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Assistance benefits and unemployment outflows of the elderly unemployed: the impact of a law change

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Abstract

This article examines the impact of a law change in benefit rules on the exit of older workers out of the unemployment benefits system. This change occurred in Spain in July 2012, when the age to become eligible for an unlimited unemployment assistance benefit was raised from 52 to 55. This policy change reduced the unlimited entitlement period for three years for the group of individuals aged 52-54 years who exhausted their unemployment insurance benefits, providing an ideal setting for a quasi-experimental evaluation. Using data from the Spanish Public Employment Service, we find that the probability of exiting from unemployment to a job for individuals aged 52-54 who stopped having access to those benefits after the policy change took place increased substantially, thus reducing the expected duration of benefits reciprocity. The estimated fiscal impact of this law change was a saving of around €600 million on the benefits budget.

1. INTRODUCTION

In the light of high and persistent unemployment during the 1980s, many European countries devised measures to reduce the effective supply of labour, extending the entitlement periods of unemployment benefits for older workers and/or tailoring early retirement schemes for elderly unemployed, so that unemployment-related benefits effectively provided a pathway to early withdrawal from labour market (Duval, 2003). Given these favourable terms, there were strong incentives for older workers dismissed before eligibility for a full pension to draw unemployment benefits (UB) and use the unemployment benefit system (UBS) as a pathway to retirement. At the same time, for these firms, dismissing older workers first might appear more socially acceptable than placing the burden of job loss on other employees.

These early retirement schemes have turned to be very costly (Grogger and Wunsch, 2013; Inderbitzin *et al.*, 2016; Kyrrä and Pesola, 2020). Moreover, in the context of increasing longevity, European countries seem to find difficult to ensure the future of public pension systems, so during the last couple of decades many of them have adopted measures aimed to encourage later retirement, such as increasing the number of years of contributions required to receive a full pension or the statutory pension age. Measures have also reached the UBS: in many of those countries, the amount of benefits (or the wage-benefit replacement ratio) and/or the potential entitlement duration were reduced, and the extensions provided to elderly workers cut.

The complexity of the UBS makes the analysis of the effects of its parameters on unemployment outflows difficult, although empirical studies have improved as long as longitudinal data have been made available. In some cases, researchers examine quasi-natural experiments where exogenous and sometimes selective changes in UBS can be observed (see below). In these works, changes in legislation give authors an opportunity to study the incentive effects of generosity on UB duration in a controllable setting. This article follows this strand of the literature.

While there is extensive literature on the effects of unemployment insurance (UI), there are few studies looking at unemployment assistance (UA), a type of benefits available in many European countries for workers who typically either have exhausted their UI or are not eligible for UI because they have not accumulated the minimum contribution period. By exploiting a reform that significantly reduced UA potential benefits duration (PBD) for older workers, we can identify the effects of UA on unemployment duration. In Spain, unemployed people who turned 52 after the exhaustion of their UI entitlement period, having contributed for at least six years during their working life and fulfilling all the conditions (except the age) for receiving a Social Security pension, were allowed to collect UA up to the moment they become eligible for a normal old-age pension (the so-called 'subsidy for individuals older than 52'). These terms changed in 2012, when the age to become eligible for this UA benefit was raised from 52 to 55 (then, the subsidy took the name of 'subsidy for individuals older than 55'). This reform reduced the unlimited entitlement period for three years for the group of individuals aged 52-54 years, providing an ideal setting for a quasi-experimental evaluation of the influence of potential benefit duration on actual unemployment duration. There are two dimensions available for identification: eligibility (age) and time (before and after the law change).

The data used come from the administrative records of the Spanish Public Employment Service (PES), the agency in charge of UB. These records provide information on spells of UI and UA over the period 2007-2017. We use the universe of all workers aged 49-57 who started receiving UA benefits in 2011 (pre-reform scheme) and in 2013 (post-reform scheme). We can follow them up until September 2017 (the last month available). Unemployment experiences of the group aged 52-54 are compared under two schemes: 'unlimited' UA entitlement period (the pre-reform scheme) and 'limited' UA period (the post-reform scheme). Workers aged 52-54 who began the reciprocity of UA benefits after the exhaustion of UI benefits in either 2011 or 2013 are considered the *treatment group* because their behaviour is potentially affected by their eligibility for the '52/55ys. subsidy' (under the pre-reform scheme) and by the elimination of their eligibility (under the post-reform scheme). The younger group (aged 49-51) serves as control group to eliminate the effect of the business cycle. This sub-group of population has a distinctive feature: it is not eligible for the '52/55ys. subsidy' both before and after the policy change. As a robustness check of our analysis, we use another, alternative control group: the older workers aged 55-57. The characteristic of this sub-group of population is that it is eligible for the '52/55ys. subsidy' after UI exhaustion both before and after the policy change.

The analysis carried out in this paper makes some contributions to previous literature, being of general interest for several reasons. First, it measures the impact of a law change affecting UA benefits (and mainly long-term unemployed) in times of crisis. Reduced PBD for older workers was implemented at the peak of the downturn in Spain, after four years of net job destruction and shortly after the unemployment rate reached the unprecedented figure of 26% in early 2013. Although a large literature has analysed the effects of changes in unemployment PBD on unemployment duration, most of the studies focus on changes to UI benefits (for instance, Valetta, 2014, and Farber *et al.*, 2015, analysing the UI benefit extensions in the US during the Great Recession; Card *et al.*, 2007, and Landais, 2015, examining less recent reforms in European countries).

Second, it contributes to the literature on the interaction between institutions in shaping the behaviour of workers, highlighting not only the entitlement effect but also the importance of the distance to retirement as response types of behaviour to UBS rules. A relatively large literature investigates the impact of welfare systems on labour supply choices of older workers, documenting the existence of programme substitution effects (Kyyrä and Ollikainen, 2008; Lamers *et al.*, 2013; Inderbitzin *et al.*, 2016).

Lastly, many countries are debating (or have already implemented) reforms that reduce the generosity of early retirement schemes with the goal of increasing the employment rates of older workers. Spain is an interesting case study because these schemes were heavily used to mitigate labour market problems over the past decades (since the 1980s, when unemployment rates skyrocketed and remained high for many years). While the Spanish early retirement system created particularly large incentives, the scheme is similar to those of other European countries (Belloni *et al.*, 2006). Early retirement schemes often featured extended periods of the maximum duration of UI benefits above certain age cut-offs (Schmieder *et al.*, 2016) or relaxed disability insurance eligibility criteria for older workers (Chen and van der Klaauw, 2008). Therefore, our results may illustrate mechanisms of policies that are at work (or under debate) in many countries.

The structure of the article runs as follows. Section 2 reviews the empirical literature on the effects of potential duration of UB on exits from unemployment for older workers. Section 3 provides a description of the UB regulations in Spain and the changes adopted in 2012 and outlines our identification strategy. Section 4 presents the data and some descriptive analyses. Section 5 sets out the econometric model to be estimated. Section 6 reports and discusses the main results, followed by several robustness checks and a quantification of the fiscal effects of the reform. Finally, section 7 concludes.

2. LITERATURE REVIEW

The role of UB on exits from unemployment has been the focus of much empirical work in labour economics.¹ Research on UBS more often focuses on UI and unemployment outflows, with many studies examining the impact of potential duration of UI benefits on duration of unemployment spells, for the unemployed in general or for the specific group of older job seekers (for recent thorough reviews, see Krueger and Meyer, 2002; Fredriksson and Holmud, 2006; and Tatsiramos and van Ours, 2014).² Recent empirical works take advantage of law changes that allow to analyse transitions out of covered unemployment for a treatment group affected by the reform and a comparison group not affected (i.e. a difference-in-differences approach), or exploit discontinuities in the relations between UB duration and age at entry or pre-unemployment work experience to identify the treatment effect (i.e. a regression discontinuity methodology).

These types of quasi-experimental identification of the treatment effect that allow the researchers to examine how recipients react to incentives have been used by studies focused on the impact of the extension/reduction of PBD affecting older workers mainly. The combination of an extended UB period and an unemployment-related pension (known by some authors as the ‘unemployment tunnel’) for the elderly workers was designed in many European countries during the 1970s and widely used during the 1980s and 1990s. More recently (in the last couple of decades or so), the governments of several countries have adopted measures to favour the active ageing of the labour force, to protect the employment of older workers and to reduce the financial burden of the public protection systems. These measures have reached not only the public pension systems but also the UBS, implying a reduction of PBD for the older unemployed. Several studies have analysed the impacts on unemployment outflows of such policy changes in different European countries.

¹ The partial equilibrium search model has been central in studying the effects of UB on the exit rate from unemployment. A comprehensive review of this modeling can be found in Rogerson *et al.* (2005) and Lalive *et al.* (2006).

² Some early studies include Ham and Rea (1987), Meyer (1990), Katz and Meyer (1990), Hunt (1995) and Carling *et al.* (1996). More recent works that use quasi-experimental identification methods are those of Winter-Ebmer (1998), Bratberg and Vaage (2000), Card and Levine (2000), Carling *et al.* (2001), Roed and Zhang (2003), Lalive and Zweimüller (2004), Kyrrä and Wilke (2007), Kyrrä and Ollikainen (2008), and Schmieder *et al.* (2016). Microeconomic estimates suggest that an increase in potential benefit duration of one week increases actual duration by 0.1-0.2 weeks, although higher or lower estimates have been found, differing also by gender and age groups and over the spell duration. Nevertheless, the magnitude of disincentive effects is not a very firmly established parameter and the literature is inconclusive on important aspects (Tatsiramos and van Ours, 2014).

For Austria, Winter-Ebmer (1998) takes advantage of a change that occurred in June 1988, in which PBD of UI was extended enormously (from 52 to 209 weeks) for elderly workers (aged 50 or above) in specific regions of the country only (the so-called 'regional extended benefits programme', REBP). Applying a difference-in-differences setting (between groups of workers and across geographic areas), his results suggest that actual spell duration rose only by 5 weeks for men, while for women the increase was not significant. Lalive (2008) examines the same law change using a regression discontinuity approach based on the age discontinuity in UI entitlement to establish the effect of the PBD extension on the unemployment duration. His results contrast with the previous ones in that for men the duration was prolonged by about 15 weeks, while for women this increase was about 75 weeks. This difference was attributed to the age distance to early retirement age: 54 for women and 59 for men.

Inderbitzin *et al.* (2016) analyse the same programme (only men) considering that it was in place for a limited period (between June 1988 and July 1993). This enabled the authors to estimate both the effects of introducing and abolishing extended UI benefits using a difference-in-differences approach based on differences over time and across regions. This allows them to examine programme complementarity (more withdrawal from the workforce by using extended UI benefits followed by higher exits to other public transfers –disability or retirement benefits– in the future) and programme substitution (higher take-up of UI benefits but lower take-up of other welfare programmes in the present). Their results confirm that the implementation of the extended benefit scheme brought about a substantial increase (about 15 percentage points) of early retirement of older job losers eligible for REBP, and the abolishment a symmetrical decrease. Moreover, they find strong evidence of programme complementarity for the group of unemployed men aged 50-54 and programme substitution for the group of workers aged 55-57.

The case of Finland is studied by Kyrrä and Wilke (2007), Kyrrä and Ollikainen (2008) and Kyrrä and Pesola (2020). In this country, UI could be collected for a maximum of two years (500 working days). Unemployed workers reaching the age of 57 before running out of benefits were allowed to collect UI up to the age of 60 when they could retire via an unemployment pension, which was transformed into the conventional old-age pension at the age of 65. In 1997, the eligibility age of the Finnish 'unemployment tunnel scheme' was raised from 53 to 55 for all workers. This implied that the unlimited period of UI of the age group 53-54 was effectively reduced to a maximum of two years, while the other age groups remained unaffected by the reform. The age threshold for the benefit extension has been raised gradually afterwards. It was increased from 57 to 59 in 2005 for those born in or after 1950, from 59 to 60 in 2010 for those born in or after 1955, and from 60 to 61 for those born in or after 1957.

Kyrrä and Wilke (2007) take advantage of the law change in 1997 to investigate the effects of reduced benefit duration on the outflow from unemployment. They find a large reduction of transitions from employment to unemployment and a large increase of re-employment probabilities for the age group affected by the reform. Moreover, the differences in the unemployment duration distributions between this age group and others not affected by the reform vanished. Their conclusion is that the high risk of unemployment and the low escape rates from unemployment in the treatment group before the reform were due to the 'unemployment tunnel scheme' and not because of a difficult

labour market of elderly workers. In fact, since they found that a relatively small fraction of those workers with extended UI benefits eventually return to employment, this means that some older unemployed with extended benefits may choose to withdraw from job search entirely after job loss, in which case the employment hazard is zero. Kyrrä and Ollikainen (2008) consider this possibility by using a split population duration model. Their results show that nearly half of the older unemployed workers with extended UI benefits withdrew from job search, confirming also the previous finding that there was a strong decrease in early retirement after the reform for the group of older workers affected by the reform. Kyrrä and Pesola (2020) examine the law change in 2005 that postponed access to extended UI benefits from age 55 to 57 using a sharp regression discontinuity design and find that the two-year increase in the eligibility age increased employment by 7 months over the remaining working career (between the age of 54 and 63) among the private sector workers.

The findings of the empirical literature thus point out to reduced employment and increased unemployment and inactivity of older workers affected by programmes of extended UI benefits. Since these schemes essentially secure the income for an unemployed person until retirement and can be regarded as early retirement measures, they can be very costly.³ We follow this strand of the empirical literature that uses policy changes that may cause alterations in the entitlement periods across all UI recipients or within some groups over time to analyse the effect of extended/reduced PBD on the exit from unemployment, although our focus is on changes of UA programmes, something that has not been examined previously. These policy changes are typically triggered by economic downturns, something that may lead to an aggregate level endogeneity problem, which may be difficult to overcome unless a suitable control group unaffected by the reform is available to control for business cycle effects (Card and Levine, 2000; Lalive and Zweimüller, 2004). If such a control group is available or the policy change is exogenous in the sense that it takes place over a period of stable economic conditions, the policy reforms are potentially very useful for identification purposes. In this paper, we exploit a reform (which affected only a group of older unemployed workers) not triggered by changing economic conditions.

3. INSTITUTIONAL BACKGROUND AND IDENTIFICATION STRATEGY

3.1. The UBS and the 2012 reform

The Spanish UBS (like many others in Organisation for Economic Co-operation and Development [OECD] countries) comprises two schemes: UI and UA. UI benefits are paid to employees (excluding

³ Some studies have tried to estimate the fiscal impact of these schemes and their changes. Inderbitzin *et al.* (2016) arrive at the result that the fiscal costs amounted to over €13,000 per worker aged 50-54 and €9,500 per worker aged 55-57 eligible to the 'regional extended benefits programme' in Austria, while Kyrrä and Pesola (2020) estimate that the 2005 reform in Finland that raised the age limit for receiving extended benefits by two years increased net income transfers to the State by €15,000 over a 10-year period for an average individual. Grogger and Wunsch (2013) estimate steady-state savings of nearly €5,000 million yearly. Most of this effect was mechanical, due to truncating at 18 months spells that could have lasted up to 32 months prior to the reform applied in 2006 in Germany. However, roughly 30% was behavioural, attributable to reductions in the exit rate from employment among workers who prior to the reform would have exited employment for UI prior to drawing a pension.

civil servants, workers hired by households, and those without past work experience) who lost their job or whose temporary contract came to an end, who can and want to work, and who have paid a minimum number of contributions (at least 12 months during the reference period of the previous six years). UI benefits can be received for a minimum of 4 months and a maximum of 24 months, depending on the time worked (an individual is entitled to the maximum if she has worked for the whole reference period). The amount of UI paid is equal to a fraction of the gross wage in the 6 months prior to unemployment and declines with the duration of the spell: the gross replacement rate is 70% during months 1-6 of UI receipt and 60% thereafter. Payments are subject to maximum and minimum amounts that also vary with the number of children the unemployed person has. This flattens the actual replacement rate for high-income earners and raises it for low-income earners.

Workers who are not eligible for UI (because they have not accumulated the minimum contribution period) may qualify for UA benefits. Those who have exhausted UI can also apply for UA. The reciprocity of UA allowance requires certain eligibility conditions: being registered for at least one month in some public employment office; not having rejected any suitable employment offer or participation in a training or professional qualification programme run by the PES; and having income of less than 75% of the minimum wage. Therefore, UA benefits are means tested, since income and wealth of the household is taken into consideration to determine eligibility. It is also flat rate: its level is a fixed amount of 80% of IPREM, i.e. €430 in 2019.⁴ In terms of generosity, this amounts to about 50% of the average UI benefit. The entitlement duration of UA is at least six months and varies depending on the number of family dependents and the age of recipient (the maximum is 36 months).

Older job losers are not in principle subject to more generous UI benefit rules. There is, however, an exception in the previous system. The unemployed who turned 52 during their PBD (specifically, either at the time of exhausting their UI benefits), having contributed to the Social Security for the risk of unemployment for at least six years during their working life and fulfilling all the conditions (except the age) for receiving a Social Security pension, could claim the 'subsidy for individuals older than 52' that is part of UA. As such, the entitlement conditions for receiving the '52ys. subsidy' and the level of benefits are the same as those for the general UA benefits ('Other UA'). What the '52ys. subsidy' allowed those workers was to collect unemployment benefits up to the moment they became eligible for a normal old-age pension, being a UA subsidy with unlimited PBD and in which the state contributes for the recipient's old age pension. Both characteristics are absent in the rest of UA benefits. Thus, the regular UI (and UA) benefits followed by this special subsidy for older workers potentially allowed them to withdraw from the labour market at a very early age, since an unemployed person aged 52 and over had an option to collect UA up to the entry into an old-age pension.

This situation changed in July 2012 when, in the context of the labour market reform approved by the new Spanish conservative government, the age to become eligible for this special subsidy was

⁴ The Public Indicator of Multiple Effects Income (IPREM) is the benchmark in Spain for the allocation of benefits and subsidies based on income. It was introduced on July 1, 2004, replacing the Minimum Interprofessional Wage (SMI) whose use was restricted to the scope of the labour market.

raised from 52 to 55.⁵ Therefore, after July 2012 an unemployed person must be aged at least 55 when either exhausting UI to have an option to collect the 'subsidy for individuals older than 55' up to the entry into the unemployment pension scheme. The reform was applied with grandfathering, so that all current beneficiaries of a '52ys. subsidy' would keep receiving the subsidy even if the age requirement was not met anymore after the reform was passed.

This change was adopted in the context of a more general labour market reform. Since the Spanish economy was hard hit by the Great Recession, after reaching an unemployment rate well above 20% and with a high share of long-term unemployed (above 50%), the newly elected conservative government implemented a broad set of reforms during 2012, under the pressure of the European Commission to reduce public sector's outlays during the sovereign debt crisis. In February, the changes focused on five main areas: hiring, dismissal, changes in working conditions, labour intermediation and active policies, and collective bargaining. In July, changes targeted the UBS, especially the UI (the gross replacement rate was reduced from 60% to 50% during month 7 and onwards of UI receipt) but also the '52/55ys. subsidy' (increasing the eligibility age from 52 to 55).

The latter change was adopted in line with what had happened in other European countries (for example, in Finland in 1997 and 2005, previously mentioned), where governments passed measures to favour the active ageing of the labour force, to protect the employment and increase the employment rates of older workers, and to reduce the financial burden of the public protection systems. The aim of the 2012 reform was allegedly to cut unemployment expenditures, to improve employment incentives among the unemployed, and to close certain loopholes in the system. The benefit for the older unemployed were perceived as a loophole. Hence, the government wanted to phase the system out.

Since there is no reason to believe that the age threshold was raised in response to a change in the relative labour market conditions for the older workers, our analysis should not be subject to endogenous policy bias. Furthermore, none of the 2012 reforms were agreed beforehand with the social partners (the employer associations and the most representative trade unions) or announced beforehand. All of them were carried out with urgency, with implementation by the means of law-decrees, what does not require the immediate approval of the Congress and Senate, so that the new rules came into effect immediately.

3.2. Identification

The 2012 reform effectively reduced the entitlement period among the group aged 52-54, providing a quasi-experimental setting for studying the relationship between the length of the UA and transitions out of unemployment. From the PES data (see below), we draw two samples: a 'before-reform' sample and an 'after-reform' sample. In our first setting, workers aged 49-51 who entered UA because they exhausted their UI benefits in 2011 and 2013, respectively, are labelled as the

⁵ Royal Decree-Law 20/2012, July 13th, on measures to guarantee the budgetary stability and to encourage competitiveness.

before-reform and after-reform control groups. Neither of them were eligible to receive the '52/55ys. subsidy'. Workers aged 52-54 who entered UA in 2011 comprise the before-reform treatment sample. Their behaviour was potentially affected by their eligibility for the '52/55ys. subsidy'. The after-reform treatment sample is made up of workers aged 52-54 who entered UA after exhaustion of UI in 2013. They were not longer eligible for the '52/55ys. subsidy' at those ages after the policy change. In our second setting, workers aged 55-57 who entered UA due to UI benefit exhaustion in 2011 and 2013, respectively, are considered the before-reform and after-reform control groups. In this case, both were eligible for the '52/55ys. subsidy'.

To estimate the effect of UB on workers' outcomes, we adopt a differences-in-differences (DID) approach by comparing the pre- and post-reform transitions out of unemployment for groups affected (treated) and not affected (control) by the reform (see section 5). Whether the DID estimator identifies the causal effect of the extended benefit duration on the unemployment risk hinges upon whether the policy change was exogenous. There are two reasons why policy endogeneity is most likely of minor importance in the present context.

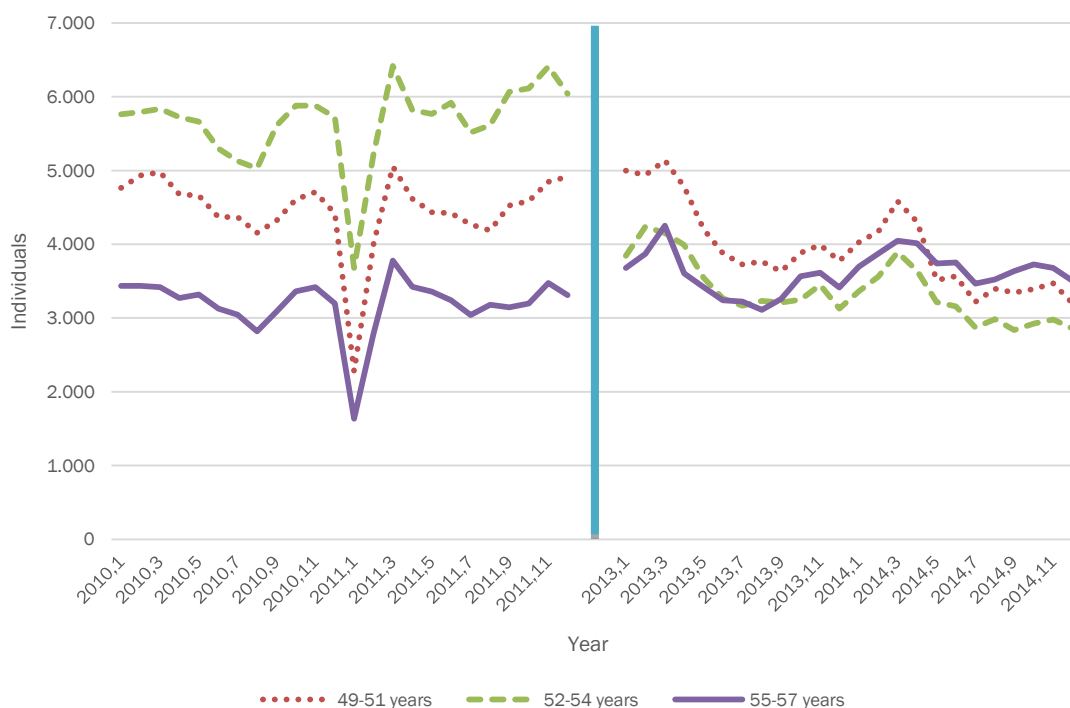
First, one reason for the implementation of the policy may have been equity concerns and the notion that early retirement rules were not actuarially fair. A worker retiring several years earlier gets benefits for longer, and this increase in benefits is larger than the increase that would leave social security wealth (the present value of pension benefits) unchanged at given market interest and mortality rates. A higher degree of actuarial unfairness makes workers more willing to retire early, which firms can exploit in implicit contracts. Hence political pressure to treat workers at risk of permanent layoff and unemployed workers still in their prime (aged less than 55) less generously than before was one reason for changing the benefit rules.⁶ To the extent that such equity concerns were the reason for the policy change, the reduction in the PBD (through the elimination of extended benefits for those aged 52-54) can be regarded as exogenous with respect to labour market outcomes of the eligible individuals in our sample.

The second reason is that the economy was in recession before the policy change (in the years 2010 and 2011). After the policy change (in the years 2013 and 2014), the economy was starting a rapid recovery. To the extent that all age groups considered in our analysis were suffering the effects of the recession to a similar degree before the policy change and benefiting from the recovery after the policy change, policy endogeneity is not an issue. This feature is related to the common trend assumption on which DID strategy is based. In our analysis we use the group 49-51 (alternatively, the group 55-57) as the control group or as the benchmark for changes in unemployment inflows in the absence of the entitlement duration reduction. Figure 1 displays information on trends in UA inflows during the period 2010-2014. This figure provides evidence

⁶ Early retirement rules are related to other aspects such as the mandatory retirement age. According to Law 27/2011, the age of 67 is foreseen as the 'new' age of access to retirement, while maintaining the same at 65 years old for those who have contributed to their pension for 38 years and six months. The implementation of the new age requirements is carried out progressively and gradually in a period of 15 years, also applied to complete the contribution periods that allow access to the pension from 65 years. Following this provision starting from 35 years and three months in 2013, a period of 38 years and six months of contribution will be required in the year 2027.

that the inflows of age groups 49-51 and 52-54 (and 55-57 as well) moved similarly in 2010-2011 and did not show substantial differences in the trend over the pre-reform period.

Figure 1
MONTHLY UA INFLOW FOR THREE AGE GROUPS (49-51, 52-54 and 55-57).
PES DATA FILES (January 2010-December 2014)



4. DATA AND DESCRIPTIVE STATISTICS

4.1. Dataset

The administrative dataset used in this study is provided by the Spanish PES (*Servicio Público de Empleo Estatal*, SEPE). This is the institution responsible for the payment of UB. The dataset contains detailed information of all UB spells that started monthly in the calendar years 2007-2017. Each individual observation contains sociodemographic information from the register of job seekers, including worker characteristics (gender, age, citizenship, and municipality and province of residence) and attributes of the last job (occupation and industry affiliation), as well as the corresponding category of job termination (individual layoff, economic redundancy, end of fixed-term contract, etc.). The dataset also provides information on the type of UB, the level of benefits, the potential entitlement period at entry and the current duration of benefit reciprocity.

For the empirical analysis, we use the UA spells of the entire population of workers aged between 49 and 57 occurring between 1 January 2011 and 31 December 2011, on the one hand, and between 1 January 2013 and 31 December 2013, on the other hand, and followed them up until September 2017. The sample contains 213,908 individuals aged between 49 and 54 at the date of UA admission (the sample amounts to 190,879 individuals when we consider the age bracket

52-57). Recipients included in the sample are those who started receiving a UA benefit (either the '52/55ys. subsidy', because they fulfilled the eligibility conditions to claim it, or 'Other UA') after they had exhausted UI benefits.

For each worker in the sample we observe the length of the unemployment spell (in days), his/her exit destination, and a set of control variables. We make a distinction between exits from UA to employment and 'Other UA'. It should be stressed that being an unemployed job seeker in the data is conditional on the receipt of UB. So applicants whose benefits expire and who do not qualify for 'Other UA' benefits (because of spouse's high income, for instance) do not remain registered as unemployed/recipients in our data. Reciprocity of other unemployment benefits is considered a different way out of UA. All unemployment spells that continue beyond three years of the timing of entering unemployment are treated as artificially censored spells in the estimated models in order to evaluate the impact of the reform, because recipients of the '52/55ys. subsidy' can receive this type of benefits until retirement.

4.2. Descriptive and non-parametric analysis

The credibility of our identification hinges on the similarity between the treatment and control groups. Regarding their characteristics, Table 1 provides sample statistics for the treatment and control age groups before and after the policy change. This table also provides the 'after-before' difference for each group. Covariates seem to be quite balanced across samples. Nearly 60% of all recipients are men and about 90% native Spanish. Most of the unemployed workers were previously working in building (around 20%) and in the services sector (close to 60%). The shares of the former declined for all groups due to the idiosyncratic shock related to the end of a speculative bubble affecting the household prices and associated with the construction sector. Consequently, the share of services increased for treatment and control groups. In the same line, the occupational distribution in both age groups is similar across entering years: 60-70% of all recipients worked in blue-collar jobs in the manufacture, construction and service sectors (about half of them in unskilled jobs) and another 15-20% in medium-skilled jobs in the service sector. While the weight of these jobs increased for all groups between the pre- and post-reform periods, there were reductions in manual skilled and, above all, unskilled occupations, reflecting the loss of importance of the construction sector.

Furthermore, data from Table 1 shows that the proportion of treated recipients going to the '52/55ys. subsidy' after exhausting UI was very much reduced (79 percentage points) in 2013 as compared to 2011, suggesting that the reform effectively reduced transitions from UI to the older workers' subsidy. Although this effect is large, it is largely mechanical as a consequence of the law being enforced. At the same time, the share of entries into other UA benefits (due to exhaustion of UI) increased, what simply reflects the substitution from the '52/55ys. subsidy' to 'Other UA' for individuals no longer eligible to the unlimited subsidy until they turn 55.

Table 1 also provides information on the exits of both treatment and control groups. The largest fraction of the unemployment spells of the before-reform treatment group continued beyond the observation period, as indicated by the censoring rate (72% vs. 38.9%). In fact, exits to employment were observed more frequently for the younger control group than the treated group both

before the policy change (22.4% vs. 16.1%) and after the policy change (35.4% vs. 28.9%). At the same time, the transition rates into employment of the older control group were close to those of the treated group both before the policy change (15.9%) and after the policy change (23.4%).

Table 1

SAMPLE MEANS AT THE TIME OF ENTERING UA BENEFITS: TREATMENT AND CONTROL GROUPS BEFORE AND AFTER POLICY CHANGE. UA RECIPIENTS: AGE GROUPS 49-51, 52-54 AND 55-57. PES DATA (2010-2017)

	Before policy change (2011)			After policy change (2013)			Difference after-before		
	Control group I: 49-51	Treat. group: 52-54	Control group II: 55-57	Control group I: 49-51	Treat. group: 52-54	Control group II: 55-57	Control group I: 49-51	Treat. group: 52-54	Control group II: 55-57
Age	50.5	53.1	56.5	50.5	53.4	56.3	0.0	0.4	-0.2
Gender (Male)	0.631	0.629	0.652	0.611	0.619	0.653	-0.020	-0.010	0.002
Nationality (Spanish)	0.893	0.928	0.913	0.913	0.917	0.932	0.020	-0.011	0.019
Industry									
Missing values	0.010	0.021	0.019	0.010	0.009	0.024	0.000	-0.012	0.005
Agriculture and fishing	0.047	0.045	0.043	0.050	0.045	0.044	0.003	-0.001	0.001
Manufacture	0.156	0.179	0.185	0.125	0.145	0.166	-0.030	-0.035	-0.019
Building	0.234	0.207	0.229	0.191	0.200	0.201	-0.042	-0.007	-0.028
Services	0.554	0.547	0.524	0.624	0.601	0.565	0.070	0.054	0.041
Occupations									
Directors and managers	0.008	0.009	0.011	0.010	0.010	0.011	0.002	0.002	0.000
Scientific and intellectual professionals	0.025	0.031	0.025	0.046	0.040	0.034	0.020	0.008	0.009
Mid-level professional technicians	0.045	0.055	0.061	0.067	0.068	0.070	0.022	0.013	0.009
Administrative support staff	0.072	0.091	0.091	0.102	0.098	0.098	0.030	0.007	0.007
Service workers	0.128	0.134	0.125	0.181	0.179	0.168	0.053	0.045	0.043
Farmers and skilled workers	0.015	0.016	0.016	0.017	0.016	0.016	0.001	0.000	0.000
Officials, operators and artisans of mechanical arts and other crafts	0.213	0.224	0.238	0.217	0.227	0.250	0.004	0.003	0.012
Operators of facilities and machines and assemblers	0.082	0.101	0.090	0.097	0.099	0.099	0.014	-0.001	0.009
Elementary occupations	0.283	0.317	0.311	0.264	0.263	0.256	-0.018	-0.054	-0.055
Military	0.006	0.003	0.004	0.000	0.000	0.000	-0.006	-0.003	-0.004
Missing values	0.121	0.020	0.029	0.000	0.000	0.000	-0.121	-0.020	-0.029
Presence of children	0.832	0.230	0.196	0.865	0.628	0.331	0.033	0.398	0.135
Cause of UA entry									
Other UA (exhausted UI)	1.000	0.206	0.241	1.000	1.000	0.301	0.000	0.794	0.060
52/55ys. subsidy	0.000	0.794	0.759	0.000	0.000	0.699	0.000	-0.794	-0.060
Cause of UA exit									
Other UA benefits	0.225	0.115	0.131	0.226	0.321	0.175	0.001	0.206	0.043
Employment	0.224	0.161	0.159	0.354	0.289	0.234	0.129	0.128	0.075
Exhaustion (artificial censored)	0.551	0.724	0.454	0.420	0.389	0.591	-0.131	-0.334	0.137
Entitlement duration	478.9	3456.6	2397.3	581.4	535.6	1775.3	102.5	-2921.0	-621.9
Effective duration	334.3	802.9	758.1	372.0	309.9	645.9	37.7	-493.0	-112.2
UA level (€/day)	14.7	14.4	14.4	13.1	13.2	13.4	-1.6	-1.2	-0.9
Wages (€/month)	532.5	532.5	532.5	532.5	532.5	532.5	0.0	0.0	0.0
No. individuals	52,141	68,578	37,585	50,716	42,473	42,243			

Since the credibility of the identification strategy also depends on the labour market behaviour over time before the reform of treated and control groups, and in order to complement the descriptive statistics of the samples, we present a non-parametric estimation of the time profile of the survival function and the empirical hazards. This may also serve as a first approximation to the relationship between the policy change in 2012 and unemployment duration. Our analysis focuses on exits from UA to a job and treats spells which end because of entitlement exhaustion as censored. We compare the job-finding rates before and after the policy change for the 49-51 and 52-54 age groups. Figure 2 shows the empirical hazard function for the control and treatment groups before and after the policy change, while Figure 3 displays the survival function. Figures 4 and 5 provide the same set of information by comparing the 52-54 and 55-57 age groups.

As Figure 2 shows, there were parallel trends in the exits from UA for the treatment and control group before the policy change, with significantly lower exits for the former than the latter. After the policy change, the empirical hazards of the control and treatment groups were both higher than before. Moreover, they were similar for both groups after the policy change, nearly disappearing the differences between them. Looking at the empirical survival function in Figure 3, the survival functions of both after-reform age groups overlapped and were located quite below those of the before-reform age groups, in particular when comparison is made with the one corresponding to the pre-reform treated individuals. Furthermore, when we instead consider the recipients aged 55-57 years before and after the policy change as control groups (see Figures 4 and 5), the finding is that the exit rates out of UA of the control and treatment groups before July 2012 were quite low and their survival functions almost indistinguishable between each other, whereas after that date the survival function of the treatment group was clearly below that of the control group, indicating that the exit rate of the former was substantially higher than the former.

Figure 2

HAZARD FUNCTION: UA RECIPIENTS, AGE GROUPS 49-51 AND 52-54. PES DATA (2010-2017)

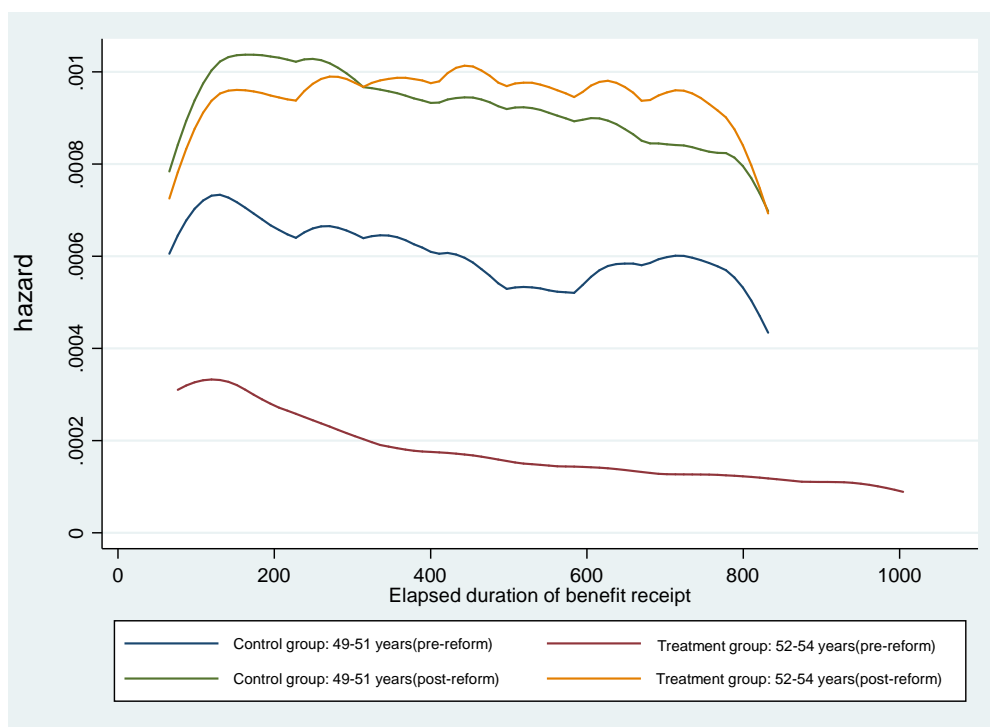


Figure 3

SURVIVOR FUNCTION: UA RECIPIENTS, AGE GROUPS 49-51 AND 52-54. PES DATA (2010-2017)

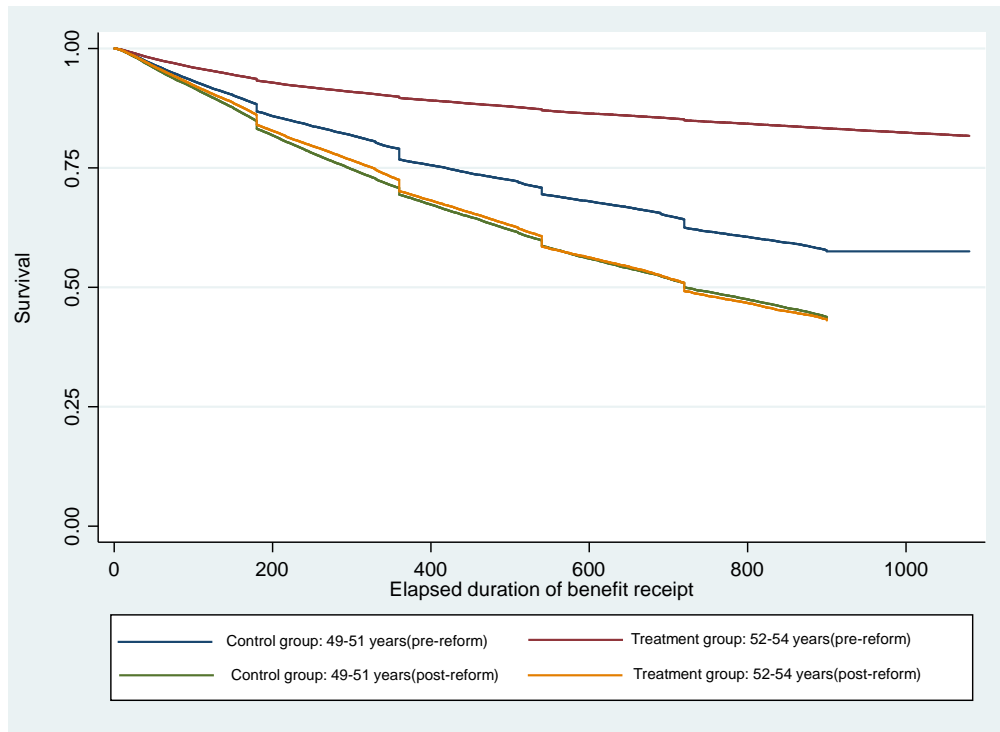


Figure 4

HAZARD FUNCTION: UA RECIPIENTS, AGE GROUPS 52-54 AND 55-57. PES DATA (2010-2017)

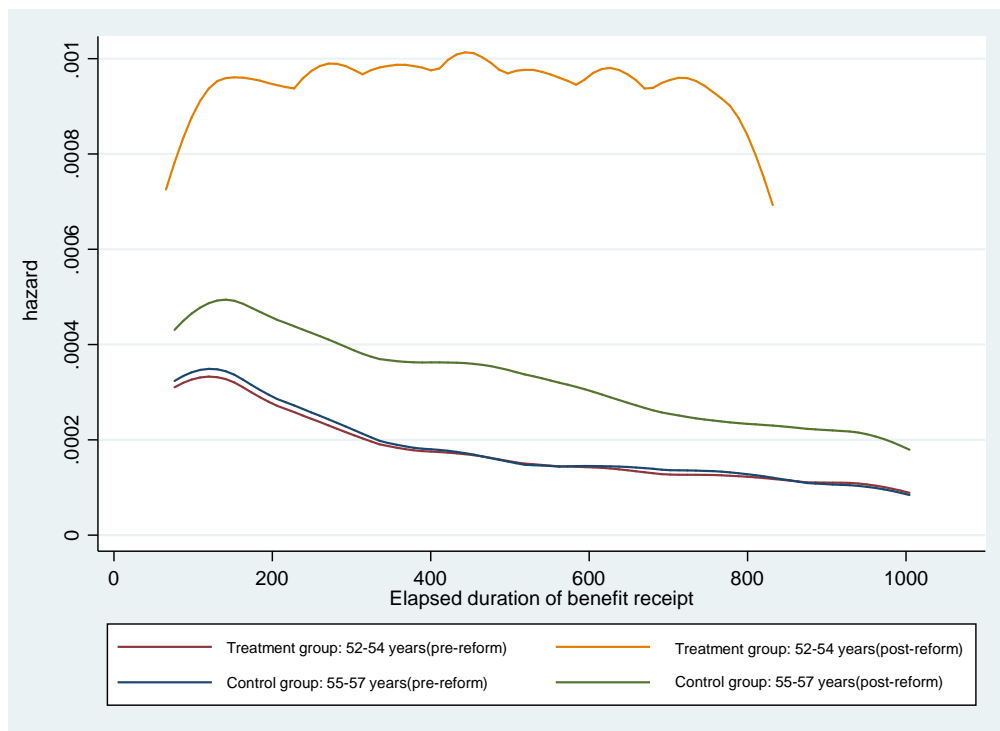
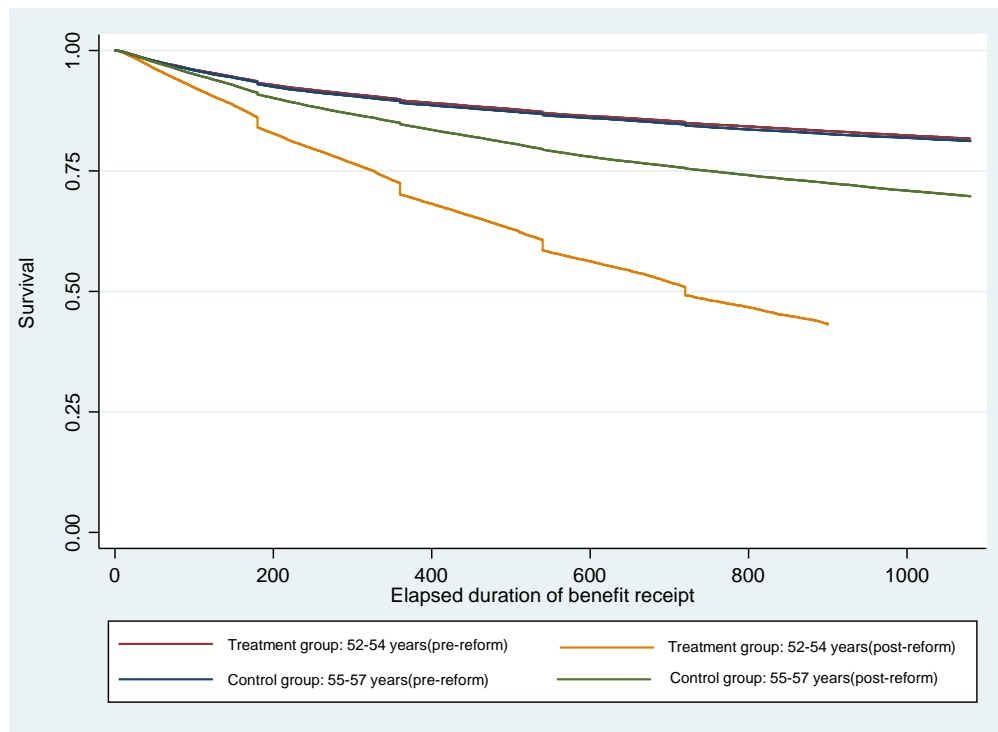


Figure 5
SURVIVOR FUNCTION: UA RECIPIENTS, AGE GROUPS 52-54 AND 55-57. PES DATA (2010-2017)



Therefore, as a first impression, the changes implemented in the PBD of unemployed older workers through the elimination of eligibility for extended benefits for those aged 52-54 after July 2012 seem to be associated with individuals increasing their escape route out of unemployment under UA after the policy change, relative to a control group of UA recipients and relative to the period before the policy change.

5. ECONOMETRIC MODEL

In our setting, the exit rates from UA are analysed using a continuous mixed proportional hazard (mph) model. The hazard representation for the mph is the following:⁷

$$h_i(t_i / X, \theta) = \lambda_{0i}(t_i) \varphi_i(X' \beta_i) \phi_i(\theta) \quad i=1,2,\dots,N \tag{1}$$

where t_i is the current duration of the period of unemployment under UA for each individual i . This equation asserts that the hazard rate out of covered unemployment into employment is being influenced by three factors. First, the function $\lambda_{0i}(t)$, named the baseline hazard function, captures the effect of the time elapsed in the unemployment state on the instantaneous probability of finding a job when all the factors are held constant. Second, the function $\varphi_i(X)$ represents the influence of the covariates on the hazard rate of finding a job. And third, the function $\Phi(\theta)$ accounts for the effects of unobserved heterogeneity components such as ability, atti-

⁷ The identification of this model has been studied by Lancaster (1979) and Heckman and Singer (1984a, 1984b).

tudes, skills, etc., on the hazard rate of finding a job. This effect is known as frailty term and represents the fact that individuals are heterogeneous in the population due to factors that remain unobserved for the researchers.⁸ All the three functions must assure that expression (1) is non-negative. We guarantee this property by using an exponential representation for each function.

To capture the effect of explanatory variables on the hazard rate of finding a job the following specification is used:

$$\varphi_i(X'\beta) = [\exp(\beta_0 + \beta_1 * Z_i + \beta_2 * R_i + \beta_3 * Age52_54_i + \beta_4 * R_i * Age52_54_i)] \quad (2)$$

where X_i can be broken down into several parts: Z_i represents a vector of exogenous control variables; R_i is a dummy variable for the policy change adopted in 2012 (it takes value 0 for the population of individuals who started a UA spell in 2011, i.e. before the policy change took place; and value 1 for those starting a UA spell in 2013, after the policy change); and $Age52_54_i$ is a dummy variable indicating whether the individual belongs to the control (=0) or treatment group (=1).

Therefore, β_2 measures the calendar time effect on transitions that is irrespective of observation i 's eligibility status; β_3 the mean transition probability of individuals belonging to the age group 52-54; and β_4 the corresponding differences-in-differences (DID) estimator that captures the impact of being 52-54 years-old after the policy change, i.e. when the eligibility for extended benefits was eliminated for that age group. This latter parameter identifies the causal effect under the 'common trend' assumption, namely that any time-varying unobservable factors have the same effect on treated and non-treated workers. The interpretation of this parameter is that it measures the higher or lower probability of leaving the unemployment register in the period after the 2012 change, relative to non-treated recipients and relative to the period before the change.

To estimate the duration model, one can consider either a parametric model that makes strong assumptions about the shape of the baseline hazard function or a Cox model that does not make any. Rather we choose a semiparametric hazard model that lies in between, in particular a piecewise constant exponential model that is the most used in a continuous time framework. In this types of model, the hazard is assumed constant within pre-specified survival time intervals but the constant may differ for various intervals (see Jenkins, 2005). In our case, we allow the baseline hazard to differ over 36 monthly intervals and use the gamma distribution (a popular choice because of mathematical tractability) for the frailty distribution.

6. RESULTS

6.1. Benchmark estimation results

In this section, we present the empirical results from the estimations of the model outlined in the previous section. Our objective is to compare job-finding rates between pre-reform and post-reform UA for the treatment and control groups. In these estimations, the dependent variable is

⁸ The frailty term was suggested by Lancaster (1979) in the context of unemployment duration.

the duration of unemployment benefits (in days) and the set of explanatory variables comprises gender, nationality, number of children, occupation, industry affiliation and regional unemployment rate. Table 2 provides the estimate results of the semiparametric piecewise hazard model with unobserved heterogeneity for the full sample, and also by gender, industry and occupational categories, using recipients aged 49-51 before and after the policy change as control group (control group I).⁹

Parameters for all duration models are given in terms of the ‘proportional hazard model’ metric rather than the accelerated failure time (AFT) metric. This means, for instance, that a positive coefficient implies an *increase* in the log-relative hazard rate, while a negative signed coefficient implies a *decrease*. We have estimated the models without and with unobserved heterogeneity (using a gamma distribution). The likelihood ratio test of a model with unobserved heterogeneity against the one without it suggests that the unobserved heterogeneity is not significant. Moreover, no differences are detected in the variables’ coefficients between both models.

Table 2
ESTIMATE RESULTS OF THE SEMIPARAMETRIC PIECEWISE HAZARD MODEL FOR EQUATION (2):
COEFFICIENT AND STANDARD ERRORS (in brackets). CONTROL GROUP I: RECIPIENTS AGED 49-51.
PES DATA (2010-2017)

Panel A: Full sample, gender and industry

	All	Male	Female	Manufact.	Building	Services
Policy ch. (R)	0.391*** (0.0125)	0.415*** (0.0151)	0.334*** (0.0222)	0.434*** (0.0360)	0.400*** (0.0250)	0.349*** (0.0166)
Age 52-54	-0.877*** (0.0149)	-0.796*** (0.0178)	-1.026*** (0.0273)	-1.022*** (0.0419)	-0.719*** (0.0292)	-0.911*** (0.0201)
R*Age 52-54	0.858*** (0.0188)	0.800*** (0.0225)	0.965*** (0.0342)	0.925*** (0.0528)	0.728*** (0.0374)	0.880*** (0.0252)
Constant	-4.277*** (0.0333)	-4.257*** (0.0401)	-4.030*** (0.0587)	-5.156*** (0.104)	-4.963*** (0.0951)	-3.969*** (0.0421)
/lntheta	-20.00 (695.0)	-19.14 (523.1)	-18.79 (740.6)	-17.01 (499.5)	-19.33 (914.8)	-19.25 (661.7)
Theta	2.07e-09 (1.44e-06)	4.86e-09 (2.54e-06)	6.90e-09 (5.11e-06)	4.10e-08 (0.0000205)	4.05e-09 (3.70e-06)	4.38e-09 (2.90e-06)
Individual-spells	3,467,949	2,267,107	1,200,842	584,324	762,296	1,943,044
Individuals	211,079	131,667	79,412	32,881	44,618	123,603
Log likelihood	-154,458.51	-104,865.76	-49,197.543	-20,661.325	-36,428.743	-87,884.819

⁹ The results are virtually the same if we estimate a fully parametric duration model [a Gompertz model, because it exhibits the largest log-likelihood value and the lowest Akaike (AIC) and Bayesian (BIC) information criterion among six parametric duration models estimated with and without unobserved heterogeneity] and a discrete hazard model. Results are available upon request.

Panel B: Occupation

	WCHS	WCMS	WCLS	BCHS	BCMS	BCLS
Policy ch. (R)	0.518*** (0.0454)	0.255*** (0.0469)	0.297*** (0.0324)	0.389*** (0.0237)	0.435*** (0.0409)	0.320*** (0.0224)
Age 52-54	-0.886*** (0.0562)	-1.404*** (0.0611)	-0.938*** (0.0403)	-0.751*** (0.0279)	-0.951*** (0.0504)	-0.983*** (0.0259)
R*Age 52-54	0.968*** (0.0669)	1.483*** (0.0734)	0.864*** (0.0493)	0.755*** (0.0352)	0.973*** (0.0613)	0.900*** (0.0337)
Constant	-4.232*** (0.113)	-3.706*** (0.119)	-3.853*** (0.0715)	-4.541*** (0.0645)	-4.039*** (0.0984)	-3.754*** (0.0478)
/ lntheta	-17.55 (794.7)	-16.97 (510.8)	-18.02 (708.9)	-19.20 (827.0)	-17.14 (582.6)	-18.97 (729.1)
Theta	2.38e-08 (0.0000189)	4.28e-08 (0.0000218)	1.49e-08 (0.0000106)	4.60e-09 (3.81e-06)	3.61e-08 (0.000021)	5.76e-09 (4.20e-06)
Individual-spells	359,566	318,007	486,790	884,707	356,942	1,012,411
Individuals	21,493	19,064	32,244	49,974	20,092	60,105
Log likelihood	-13,409.197	-11,254.246	-23,214.462	-41,392.487	-14,904.809	-46,710.674

Note: The table reports hazard model estimates with an indicator variable for policy change, an indicator variable for 52-54 age group, the interaction term of both variables and additional explanatory variables which include personal, job and employer attributes such as gender, nationality, and number of children, occupations, industry, regional unemployment rate and 36 dummy monthly variables. Standard errors in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Focusing on the results shown in panel A of Table 2 for the full sample, all coefficients have the expected sign. The effect of increased/reduced PBD seems to be particularly strong. The coefficient of *Age52_54* indicates that the probability that an individual leaves the unemployment register within the next month is 58% lower (coefficient of -0.877) for individuals aged 52-54 that were eligible for extended benefits relative to the control group of individuals aged 49-51. At the same time, the point estimates for both age groups after the policy change are statistically significant and indicates that is 48% higher (coefficient of +0.391) than before the change, as can be deducted from the parameter of the *R* variable. This latter result may be caused by the fact that the economy was doing badly in 2011 and had improved in 2013.

Moreover, the coefficient of *R*Age52_54* (β_4) measures the causal impact of the policy change that took place in 2012 on the probability that the unemployed found a job through the DID effect between outcomes of control and treatment group before and after the reform. This parameter intends to capture the DID effect of the policy change. It is in line with expectations, suggesting that the impact of unlimited UA benefits was substantial. The estimated coefficient is +0.858, so that the probability finding a job is 2.35 times higher for individuals who had not access to those benefits after the policy change took place, once the better economic situation in 2013 and the fact that the 52-54 age group exhibit lower exit rates than the 49-51 age group on average are controlled for.

Therefore, reductions in the benefit entitlement period for older workers (which limited their use of UB to secure income until retirement as a very early retirement instrument) are associated with

increases in the outflow from unemployment to employment, *ceteris paribus*. When we use these estimates to calculate the expected average duration of UB reciprocity, the results are 912 days for the treatment group and 1,242 days for the control group. The difference between them suggests that there was a reduction of 330 days in the average duration due to the impact of the reform. The conclusion would be that eligibility for longer benefits at relatively early ages in the case of older workers reduces their transitions from unemployment to a job and increases their unemployment duration.¹⁰

As regards the remaining control variables included in the regressions, we find that high-wage workers (those working in white-collar high- and medium-skilled occupations) have a lower chance to exit unemployment. Combined with the usual finding that they also exhibit a lower risk of unemployment, the result would be that they face substantially lower turnover. Results also show significant differences between industries, with building workers exhibiting lower exit rates than workers from other sectors (mostly manufacturing but also services). We also find that women have significantly worse chances than men to exit unemployment.

These differences in the exit rates among groups of recipients have induced us to estimate separate models for them. The corresponding results appear by gender and industry in panel A of Table 2 and by occupation in panel B.¹¹ The variable $R*Age52_54$ has a positive effect on the probability of men and women leaving unemployment. In particular, the probability of finding a job associated with the policy change was 2.22 times higher for males and 2.62 times higher for females. The reduction in PBD for older workers after 2012 is related to an increase in exits from unemployment to employment for all the sectors. The unemployed working previously in manufacturing exhibited the highest hazards of finding a job, while the lowest effect was found for the building sector. Finally, the cut in entitlement duration also implies a significant and positive effect on exiting out of UA among recipients in all the occupation categories. The positive impact was higher in magnitude for white-collar workers than blue-collar ones, in particular those in medium-skilled jobs (administrative occupations and operators of machines and assemblers, respectively).

6.2. Robustness checks

In this sub-section, two strategies to test the robustness of our baseline estimates are carried out. Firstly, we show that our main results are robust to alternative definitions of the control group. In

¹⁰ We have also estimated the effect of the reform using regression analysis by ordinary least squares (OLS), the dependent variable being the UA benefit duration. Our results suggest that the reform reduced this duration by 544 days and 368 days, respectively, when using the control groups I and II. We find that, after controlling for a set of explanatory variables, the reform brought about a reduction of 92.5% (compared to the control group I) and 62.8% (compared to the control group II), respectively, on the expected duration of UA.

¹¹ The occupational categories are as follows: White-collar high-skilled (WCHS) workers include directors and managers, scientific and intellectual professionals and mid-level professional technicians; White-collar medium-skilled (WCMS) workers include administrative support staff; White-collar low-skilled (WCLS) workers include service workers; Blue-collar high-skilled (BCHS) workers include farmers and skilled workers, officials, operators and artisans of mechanical arts and other crafts; Blue-collar medium-skilled (BCMS) workers include operators of facilities and machines and assemblers; and Blue-collar low-skilled (BCLS) workers include elementary occupations.

particular, we use the control group II, which is comprised of recipients aged 55-57 before and after the policy change. Secondly, a placebo test is performed. We replicate the analysis for a placebo reform on January 2011, a year and a half before the actual reform took place, and on January 2014, a year and a half after the actual reform took place. The aim of this exercise is to provide additional evidence of the lack of differential time trends between the treated and control groups.

Table 3 provides the results for the full sample, and broken down by gender, industry and occupation, when the control group II is used. Although the magnitudes of the estimated coefficients vary, the main findings remain. For the full sample, the coefficient of *Age52_54* suggests that the probability of exiting within the next month is slightly lower for individuals aged 52-54 as compared to the control group of individuals aged 55-57, both eligible for the ‘52/55ys. subsidy’. Note that this result is driven by women and workers in blue-collar medium-skilled occupations: for the rest of categories considered in panels A and B this probability is not significantly different from zero. As before, better economic conditions (reflected in the parameter of the *R* variable) induced an increase of 60% (coefficient of +0.475) in the exit rates for both age groups after the policy change.

Table 2

**ESTIMATE RESULTS OF THE SEMIPARAMETRIC PIECEWISE HAZARD MODEL FOR EQUATION (2):
COEFFICIENT AND STANDARD ERRORS (IN BRACKETS). CONTROL GROUP II: RECIPIENTS AGED 55-57.
PES DATA (2010-2017)**

Panel A: Full sample, gender and industry

	All	Male	Female	Manufact.	Building	Services
Policy ch. (R)	0.475*** (0.0171)	0.476*** (0.0196)	0.457*** (0.0346)	0.468*** (0.0455)	0.494*** (0.0319)	0.446*** (0.0238)
Age 52-54	-0.0346** (0.0162)	-0.0131 (0.0187)	-0.0800** (0.0322)	-0.0357 (0.0432)	-0.00210 (0.0304)	-0.0345 (0.0225)
R*Age 52-54	0.605*** (0.0216)	0.594*** (0.0251)	0.585*** (0.0425)	0.640*** (0.0582)	0.501*** (0.0413)	0.615*** (0.0297)
Constant	-4.696*** (0.0406)	-4.668*** (0.0477)	-4.269*** (0.0749)	-6.022*** (0.129)	-5.123*** (0.116)	-4.363*** (0.0517)
/ lntheta	-18.34 (395.2)	-19.17 (667.1)	-18.69 (1025.6)	-15.75 (347.0)	-17.80 (513.0)	-17.79 (429.2)
Theta	1.08e-08 (4.28e-06)	4.73e-09 (3.16e-06)	7.63e-09 (7.82e-06)	1.45e-07 (0.0000502)	1.86e-08 (9.53e-06)	1.87e-08 (8.04e-06)
Individual-spells	4,072,489	2,719,941	1,352,548	769,302	897,646	2,17,740
Individuals	187,364	119,468	67,896	32,415	39,795	106,633
Log likelihood	-128,760.31	-91,690.958	-36,568.652	-18,712.738	-32,060.407	-70,241.089

Panel B: Occupation

	WCHS	WCMS	WCLS	BCHS	BCMS	BCLS
Policy ch. (R)	0.599*** (0.0592)	0.514*** (0.0719)	0.406*** (0.0471)	0.486*** (0.0296)	0.553*** (0.0546)	0.458*** (0.0322)
Age 52-54	0.0257 (0.0579)	0.0202 (0.0678)	-0.0438 (0.0460)	-0.0224 (0.0288)	-0.113** (0.0538)	-0.0177 (0.0291)
R*Age 52-54	0.711*** (0.0746)	0.919*** (0.0885)	0.597*** (0.0589)	0.518*** (0.0385)	0.655*** (0.0696)	0.579*** (0.0401)
Constant	-4.916*** (0.135)	-4.558*** (0.149)	-4.440*** (0.0881)	-5.204*** (0.0757)	-5.037*** (0.120)	-4.477*** (0.0592)
/ Intheta	-16.48 (540.5)	-17.09 (728.4)	-17.73 (812.5)	-18.46 (678.3)	-16.79 (623.2)	-17.40 (498.5)
Theta	6.98e-08 (0.0000377)	3.77e-08 (0.0000275)	2.00e-08 (0.0000163)	9.58e-09 (6.50e-06)	5.13e-08 (0.000032)	2.77e-08 (0.0000138)
Individual-spells	438,996	400,691	553,186	1,063,390	424,185	1,175,427
Individuals	19,535	17,642	27,992	46,808	18,376	54,266
Log likelihood	-11,478.013	-8,873.62	-18,509.133	-37,383.014	-12,645.256	-37,625.267

Note: See Table 2.

Moreover, the estimated coefficient of $R*Age52_54$ is +0.605, so that the probability of finding a job was 83% higher for the unemployed who could not resort to unlimited benefits after the policy change took place, after taking account of the improved labour market situation in 2013 and the similar exit rates of both age groups on average. Thus, the impact of eliminating the unlimited benefits for the treated groups of recipients was substantial. The results are similar for men and women, the three industry groups and the six occupational categories, with the differences mentioned above: the impact of the reform was larger for workers in manufacturing and the ones in white-collar jobs.

As said before, an alternative way to test the assumption of equal trends would be to carry out a placebo test, a device that serves to gain confidence that the unemployment inflows would have continued to move parallel after the date of the reform if the intervention had not occurred. To do this test, we perform an additional DID estimation using a “fake” pre- and post-reform period. We have used data from years 2010 and 2011, pretending that 2011 is the post-reform period and 2010 the pre-reform period. We have repeated the same exercise using 2013 as the pre-reform period and 2014 as the post-reform period. Table 4 offers the results. Reassuringly, we do not observe any significant treatment effect using data on either the pre-reform years (see parameter β_4 in column 1) or the post-reform years (see parameter β_4 in column 2).

Table 4

ESTIMATE RESULTS OF THE SEMIPARAMETRIC PIECEWISE HAZARD MODEL FOR EQUATION (2):
 COEFFICIENT AND STANDARD ERRORS (IN BRACKETS). PLACEBO TESTS A (2010-2011) AND
 B (2013-2014). CONTROL GROUP I: RECIPIENTS AGED 49-51. PES DATA (2010-2017)

	Placebo A	Placebo B
Policy change (R) (β_2)	-0.179*** (0.0120)	0.175*** (0.0106)
Age 52-54 (β_3)	-0.936*** (0.0127)	-0.0328*** (0.0115)
R*Age 52-54 (β_4)	-0.00711 (0.0179)	0.0133 (0.0164)
Constant	-3.618*** (0.0169)	-3.824*** (0.0167)
/Intheta	-18.933*** (0.0199)	-18.815*** (0.011)
Theta	5.99e-09 (1.20e-10)	6.74e-09 (7.29e-11)
Individuals	238,276	174,083
Individuals-spells	4,644,175	1,952,781
Log likelihood	-164,240.74	-150,432.89

6.3. The fiscal effects of the reform

In this final sub-section, we evaluate the total savings of the reform using information on the recipients of UA benefits registered in the PES dataset. Table 5 provides descriptive evidence of cost by treatment and control group before (2011 year) and after (2013 year) the reform. In this table, the first column contains information of recipients starting UA spells benefits, the second column the duration of UA spells (in days) considering a three-year time window, and the third column the daily UA benefit level (in €). The information displayed in these columns comes from Table 1.

The fourth column gives the total saving in the 36 months following the exhaustion of UI benefits as the result of multiplying the first three columns. This is calculated using the information from the control group I (panel A) and the control group II (panel B). In each panel, the first four rows show information distinguishing between treatment and control groups for pre- and post-reform periods. The next rows offer the differences in the corresponding indicator across groups of recipients and periods. Finally, the bottom row displays the difference-in-difference by treatment status and period. This analysis is only descriptive and does not consider the potential endogeneity of the UA benefits variable.

Our estimates suggest that expenditure of the treatment group amounted to €791 million in 2011, before the reform, and to nearly €173 million in 2013, after the reform. These figures would imply a fiscal saving of €618 million. We arrive at this sum by comparing the pre- and post-reform costs for the treatment group (B-A). It is important to note that this would be the “false”

counterfactual in order to estimate the impact of the reform over the total expenditure. The correct method implies to calculate the difference-in-difference, whereby that impact is computed as the change in the total cost before and after the reform for the treatment group (B-A) and the control group (D-C). By applying this double difference method, we obtain that the estimated fiscal impact was €609 million €when using the control group I (€575 million with the control group II). To put it into context, these savings would represent about 0.05 per cent of the Spanish GDP.

Table 5

FISCAL EVALUATION OF THE REFORM. ONE YEAR AFTER THE REFORM (2011 and 2013)

Panel A: control group I

	Spells (1)	Duration (2)	Daily UA level (3)	Total savings (4)=(1)*(2)*(3)
Pre-reform period (2011)				
Treatment (A)	68,578	802.9	14.4	791,847,366
Control (C)	52,141	334.3	14.7	256,598,889
Post-reform period (2013)				
Treatment (B)	42,473	309.9	13.2	173,292,865
Control (D)	507,16	372.0	13.1	247,728,342
Diff. treatment - control				
Pre-reform (A-C)	16,437	468.6	-0.3	535,248,477
Post-reform (B-D)	-8,243	-62.1	0.0	-74,435,477
Diff. post-reform - pre-reform				
Treatment (B-A)	-26,105	-493.0	-1.2	-618,554,501
Control (D-C)	-1,425	37.7	-1.6	-8,870,547
Difference-in-difference				
DID ((B-A)-(D-C))	-24,680	-530.7	0.4	-609,683,954

Panel B: control group II

	Spells (1)	Duration (2)	Daily UA level (3)	Total savings (4)=(1)*(2)*(3)
Pre-reform period (2011)				
Treatment (A)	68,578	802.9	14.4	791,847,366
Control (C)	37,585	758.1	14.4	408,979,239
Post-reform period (2013)				
Treatment (B)	42,473	309.9	13.2	173,292,865
Control (D)	42,243	645.9	13.4	366,078,888
Diff. treatment - control				
Pre-reform (A-C)	30,993	44.8	0.0	382,868,127
Post-reform (B-D)	230	-336.0	-0.3	-192,786,023
Diff. post-reform - pre-reform				
Treatment (B-A)	-26,105	-493.0	-1.2	-618,554,501
Control (D-C)	4,658	-112.2	-0.9	-42,900,351
Difference-in-difference				
DID ((B-A)-(D-C))	-30,763	-380.8	-0.3	-575,654,150

As an additional piece of information, we have converted UA days in amounts, knowing that each of them pays around €14 per day, and estimate the total fiscal impact for each individual, taking into account their past history and their behavioural response induced by the reform. The coefficients of an OLS model including a set of explanatory variables (not shown, but available upon request) suggest that the reform reduced the average individual outlay for treated individuals relative to the control group by nearly €7,800 if we use the control group I (about €5,200 with the control group II). The results do not differ much if we do not include personal and job variables.

7. CONCLUSIONS

In this paper, we have analysed a policy change that took place in Spain in July 2012 that raised from 52 to 55 years the minimum age to claim an unlimited UA benefit, so that unemployed workers could collect UA up to the moment they become eligible for a normal old-age pension. This reform reduced the unlimited entitlement period for three years for the group of individuals aged 52-54 years at the time of job loss, providing an ideal setting for a quasi-experimental evaluation of the influence of cutting potential benefit duration on exits out of unemployment into employment. For this purpose, we have made use of data extracted from the administrative records of the Spanish Public Employment Service. Unemployment experiences of the treatment group aged 52-54 are compared under two schemes: unlimited UA entitlement period (the pre-reform scheme) and limited UA period (the post-reform scheme). The younger group (aged 49-51) serves as control group to eliminate the effect of the business cycle. An alternative control group, comprised of older recipients (aged 55-57), is used to carry out a robustness check of our analysis. Whereas the former is not eligible for the '52/55ys. subsidy' both before and after the policy change, the latter is eligible in both periods. The analysis was performed within the framework of a continuous hazard model controlling for both observable and unobservable individual characteristics.

Our empirical work follows the strand of the literature that takes advantage of law changes that allow to examine transitions out of UA reciprocity using a difference-in-differences approach in order to measure what is the impact of the extension/reduction of potential benefit duration. Our results suggest that changes in this important parameter of the UBS (the entitlement period) brings about substantial behavioural effects on older workers. They are in line with the findings of the empirical literature that point out to reduced employment and increased unemployment and inactivity of older workers affected by programmes of extended benefits (Kyyrä and Wilke, 2007; Lalive, 2008). In particular, the impact of unlimited UA benefits on transitions to a job that we find is substantial. The probability of exiting from unemployment to a job for individuals aged 52-54 who stopped having access to those benefits after the policy change took place was 2.5 times higher than before the change, once the improved economic situation experienced during the post-reform period and the average differential exit rates between the 52-54 and the 49-51 age groups are controlled for. This finding is maintained when we use an alternative control group (the rise in exit rates amounts to 89% in this case). Moreover, this occurs for different sub-population groups defined by various characteristics (gender and occupational category and industry affiliation of their previous job). The conclusion is that reductions in the benefit entitlement period for

older workers (limiting the use of UA as a *very early* retirement instrument) increases significantly the transitions from unemployment to employment.

The problem with these unlimited benefits schemes is that, by essentially securing the income for an unemployed person until retirement, they can be very costly. Our fiscal evaluation of the reform suggests that the savings amounted to approximately €600 million over a three-year period (or, equivalently, between €5,000 and €8,000 for an average individual). Therefore, the existence of these types of benefits and their changes may induce responses by workers resulting in varying unemployment outflows, with effects that appear to be quantitatively significant and may result in large costs/savings for the UBS. Policy reforms aiming to increase the age at which older workers may gain access to these schemes and raise the effective retirement age seem to be beneficial for the society as a whole, although particular care should be taken to consider the entire set of welfare programmes that affect the early retirement decisions of workers. Potential benefit duration may be an instrument to increase the employment rate and the stability of older workers. If PBD is shortened, companies may become more reluctant to destroy jobs and workers less prone to move into non-employment, thus reducing the inflows from employment into unemployment in the first place (Lalive *et al.*, 2011). Combining the unemployment benefit and pension systems may enhance the job search of older unemployed workers, by taxing pensions in proportion to the length of the unemployment spell (Hairault *et al.*, 2010). At the same time, if labour demand is important in this context, reducing the UA duration may affect negatively on the most vulnerable older workers. Measures that induce firms to retain these workers (i.e. employment subsidies) should be carefully considered.

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