country has experienced from 2005 onwards, as Figure 2 points out.

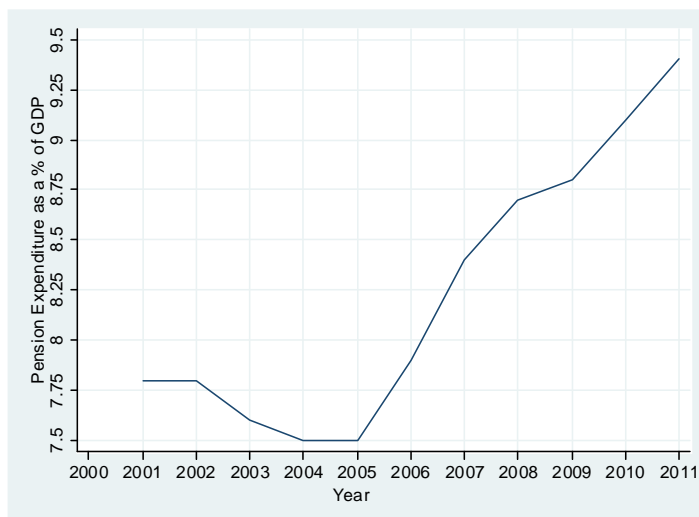


Fig. 2.— Spanish Pension Expenditure as a Percentage of GDP.

Source:

World Bank.

Minimum pensions have significantly contributed to this overall increase in pension expenditure. Their amounts and their numbers have both increased. In 2011 out of 8.711.406 pensions granted, 2.509.476 were classified as minimum pensions, which amounts to almost

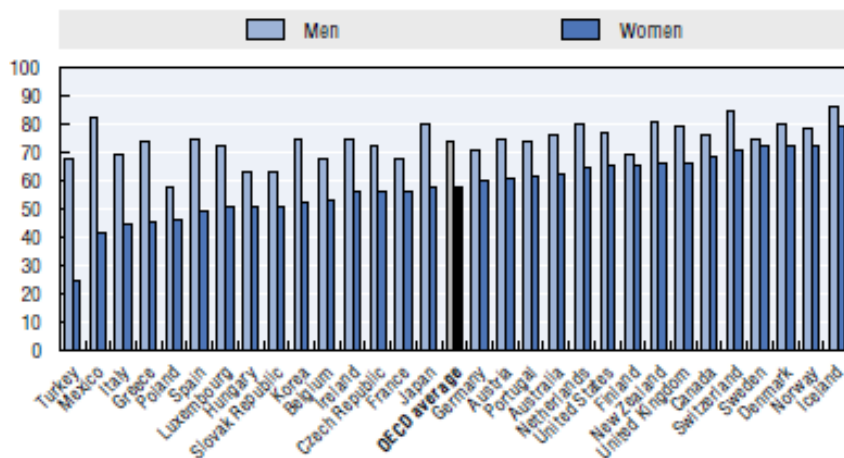


Fig. 3.— Spain’s Participation Rates, 2009. Source: OECD.

the 30% of the total. Several reforms have been adopted in the last decade and as a result the minimum pension benefit has increased substantially. In addition to this, Spain is characterized by a low female participation rate. Figure 3 plots the 2009 male and the female participation rates. Spain lies below the OECD average as for the female participation rate and the difference between male and female participation rates are still quite high compared to the OECD average. Thus, Spain is a good case in point also for a gender analysis which is one of the main aspects within the context of minimum pensions that the present papers investigates.

This paper is related to the empirical literature on early retirement behavior. In 2001 Gruber and Wise launched an international research project aimed at studying the relationship between social security provisions and retirement behavior. They found a strong relationship cross countries between the incentives to retire provided by different Social Security programs and the proportion of old people who decide to exit the labor force in advance. These results have been confirmed in the subsequent literature, which emphasizes the fundamental role Social Security rules and policy changes have in shaping individuals’ retirement decisions. (see Brugiavini, Peracchi and Wise, 2003). More recently, Dorn and Sousa-Poza (2010) have explored the difference between voluntary and involuntary early retirement, where “involuntary” early retirement is due to firms’ decision to fire the workers, perhaps in an economic recession, whereas “voluntary” retirement results from a preference for leisure relative to work, which may be induced by generous early retirement benefits. Coe and Zamarro (2011) investigated the link between health and early retirement decisions and found out significant evidence of a positive preserving effect of retirement on the individual’s

health.

This paper is also related to the literature on gender and retirement decisions. Gynn (2004) showed that women’s retirement decisions crucially depend on their discontinuous labor careers and on their key role within the family. Boeri and Brugiavini (2008) analyzed the effects of pension reforms on the planned retirement age of women and find out that women are less responsive than men to changes in pension policies since they have binding constraints due to gaps in their contributory history. The discontinuity in women’s careers and their role within the family, as my empirical analysis confirms, play an important role also in determining the gender bias induced by minimum pensions.

Within the literature on early retirement, this paper is specifically concerned with minimum pensions on the one hand and on gender and retirement on the other. The literature on pension presents only few systematic investigations of minimum pensions. In 2002, Atkinson, Bourguignon, O’Donoghue, Sutherland, and Utili explored the effects of the implementation of a European Minimum Pension, seen as an anti-poverty policy. Thus, their focus is more on equality and poverty issues rather than on the distortive effects induced by minimum pensions. The distortion caused by minimum pensions on retirement behavior is analyzed by Jiménez-Martín and Sánchez Martín (2007). They found that minimum pensions create a very strong incentive to retire as soon as possible, in particular for low income workers: the presence of minimum pensions triplicates the occurrence of early retirement. They set up a stylized life-cycle model and quantitatively assess the contribution of minimum pensions to early retirement behavior.

This paper contributes to this debate in two ways, by focusing on and assessing the distortionary effects induced by a contributory minimum pension reform which was implemented in Spain in 2007, and by investigating what kind of individuals are more likely to retire early on a contributory minimum pension. The dataset I use for my empirical analysis is the “*Muestra Continua de Vida Laborales*”, provided by the Spanish Social Security. My main findings can be summarized as follows:

- Minimum pensions are implemented mainly for equity reasons but they bring along inefficiency effects, since they modify the incentives to retire and in particular they do so for individuals who, for a variety of reasons, seem to be less attached to the job market. They do display a relevant gender bias whose social and economic implications have to be taken seriously into account by policymakers. The behavioral response to the 2007 minimum pension reform implemented in Spain shows that women are more affected than men by the change in retirement incentives caused by the reform and that they are more likely to exit the labor force than male individuals after such a reform.

- Individuals who are more likely to opt for early retirement on contributory minimum pensions are women, low educated and with a scarce geographical mobility throughout their life. Their family situation matters significantly: the decision to exit from the labor force with a minimum pension is stimulated by the presence of old people within the household. Discontinuities in the work career are obviously determinant in shaping the eligibility for minimum pension and strongly contribute to the gender bias.

The remainder of this paper proceeds as follows. Section 1 describes the main features of the Spanish pension system. In Section 2 I analyse the evolution of minimum pension reforms and illustrate the 2007 reform. Section 3 briefly describe the dataset and section 4 presents the empirical estimation and the results. I conclude in Section 5.

## 2. The Spanish Pension System

The Spanish public pension system consists of two different programs. One is non-contributive, whereas the other is strictly based on contributions. The non-contributive program is means-tested and it is provided to people aged 65 and older who are not entitled to receive a contributory old-age pension, since they have not accomplished the requirements fixed by the law. It is financed by tax revenues. In order to be eligible for this welfare pension, the person is required to have lived in Spain for at least 10 years after the age of 16 and for 5 consecutive years just before applying for the pension.

The second program is a contributory system. It is mandatory for all employees and self employed people. It is a PAY-AS-YOU-GO pension system. Pensions are financed out by the social contributions paid by companies (8.2% of earnings in 2010) and workers (29.9% of earnings, on average in 2010). Contributions depend on the category the worker belongs to and are computed as a fixed proportion of gross labor income. The contributory system is divided into five different types of pensions: old age, disability, orphans, widows and widowers, and other relatives.<sup>1</sup>

The old age pension, in turn, can follow three different schemes, each of which covers a different group of workers, each of them with peculiar characteristics:

1) *General Regime*, the main scheme including all private sector employees who are not part of any other special scheme and part of the public servants. In 2011 it accounted for

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<sup>1</sup>The benefits granted to "other relatives" are pensions in favor of family members who depend economically on the deceased, have no others means to support themselves and have lived with the deceased for at least two years.



79% of all pensions. Most contributory minimum pensions belong to it.

2) *Central Government Civil Servants*;

3) *Special Regimes*, including self-employed people, farmers (all people who work in agriculture, forestry or with livestock), miners, sailors and domestic workers.

## 2.1. Eligibility and Pension Computation

The current standard retirement age in Spain is 65 years for both men and women. However, it is possible to retire on a contributory pension from 60 (if the person has started to pay contributions before January 1967) or 61 years of age. In all cases, in order to get the State pension, a person needs to have a minimum contribution period equal to 15 years, of which at least 2 must have occurred in the last 15 years before claiming the pension.

The current way to compute the amount of the pension was established in 1997 by the Popular Party government that agreed on the reform with trade unions. Pensions are computed according to the following formula:

$$P = PB \cdot RR \cdot ER$$

$PB$  is the regulatory pension base, the *base reguladora*, which is calculated as follows:

$$PB = \frac{\sum_{i=1}^{i=24} C_m + CPI \sum_{i=25}^{i=180} C_m}{210}$$

where  $C_m$  is the so-called *base de cotization*, the monthly contribution accrued to the individual and  $i$  indicates the months.  $PB$  is equal to the sum of the contributions made during the last 180 months of work before retirement, divided by 210, since the pension is paid 14 times a year. Monthly contributions have a minimum and a maximum value. This means that if a person's monthly contribution is lower than the established minimum value, it is increased so as to reach this minimum value and, if it is above the maximum level, it is decreased down to be equal to the maximum. These minimum and maximum amounts are decided each year by Spanish Social Security authorities and vary according to the professional category the worker belongs to. In 2011, for example, the minimum monthly contribution for a worker with no specialization was € 748, 20, while the maximum amount was equal to € 3262, 50. Contributions for the 24 months immediately prior to retirement

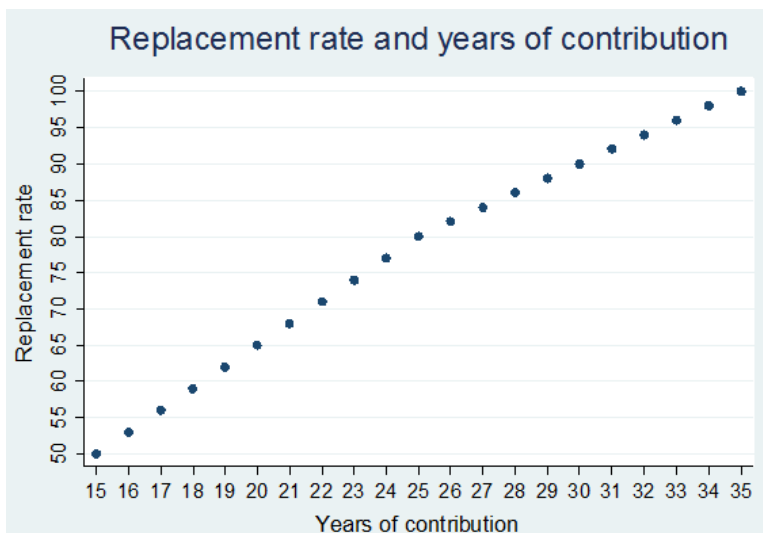


Fig. 4.— The Replacement Rate

are simply computed at their nominal value, whereas previous contributions from the 25th to the 180th month are indexed according to the Spanish Consumer Price Index (*CPI*).

$RR$  is the replacement rate which is the percentage of the regulatory pension that is paid, as shown in Figure 4. It increases with the number of years a person has contributed to the system. The minimum number of years necessary to receive a pension is 15 and, in that case, the pension received amounts to fifty percent of  $PB$ . The  $RR$  increases from 50% after 15 years by 3% a year between the 16th and the 25th year (reaching 80% after 25 years) and by 2% a year until the 35th year (reaching 100%). If a person works beyond 65 years, this percentage increases by an additional 2% for every full year contributed after that age, always assuming that 35 years contributions have already been paid.

$ER$  is the early retirement penalty applied when retirement occurs before the standard age of 65 years. It is equal to:

$$ER = 100 - \alpha(65 - RA)$$

The pension benefit is reduced by 8% ( $\alpha$ ) for every year of retirement before age 65 ( $RA$  is the retirement age). It is equal to 100% if the person is 65 or older when she retires. In this case there is no penalty. The maximum reduction is 40% and is applied when the person retires at 60. Thus, in order to be entitled to receive a pension equal to the calculated  $PB$ , it is necessary to have paid contribution for 35 years and to retire at the age of 65.

## 2.2. Defining minimum contributory pensions

Minimum pensions are aimed at ensuring that pensions reach at least a threshold level. They are pensions topped up by a complement. In order to be eligible for them, an individual needs to possess the common requirements necessary to receive a standard pension. If the pension she would accrue is lower than a threshold (i.e. the minimum pension), the system complements it up until this threshold. According to the Spanish pension system, minimum complements can be granted for all types of pensions, i.e. old age, disability, orphans, widows and widowers, and other relatives. Minimum pensions are defined as contributory only when complements are given to individuals who retire on an old age pension. Those individuals will satisfy all the conditions to receive an old age pension: they have paid contributions for at least 15 years (two of which in the last 15 years before retiring) and they are at least 60 or 61 years old, depending on when they started to contribute to the Social Security System. Contributory minimum pensions belong to the *General Regime* (72% of the total in 2010) and to *Special Regimes*, in particular to those for self-employed people and farmers.

For the purposes of this paper, it is essential to understand not only which type of pensions can be complemented with the minimum pension mechanism, but also the rules of compatibility among minimum complements belonging to different types of pensions. If an individual receives more than one pension, she is granted a minimum contributory complement amount only if she retires on an old age pension and if the total sum of the pensions received is less than the threshold established by the Spanish Social Security. In such cases, the complement will be the difference between this sum and the threshold.

## 3. Minimum Pension Reforms in Spain

From the end of the 90s, on some parameters of the Spanish Social Security System (in particular minimum and maximum pensions) have been changed continuously and remarkably. Whereas it looks like nothing has been changed (the age, the formula to compute the pension, etc were kept the same), the fact of substantially reforming the parameters of the system resulted in what can be called a silent reform. (J. I. Conde-Ruiz, V. Galasso 2007)

There is general agreement in the literature (Jimenez, Martin 2007) on the fact that in the last thirty years the Spanish pension system has undergone a series of little reforms concerning the value of its parameters, which in end have resulted in a deep change of it, although no structural reform took place. These changes have been specifically concentrated

on the value of the minimum and maximum thresholds, thus modifying significantly the degree of generosity of the system. Table 2 summarizes the size of this silent reform on contributory minimum pensions. The first column describes the evolution of the ratio of minimum to maximum pensions, while the second the ratio of minimum pensions to minimum monthly contributions. Both ratios have been almost constantly increasing from the ‘90s up to today, reaching respectively 30% and 115% in 2010. The last two columns show the real growth rates, both for minimum pensions and minimum monthly contributions. Unlike maximum pensions which have maintained constant their value in real terms, minimum pensions have enjoyed a remarkable increase in real terms starting from 2004.

Table 2: Minimum Pensions and the Silent Reform

	Minimum Pension Ratios		Generosity of the System	
	Min/Max pens.	Min pens./min. contr.	Min. pens.	Min. contr.
1990	0.23	0.94	3.58	0.36
1991	0.23	0.94	0.72	0.51
1992	0.23	0.94	-0.21	-0.21
1993	0.23	0.95	0.51	-0.52
1994	0.23	0.95	-1.16	-1.19
1995	0.23	0.96	-0.26	-1.14
1996	0.23	0.97	0.81	-0.07
1997	0.23	0.97	0.62	0.71
1998	0.23	0.97	0.63	0.65
1999	0.23	0.98	0.38	-0.49
2000	0.24	1.02	2.70	-1.75
2001	0.23	1.03	-0.86	-1.44
2002	0.24	1.05	0.35	-1.47
2003	0.23	1.05	-0.23	-0.97
2004	0.24	1.00	0.29	5.57
2005	0.24	1.02	3.19	1.10
2006	0.25	1.05	5.16	2.39
2007	0.27	1.06	4.21	2.59
2008	0.28	1.10	3.74	0.35
2009	0.29	1.12	6.67	5.00
2010	0.29	1.15	2.12	-0.51

Besides the increase in the generosity of the system, it is relevant for the purposes of this paper to shed light on amount paid by the government to grant minimum pensions. The complements to minimum pensions are defined as the difference between the minimum pension the individual receives and the pension the individual would have received according to the standard rules of computation. This difference measures the financial pressure that the minimum pension program puts on the sustainability of the overall pension system. The contribution of these complements to the overall pension expenditure cannot be

overlooked. Within the General Regime in 2008, 19% of the pensions granted were indeed classified as contributory minimum pensions and they accounted for 6.4% of the total pension expenditure. In 2008, more than 36% of the pensions granted to self-employed people were minimum pensions. These data confirm the importance of minimum pensions in the Spanish pension system.

Figure 5 shows the evolution of real contributory minimum pensions, both for individuals with and without a dependent spouse.<sup>2</sup> Starting from 2004, a series of reforms concerning minimum contributory pensions have been implemented. After the *Real Decreto 2/2004*, all pensions experienced an increase of 2% (according to the expected CPI), while minimum contributory pensions were revalued by 4.8%. The year after, the *Real Decreto 1611/2005* enacted exactly the same increase for all pensions as the previous year and minimum contributory pensions were increased again by between 5%.

The impact of the reform evaluated in the present paper is the one endorsed on December 22, 2006 and in force starting from 2007, by the *Real Decreto 1578/2006*. This decree concerned the 2007 increase in value of the pension benefits provided by the Spanish Social Security system. It established, once again, a 2% increase for all contributory pensions, a 3% increase for non-contributory pensions and a rise between 5% and 6.5% for minimum contributory pensions: the yearly amount of the minimum contributory pension is equal to € 8484.84 if the individual has a dependant spouse and to € 6905.08 otherwise.

#### 4. The Dataset: MCVL

The empirical analysis is conducted using the dataset called *Muestra Continua de Vidas Laborales (MCVL)*, a unique Spanish dataset organized by the Ministry of Employment and Social Security. They are anonymous microdata coming from three different sources, the Social Security, the Census Bureau and Internal Revenue Service, starting in 2004 and collected each year up to 2010. It is a representative sample: each year a random sample of 4% of the whole population who has been affiliated to the Social Security System in that particular year, is selected. Each year individuals, who were already part of the sample in the preceding year and who continued having a connection with the Social Security System,

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<sup>2</sup>The dependent spouse is required to live with the retiree (unless they are divorced) and to be economically dependant on him.

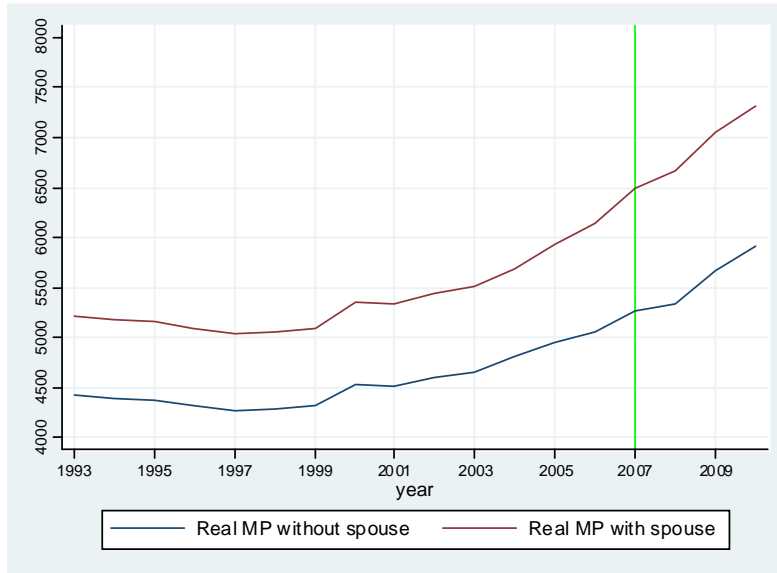


Fig. 5.— The Real Growth of Minimum Pensions

are kept in the sample and new individuals are added. About 75% of the individuals are observed in all the six waves following the initial one (Lapuerta, 2010). The number of observations has increased throughout the different waves, as the following table shows.

Table 3: MCVL: Number of observations

<b>Years</b>	<b>Observations</b>
2004	1.089.016
2005	1.140.929
2006	1.170.862
2007	1.200.998
2008	1.212.884
2009	1.214.727
2010	1.219.423

The *MCLV*, in each year, is composed of different files (Figure 6). The first contains basic personal characteristics, among which birth date, sex and education. The personal information is completed by an additional file where it is possible to find the birth date and sex of up to ten people living in the same household as the individual in question. Then, there is a file concerned with the labor relations the individual has had during her working life and, through it, it is possible to construct the whole labor history of an individual, since she first registered to Social Security (i.e. type of activity, starting and ending date, reason for the interruption, etc.). Within the same file, it is possible to retrieve information on

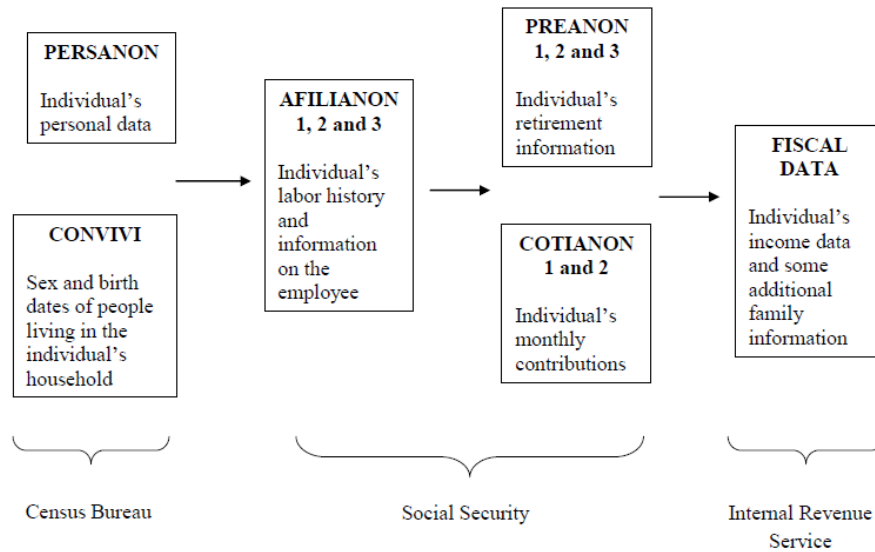


Fig. 6.— Muestra Continua de Vida Laborales

the employer and on the firms where the individual has worked. Another file records the individual's monthly contributions but only for the specific year of the sample. The *MCVL* provides a file on retirement, containing complete information on the amount and kind of the pension received. Finally, from the fiscal file, information on the person's income can be retrieved, together with some additional insights into her family composition, namely the presence of ascendants or descendants, their eventual degree of incapacity and their age range. As a result, the dataset provides information both on workers and retirees and it is thus a valuable tool in the study of labor and retirement decisions: it includes people who are working and paying contributions, including self-employed people, individuals who are on a non-contributory pension or benefit (for instance unemployment benefits, temporary incapacity) and retirees who receive a contributory pension. Each individual has an ID number that makes it possible to merge folders and put together the information available for one individual, thus leading to a panel structure.

Since the dataset collects information on a big amount of people coming from different data sources, its handling requires a huge amount of data cleaning and a careful check of the matching of information across the different files. Nevertheless, the *Muestra* embeds a great potentiality of analysis because it allows longitudinal and dynamic investigations of the labor market and retirement issues.

## 5. Empirical Estimation

### 5.1. Personal characteristics, early retirement and minimum contributory pensions

The first goal of my empirical estimation is to understand, according to the pension rules applied by Spanish Social Security authorities, what kind of individuals are more likely to retire earlier than the standard age (65 years) on a contributory minimum pension. I perform this exercise using the 2006 data; in my sample I keep individuals who are pension eligible according to the rules of the Spanish pension system described in Section 2, who are not retiree yet and who are less than 65 years old. The choice of the age threshold is due to the fact that the purpose is to analyse contributory minimum pensions in an early retirement context. Table 4 presents some descriptive statistics of the dataset used.

Table 4: MCVL: Descriptive Statistics, 2006

<b>Observations</b>	38,085								
<b>Sex</b>									
Women	33,14%								
Men	66,86%								
<b>Education</b>		<b>By sex</b>							
		<b>Women</b>	<b>Men</b>						
Low	49,05%	50,37%	48,38%						
Medium	27,72%	28,42%	27,36%						
High	23,23%	21,21%	24,26%						
<b>Retirees</b>		<b>By sex</b>		<b>By education</b>			<b>Women and education</b>		
		<b>Women</b>	<b>Men</b>	<b>Low</b>	<b>Middle</b>	<b>High</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
Total retirees	11,00%	27,05%	72,95%						
Total MP wrt total retirees	13,25%	64,86%	35,14%						
<b>Contributory MP wrt total MP</b>	77,30%	63,64%	36,36%	61,30%	31,60%	7,10%	56,68%	34,44%	8,88%
<b>Contribution years</b>	Average	<b>By sex</b>							
		<b>Women</b>	<b>Men</b>						
Contributory MP	19.14	15.84	25.15						

The descriptive statistics for year 2006 confirm the important role of minimum pensions within the overall pension system. More than 13% of all people who retired in the 2006 sample were granted a minimum pension. Out of them, almost 65% were women. To the purpose of this paper, it is important to distinguish contributory minimum pensions with respect to other non contributory pensions which may be topped up by the government in order to reach the amount fixed for the threshold pension benefit (disability pensions, survivor’s and orphan’s pensions and pension benefits paid to family members). By large, most minimum pensions are indeed contributory. They are held more by women than men. In particular, women, on average, reach a significantly lower number of contribution years than men during their working career: less than 16 years versus more than 25 years for men. Education is negatively correlated with minimum pensions, as expected: the lower



the individual’s education, the higher the chance that she may receive a minimum pension benefit. Once again, this effect is stronger for women than for men.

The first step of the empirical analysis is the estimation of a logit model. Table 5 presents the results. Some of the variables included in the estimation deserve a more detailed discussion. Low education corresponds to no schooling, completed and uncompleted primary school. High education includes secondary school, graduate and post-graduate education. Medium education represents the in-between level of schooling. The dataset allows me to investigate another personal characteristic which turns out to be of interest: geographical mobility. Information about individuals’ mobility can be drawn from the dataset which specifies the country and district of birth, the district/region where the individual had his first job and the district/region where the individual finds herself in the year of the survey. In addition to that, for each work experience recorded in the dataset, the district and the region are specified. Starting from this information, for each individual I construct a variable called mobility which is the sum of the number of times an individual has changed region when changing her job throughout her working career up to the survey year.

As for the information concerning the family, the number of household members can be retrieved for each year of the *Muestra*. However, for each member only the sex and the birth date are provided. There is common agreement and strong empirical support for retirement decision being not much an individual decision, but rather being very much grounded on the family situation of the person (Forma, 2009). This is the reason why it is essential to analyze deeper the family structure of the individuals in my sample, in particular to identify the presence of a partner. In order to do this, I have used the EU’s *Statistics on Income and Living Conditions micro-level dataset (EU-SILC)*, which provides comprehensive data on a wide range of social and economic indicators including income and living conditions. It also contains detailed information on family and, in particular, on the partner. From the 2008 dataset for Spain, I compute the average difference in age between husband and wife and I find out that the interval which minimizes the error probability is the range from 1.4 years above to 3.2 years below the age of the male partner. I apply this range to my dataset as to detect the presence of the partner within the same household. In addition to that, another aspect that it is worth investigating is whether having a partner whose age is close to the pension age or higher than the standard pension age has any effect on the decision of retiring early on a minimum pension. Recent research on joint retirement (Hospido and Zamarro, 2012) suggests that, on average, in European countries, a significant share of spouses retire within less than one year of each other, independently of the age difference between them. Following the same procedure, I compute the average age of sons and daughters who live within the household as to be able to identify, besides the partner, the number of sons and daughters who actually live within the same household as the individual. The family

information of the household provided in the dataset also includes the number of people older than 75 and their eventual degree of incapacity and the total number of descendants, and among them those who are less than 3 years old.

Table 5: Logit Estimation Results

	(1)				(2)			
	a)		b)		a)		b)	
	Dep. var: MP Odds Ratio	Marg. Effect	Dep. var: MP Odds Ratio	Marg. Effect	Dep. Var: MP Odds Ratio	Marg. Effect	Dep. var: MP Odds Ratio	Marg. Effect
Age	0.6132*** (0.0158)	-0.0121*** (0.0029)	0.6251*** (0.0253)	-0.0127*** (0.0029)	0.7143*** (0.0321)	-0.0192*** (0.0039)	0.7152*** (0.0323)	-0.0193*** (0.0035)
Female	6.2531*** (1.7288)	0.0461*** (0.0077)	6.3909*** (2.0087)	0.0398*** (0.0061)	9.9325*** (1.4826)	0.1921*** (0.017)	9.989*** (1.6521)	0.2122*** (0.0186)
Low education	4.9821*** (0.9254)	0.0361*** (0.0182)	5.0142*** (1.1222)	0.0469*** (0.0098)	6.1251*** (1.1264)	0.1625*** (0.0213)	5,2153*** (1.5421)	0.1675*** (0.0214)
Medium education	2.8167** (0.4421)	0.0204** (0.0028)	3.021** (0.8329)	0.0262** (0.0032)	2.231** (0.4172)	0.0731** (0.0189)	2.0561** (0.3255)	0.0629** (0.0174)
Mobility			0.6123 (0.0233)	-0.0035 (0.0004)			0.7321* (0.0261)	-0.012* (0.0029)
HH members	1.328 (0.028)	0.0071 (0.0021)	1.312 (0.026)	0.009 (0.002)	1.452 (0.0734)	0.012 (0.003)	1.402 (0.027)	0.009 (0.002)
Partner	2.114* (0.329)	0.0100* (0.0069)			2.458* (0.651)	0.02* (0.004)		
Partner of retirement age			3.451** (0.582)	0.0220** (0.0043)			3.451** (0.582)	0.0220** (0.0043)
Ascendants > 75	2.913** (0.4612)	0.030* (0.0026)			3.421** (0.622)	0.029** (0.0039)		
Ascendants > 75 with incapacity			2.861** (0.4562)	0.028** (0.004)			3.432*** (0.633)	0.030*** (0.0039)
Sons/daughters in the HH	1.233 (0.087)	0.005 (0.004)	1.212 (0.079)	0.008 (0.002)	1.165 (0.0674)	0.0041 (0.0027)		
Descendants < 3			1.672* (0.048)	0.0026* (0.0004)			1.892* (0.597)	0.0101* (0.0003)
Pseudo R squared	0,46		0,46		0,51		0,51	
Observations	37457		37457		4167		4167	

In the first column of Table 5 the dependent variable is contributory minimum pensions, indexed as 1 if the minimum contributory pension is received and 0 in all other cases (stay on the job or retirement on any other pension). Age has a negative effect on minimum pension retirement and this is quite intuitive, considering that the sample includes only people from 60 to 64 years: as the individual gets older and approaches the standard retirement age, she is less likely to receive a minimum contributory complement. In the column (2) of Table 5 the dependent variable is minimum pensions, again indexed as 1 if the minimum contributory pension is received and 0 if the individual ends up receiving a standard contributory pension. The negative effect of age is larger than in the previous case. The results of the estimation confirm that gender plays indeed an important role, especially in the individual's decision between minimum and standard pension. Women are about 20% more likely than men to retire on a minimum pension. This result is strong and significant with respect to several

different specifications that I have estimated.

As for education, in both scenarios, an individual with lower education is by large more likely to retire on a minimum benefit than an individual with more schooling. In particular, column (2) shows that the odds of receiving a minimum complement for an individual with low education are 5.2 times the odds of a person with high education. Mobility appears to be slightly significant only in the second specification of the estimation. Individuals who have had a higher degree of mobility throughout their working life are less likely to receive a minimum pension.

As far as family structure is concerned, it turns out that it is not the number per se of members within the household of the individual which determines the minimum pension outcome. It is its composition, namely kind, age and characteristics of the family members which indeed makes a difference. In the presence of a partner, the odds of receiving a minimum pension rather than any other kind of retirement benefit are between 2 and 2.5 the odds in case there is no partner within the household. If the partner is of retirement age, the effect is more significant, showing that the joint retirement issue concerns retirement on minimum pensions as well. While the presence of sons and daughters within the household does not seem to be significant, elderly care and child care enter into the picture as well. Having descendants has a positive effect on the decision of retiring on a minimum benefit. This is probably due to the fact that grandparents exit the labor market as soon as possible to look after their grandchildren. Living with people older than 75 years, especially if with some degree of incapacity, increases the probability of being granted a minimum pension by 3%. As a result, the decision of retiring on a minimum pension depends both on personal characteristics, such as sex, education and working history, and on the family composition.

## **5.2. Adding the impact of the 2007 reform: methodological framework and estimation**

In this paper the event of interest is the transition from the working or even non-working state into retirement in the presence of a reform on minimum pensions. Such transition can be accomplished only if the individual satisfies the requirement fixed by Social Securities Authorities. Once those requirements are met, then the transition may occur at any point in time. Data are not provided on a continuous time basis, but rather in a discrete form with monthly or yearly intervals. This is the reason why I use a proportional discrete hazard model.

The hazard rate  $h$  of retiring for individual  $i$  at year  $t$  is the probability of becoming

retiree from time  $t - 1$  to  $t$ , provided that she was not retiree up to time  $t - 1$  and she meets the requirement needed for retirement at time  $t$ . Thus, the hazard rate is given by the following expression:

$$h_{it} = \Pr [T_i = t | T_i \succeq t]$$

I choose a complimentary log-log model with random effects because it is consistent with a continuous time model and survival data which are interval censored. The specification for the hazard rate for individual  $i$  at time  $t$  is the following (Pronzato, 2009):

$$h_{it} = 1 - \exp [- \exp(\alpha + \eta_t + \beta X_i + \delta Y_{it} + \lambda EP_{it} + \gamma R_t)]$$

The hazard rate into pension depends from  $\eta_t$ , which is the age and expresses time dependency and from  $X_i$  which contains all variables related to personal information which are not time varying such as for example birth date, sex and education.<sup>3</sup>  $Y_{it}$  is the personal information which may be varying overtime, such as the number of family members, the presence of the partner, sons, daughters, children less than three and people older than 75 within the same household.  $EP_{it}$  is the expected pension for each individual at risk in each year. It may change from year to year as new contributions are added if the individual is still working and as the early retirement penalty decreases.  $R_t$  is intended to capture the effect of the reform implemented on minimum pensions.

The estimation plan is the following. I select a sample including only individuals who have the following characteristics: they are 60 years old in 2005, they are eligible for early retirement and they are not receiving any pension and or any complement which is not compatible with possibly receiving a minimum pension benefits.

Table 6 summarizes some characteristics of the sample at the beginning and at the end of the spell. 20.3% of the individuals who retire receive a contributory minimum pension, whereas non contributory pensions (disability, orphans, widows and relatives) account for less than 15% of the total. The average amount of the pension that individuals have accrued in the sample according to the formula used by the Spanish Social Security System is equal to 801.06€, wheas the average complement to minimum contributory pension amounts to 286.3€.

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<sup>3</sup>Since my sample is made of people from 60 to 65 years old the level of education can be assumed as being constant throughout the sample period.

Table 6: Some descriptive statistics

Numb. of individuals	13300		
Sex	Female	Male	
	64.8%	35.2%	
Education	Low	Medium	High
	51%	27%	18%
Retire on CMP	20.3%		
Retire on CP	65.4%		
Retire on NCP	14.3%		
Stay on the job	13%		
Average MCC	286. 30€		
Average MNCC	146 €		
Contributory Pension accrued	801.06€		
Partner	62%		

My dependent variable, called “end”, is a binary variable equal to 1 when the individual retires on a contributory minimum pension, on a non contributory or contributory pension whose amount is higher than the amount of the minimum threshold pension fixed for that year, and 0 otherwise (i.e she stays on the job, dies, disappears from the sample). Individuals are followed throughout the sample, until they “fail”, they die or until 2010, the end of the survey. In the last cases, observations are right censored. Some observations are interval truncated because people are unobserved for a year or more and then reappear in the following survey waves. If when they reappear they are still at risk, I include them in the sample, accounting for their gap in time. When the interval truncation covers more than one period and the individual is no longer at risk when she reappears in the sample, I drop the observation if it is not possible to reasonably recover the failure time.

The empirical strategy in order to be able to identify the effect of the reform is the following. I define a treatment group formed by individuals who are the population at risk for minimum pension complements. In order to define it, I use the number of years of contribution to the Social Security System. The value of this variable in the dataset is provided only when the individual actually retires on any kind of contributory pension. Thus, I compute the number of years of contribution, through the information available on the individuals’ labor history, for individuals who do not retire at all and for those who receive only a non contributory pension throughout the sample period but who do work or have worked for at least 15 years, two of which in the last 15 years (as required to receive a pension).<sup>4</sup> The treatment group is made up by individuals who have collected less than

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<sup>4</sup>For female individuals, I consider also the periods of maternity leaves which are actively counted as

21 years of contributions. The control group is made by individuals who have contributed for more than 30 years. The sample in-between is left out from the estimation. In order to capture the effect of the 2007 reform, I estimate the following equation, where the interaction term given by the year and the treatment group allows the empirical evaluation of the effect of the reform.

$$h_{it} = 1 - \exp - [\exp(\alpha + \eta_t + \beta X_i + \delta Y_{it} + \theta year_t + \gamma year_t * treatment)]$$

The estimated parameters are reported in table 7.

Table 7: Model estimates

	(1)	(2)	(3)
Age	1.215*** (0.023)	1.303*** (0.032)	1.219*** (0.025)
Female	0.327*** (0.040)	0.319*** (0.038)	0.312*** (0.037)
Treatment	0.797** (0.204)		0.821** (0.267)
Treatment_female		1.892** (0.463)	
year_2005	-1.486 ** (0.399)	-1.465 ** (0.327)	-1.384 ** (0.327)
year_2006	-1.216 ** (0.353)	-1.208 ** (0.348)	-1.162 ** (0.311)
year_2007	-0.586 * (0.03)	-0.556 * (0.03)	-0.466 * (0.028)
year_2008	-0.218 * (0.028)	-0.198 * (0.022)	-0.253 * (0.024)
year_2009	0.201 * (0.043)	0.191 * (0.037)	0.222 * (0.051)
year_2010	1.345** (0.372)	1.343** (0.374)	1.289** (0.412)
year_2005*treatment	0.342 (0.298)		0.412 (0.265)
year_2006*treatment	0.371* (0.129)		0.394* (0.176)
year_2007*treatment	0.498*** (0.128)		0.512*** (0.101)
year_2008*treatment	0.401 (0.287)		0.363 (0.269)
year_2009*treatment	0.323 (0.341)		0.298 (0.212)
year_2010*treatment	0.364 (0.325)		0.343(0.301)
year_2005*treatment_female		0.452 (0.282)	
year_2006*treatment_female		0.511* (0.199)	
year_2007*treatment_female		0.689*** (0.213)	
year_2008*treatment_female		0.612 (0.248)	
year_2009*treatment_female		0.412 (0.378)	
year_2010*treatment_female		0.211 (0.225)	
Low education		0.249 ** (0.081)	0.235 ** (0.069)
Medium education		-0.673* (0.387)	-0.599* (0.369)
HH members			0.237 (0.187)
Partner		0.001 (0.002)	
Partner of retirement age			0.453*** (0.165)
Ascendants > 75			0.326* (0.219)
Ascendants > 75 with incapacity			0.385** (0.256)
Sons/daughters in the HH			0.002 (0.003)
Descendants < 3			0.376** (0.197)
Observations	65038	65038	65038

Age has a positive effect on the exit from the labour market: the older an individual gets the more likely she is to retire. Belonging to the treatment group has a positive and

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contribution years according to the pension computation rules.

significant effect on the hazard of retirement: individuals who have collected throughout their working career a low amount of contributions have no incentive to stay longer in the labor force. The pension they have accrued is in most cases too low and even if they continue working for a few years they will not be able to receive a standard contributory pension, as they will need a minimum complement to reach the pension threshold. This effect is particularly significant when the treatment group is limited to include female only. This result is consistent with the results found in the previous section. Women who have paid little contributions, often due to strong discontinuities in their working career, exit the labor market and opt for retirement as soon as they are entitled to do so. Low education affects positively the hazard of retiring. As individuals approach the age of 65 they tend to retire more, as expected, according to the Spanish pension rules. Thus in 2010, when individuals are exactly 65, most of them retire and choose not to continue working.

The effect of the 2007 reform of minimum pensions on early retirement behaviour is significant. The reform, indeed, had a significant and positive impact for individuals belonging to the treatment group. This means that because of the reform, more people exited the labor force opting for a minimum pension benefit. This distortionary effect is even stronger when considering female workers who are particularly reactive to changes in the degree of generosity of the pension system. There are many reasons which can account for this behavior: among them, family reasons, as women are normally taking care of the household and the fact that women seem to be less attached to labor participation as men are.

Interestingly, results confirm that joint retirement potentially plays a role in the retirement decision, since having a partner of retirement age has a positive effect on the hazard of retiring. As shown in the previous section, retirement decisions seem not to be driven by the number of members within the household, but rather by its specific composition. When the household is composed of people older than 75 years, especially if with disabilities, and by children less than three the hazard of leaving the labor force increases.

The future empirical work on the distortionary effect of the 2007 reform will include the computation of  $EP_{it}$ , the expected pension amount for each individual. This computation is made possible by the information on the labor history provided in the dataset which allows the recovery of the parameters needed to compute the pension amount. The computation of  $EP_{it}$  will be carried out taking into careful consideration the increases in the generosity of the system caused by the 2007 reform. Then the following equation will be estimated, including the treatment group only:

$$h_{it} = 1 - \exp[-\exp(\alpha + \eta_t + \beta X_i + \delta Y_{it} + \lambda EP_{it})]$$

By increasing the minimum threshold, the 2007 reform rises the expected pension amount for individuals who have been able to accumulate a low amount of contributions and thus  $EP_{it}$  is expected to have a positive and significant effect on the hazard of retiring for the treatment group.

## 6. Conclusions

There has been an extensive amount of research into social security and early retirement decisions, whereas minimum pension schemes have received little attention. In particular, their distortive effects towards early retirement behavior have not been deeply investigated.

The primary aim of this paper is to investigate the inefficiency effects of contributory minimum pension reforms, especially on a crucial group of individuals: female workers. The empirical estimation is conducted on Spain using the dataset called Muestra Continua de Vida Laborales. Spain is a very interesting case for the purposes of this analysis, due to a variety of reasons. First, as most OECD countries, it has a well-defined minimum pension scheme; furthermore, population ageing is a concern and it is putting high pressure on the sustainability of the pension system. Secondly, Spain is still characterized by low female participation rates compared to the OECD average; thus gender issues are particularly relevant. Thirdly, in the last decade, Social Security authorities have implemented significant reforms concerning minimum pensions, increasing the generosity of the benefits provided in a substantial way.

The empirical results show that individuals who are more likely to opt for a minimum contributory pension are women, low educated, with a scarce geographical mobility throughout their life. The household composition matters significantly, in particular the presence of a partner of retirement age, people older than 75 years and children less than 3 years have an effect. Reforms increasing the size of minimum pension benefits have distortionary effect, as they provide incentive to leave the labor force. Such an incentive is particularly strong for female workers, compared to male, who are more reactive to increases in the degree of the generosity of the pension system. Thus, empirical results show that minimum pension benefits are not mere redistribution tools. They are strictly based on Spanish data but they can be applied to other countries as well. This is an exercise that I leave for further research.

Minimum pensions should receive more attention in the current debate about the reform of pension systems and their sustainability. Despite being implemented for social equity reasons, they result in disincentive effects and discourage workers' labor participation, in particular that of women. The policy question then is how to design a policy which responds



to equity concerns without creating those distortions.

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