The Right to Retire Early and Mortality*

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Abstract

We shed new light on the mortality effect of delaying retirement by investigating the 1967 pension reform in Spain. The pension reform exogenously changed the early retirement age depending on the date individuals started contributing to the pension system. Those that contributed before January 1st 1967 maintained the right to retire early at age 60, while individuals who started contributing after that date are regulated by the new regime and can not claim pension until age 61 to 65, depending on their birth year. Using the Spanish administrative social security data, we find that people in the new regime delay labor market exit by around one year. The reform also changed the pathways to exit from the labor market to the pension system. It increased the probability that individuals take up disability insurance and a partial pension. We show evidence of substantial heterogeneity in the effect of retirement on mortality. Later retirement decreases mortality for those employed in high-skilled occupation while has no significant impacts on mortality for those working in low-skill, physically demanding jobs.

JEL Codes: I12, J1, J24, J26

Keywords: ageing, early retirement, mortality, health outcomes

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1 Introduction

Many countries have reformed their public pension system to cope with the population ageing and maintain financial solvency. One of the main policy tools is restricting access to early retirement schemes by increasing the minimum pension eligibility age. Standard economic theory predicts that such reform delays retirement and increases fiscal revenue. However, the impacts of retirement on mortality, health, and public health expenditures are theoretically and empirically unambiguous.[1] While retire earlier can prolong life expectancy via more leisure, less work-related stress and accidents, better mental health (Eibich (2015), Celidoni and Rebba (2017), Gorry et al. (2018)), retire earlier can also harm health through the loss of social network, reduction in cognitive and physical activities and adopt unhealthy lifestyles (Grip et al. (2012), Insler (2014), Celidoni et al. (2017)). Moreover, understanding the size and nature of such effects on mortality, health has important implications on overall implied costs (healthcare and long-term care expenditure) (Hagen (2018), Nielsen (2019)). Using an unanticipated policy reform that takes away access to early retirement for workers start contributing to the system late, our paper present evidence from Spain that early retirement has substantial heterogeneous impacts on mortality. Retirement increases mortality for those employed in high-skilled occupations while has no significant effect on mortality for those working in low-skill, physically demanding jobs.

Our analysis investigates the Spanish pension reform in 1967, which established the current public old-age pension system. Before 1967, individuals are entitled to a basic Old Age and Disability Insurance System (*SOVI*) and occupation-specific pensions called "Mutual Societies" (*Mutualidades*). Legislation in 1967 unified the pension system and set the basis of the current old-age pension. One major change is the eligibility age for old-age pension. In the old system, people can voluntarily claim a pension as early as age 60. In the new regime, individuals can only retire at age 61 (through involuntary early retirement), 63 (through voluntary early retirement), or 65 (statutory retirement age), depending on their year of birth. Individuals who contributed to the pension system before January 1st 1967 maintained their initial rights in the old system. Therefore, the reform effectively increases the early retirement age from 60 to 61-65 years for those who started contributing after January 1st 1967 and provides a setting similar to a natural experiment.

Using the Spanish administrative social security panel data from 2005 to 2019, we focus on a sample of individuals who started contributing in 1966 and 1967 and compare those who started contributing before and after this cutoff date. We find that the reform has a remarkable impact on age at exiting employment and age at claiming a pension. Those contributed in 1967 delay labor market exit by around one year. They are also less likely to claim a regular pension, more likely to claim partial pension and disability insurance. They seem to switch from using unemployment in-

[1] See Pilipiec et al. (2020) for a review.

surance to completely bridging to a regular pension to take up a partial pension to reduce working hours but remain in the labor force. Furthermore, we instrument the age at last employment using the reform treatment status and find no detrimental effect of retirement on mortality. Delaying retirement by one year decreases mortality of high-skilled individuals by 0.3 percentage points. This result suggests that early retirement, for individuals with high-skilled occupations, is detrimental for their health through the loss of social networks, reduction in cognitive and physical activities, and adopt unhealthy lifestyles. Yet, we find that delaying retirement has no impact on the mortality of those worked in low-skill, physically demanding jobs. This is likely due to the low-skill workers are more likely to find other options to exit early.

Our paper relates to and completes papers study the mortality effects of retirement. The existing papers instrument actual retirement age by using exogenous changes in ERA of some special occupation groups (Hallberg et al. (2015), Bloemen et al. (2017), Hagen (2018), Kuhn et al. (2020)), and using the nationwide statutory retirement (Hernaes et al. (2013), Fitzpatrick and Moore (2018). The empirical findings are mixed. Hagen (2018) studies the mortality effect of a two-year increase in the normal retirement age of local government female workers in Sweden and finds that the reform had no impact on mortality and health care utilization. On the contrary, Bloemen et al. (2017) finds that male civil servants who are entitled to claim pension around eight years earlier have a lower mortality rate within five years in the Netherlands. Similarly, Hallberg et al. (2015) also finds five-year earlier access to pension reduces mortality of male army officers in Sweden. More recently, Kuhn et al. (2020) estimates the effect of 3-year earlier access to pension on mortality using Austria register data. They find that one year earlier retirement reduces the age at death for men while increasing the immediate pre-mature mortality rate. They find no significant effect for women. A recent U.S. study by Fitzpatrick and Moore (2018) also shown that becoming eligible for pension at age 62 leads to an immediate increase in male mortality and again finds no significant impact on women. We contribute to this literature from three perspectives.

Our paper also contributes to studies on the impact of pension reforms on retirement decisions (add citations). We are the first paper to study the impact of the 1967 reform in Spain. The Spanish reform explored in this paper has several features that facilitate our analysis. First, this reform has a large impact on age at exiting employment and changes the pathways to retirement. The large behavior changes help to capture the mortality impacts. Second, the eligibility for early retirement depends on the date of starting contributing to the pension system. Therefore, the treated individuals have a very long time-horizon to respond to the expected longer distance to retirement. This feature helps to address the importance of expectation and anticipation effects. Lastly, we explore heterogeneity along gender and occupation dimensions. + some new findings on nature of the findings..

add some literature on O$*$Net physical intensity and other work context measures

This article proceeds as follows: Section 2 presents a brief description of the institutional setting in Spain and the 1966 pension reform. Section 3 describes the data and examines the validity of our empirical strategy. Section 4 presents the labor supply results and the instrumental variable estimates of the impact of age at last employment on mortality. We also discuss the heterogeneity and potential mechanisms that may explain the impact on mortality. We conclude with a discussion of the findings.

2 Institutional Setting

The nowadays old-pension system in Spain is a benefit pay-as-you-go system with an average replacement rate of around 80% (one of the highest in the EU). The key elements of the actual Spanish pension system were set in 1966 and further developed in the 70s. Yet, in the last 30 years, the system has experienced six important reforms in 1985, 1997, 2002, 2007, 2011, and 2013.[2]

Before 1967, a fixed-amount pension (*SOVI*) financed by employers and the state was available for low-income or disabled workers. This pension benefit, which was very basic and insufficient, was complemented by the "Mutual societies" (*Mutualidades*), which were specific to each occupation/sector. The coexistence of *SOVI* and *Mutualidades* gave rise to duplications and waste of resources. In 1967, the General Social Security Law (*Ley General de Seguridad Social*) unified the pre-existing insurance systems in a single institution, the *Social Security*.

Yet, individuals who have contributed before the 1st of January of 1967 (even by one day) maintained the initial rights of the old system indefinitely. Under the old system, the statutory retirement age was set at 65, but individuals could freely decide to retire early at age 60 with some penalities. Individuals needed a minimum of 10 years of contributions to gain access to a contributive pension. Finally, the pension benefits were calculated based on three elements: (1) the average of the contributions in the 24 months preceding retirement, (2) the penalty for early retirement[3], and (3) the penalty for insufficient contributions.[4]

The pension rights of individuals that started contributing after the 1st of January of 1967 are regulated by the specific law applicable in the year they retire (which relates to their birth year).[5] During our sample periods, for all individuals, the statutory retirement age remained at 65. How-

[2]See Boldrin et al. (2010) and García-Gómez et al. (2012) for a very detailed explanation of all the reforms of the old-age pension system in Spain.

[3]The penalty for early retirement was set to 8 percent per year anticipated.

[4]The penalty for insufficient contributions was set to 2 percent per year not contributed. Full benefits were reached with 35 contribution years.

[5]The key elements of the modern Spanish pension system were set in 1985, but since then, there have been six important reforms in 1985, 1997, 2002, 2007, 2011, and 2013. One of these laws applies to each individual depending on the year when he/she turns 65.

ever, the possibility of accessing early retirement was different for different cohorts. As we can observe in Figure 1, individuals who contributed before 1967 independently on their birth year could always voluntarily retire early at age 60. For those that contributed after 1967, voluntary early retirement was not allowed before 2011 (affecting individuals born between 1936 and 1948 in our sample). The reform in 2011 introduced voluntary early retirement, which provides the option to claim pension early at age 63. This law affected individuals born from 1948 onwards. Before 2011, the only other way to claim early was via involuntary early retirement. In 2002, the involuntary early retirement age was at age 61 under exceptional circumstances. Only individuals who were unemployed for at least six months beyond their willingness (involuntary) and with at least 30 years of contribution are eligible for claim early at age 61. This law affected individuals born from 1942 to 1952. Therefore, we expect individuals who wish to retire early and started contributing after 1967 to increase their retirement age between 1 and 4 years.

The early retirement age was not the only change that the new *Social Security* system introduced. First, eligibility for the old-age benefits increased gradually from 10 to 25 years of contributions. Secondly, the calculation of pension benefits in the new system considers the age of the individual and the number of years contributed to the system (the number of years taken for this calculation has also increased over time). Thirdly, from 2002, partial and flexible retirement option became available[6] and the introduction of incentives for individuals to retire after the statutory eligibility age of 65.[7]

Another factor that may affect older workers' labor market behavior is the disability and unemployment insurance policies (García-Gómez et al. 2012). Permanent disability benefits have been used extensively as an early retirement mechanism in Spain. This action has prompted several reforms since 1985 that tightened the eligibility criteria and managed to keep the inflows into the disability system stable after that. Meanwhile, in 1984, the government established a special provision for those who become unemployed after age 55. They were allowed to receive unemployment assistance benefits until their pension claiming age. The only prerequisite is to reach the minimum contribution years to become eligible for an old-age pension. This unemployment assistance paid 75% of the minimum wage. In 1989, unemployed aged over 52 also can take up this unemployment assistance. Moreover, a reform in 2002 also opened up the possibility to combine the unemployment insurance claiming with labor earnings.[8] Therefore, both the disability insurance

[6]They allowed the possibility of combining income from work with old-age benefits. Partial retirement enables individuals aged 61 years and older that have contributed for at least 30 year and with six years of tenure in the same company to claim 85% pension while work for 15%. Since 2011, the minimum age and the contribution years requirement have increased and made this option less attractive.

[7]An additional two percent per additional year of contribution beyond age 65 for those with at least 35 years of contributions on top of the 100% applied to the regulatory base

[8]They could receive 50% of their unemployment insurance entitlement and work at the same time. The employer would pay the remaining amount in wages.

and unemployment insurance are important early retirement pathways.

3 Data and Empirical Straregy

3.1 Data Sources

Our main data source is the administrative records from the Continuous Sample of Working Histories (Muestra Continua de Vidas Laborales (*MCVL*), in Spanish) from 2005 to 2019. Each year, the *MCVL* selects a random sample of 4 percent of all individuals registered in the Social Security (affiliates and pensioners) that year. Once individuals enter the data set, they remain in the sample for all the subsequent years. In addition to those present in a past wave, new members are added in each wave, so that the sample is always representative of the active population for the year of reference. Moreover, the *MCVL* includes historical labor market information, allowing the construction of the individuals' employment history.

We have information about the date individuals started contributing, their employment and unemployment spells, occupations, industry, type of contract and monthly contributions bases.[9] From their pension records, we also have information about the date they claimed any pension, the type of pension they receive at each point of time, pension benefit, and the number of years they contributed. Individuals can also exit from our dataset due to death. In this case, we also have information about the exact date of death.

The date of the first contribution to Social Security is poorly recorded for some individuals. We correct this information using the total number of years of contribution when they claim a pension. The contribution years are better recorded because this information is used to calculate the pension benefit.

The sample we use covers Spanish pensioners born between 1936 and 1952 who are registered in the Social Security system under the general regime. We also restrict our sample to individuals who entered for the first time in the formal labor market between 14 and 30 years old.[10] In our main specifications, we only select individuals that contributed 12 months before and after the 1st of January of 1967. This final sample contains 13,945 pensioners, from which only 24% are women (Table 1).

[9] Earnings from contribution bases are, however, top-coded due to regulatory constraints. Therefore, for high-earners individuals, a fraction of their income will not be unobservable.

[10] We do not have information about the informal labor market in Spain. We only observe the age at which individuals started contributing to the social security system, which will coincide with the age at which they had their first formal job.

3.2 Descriptive Evidence

Table 1 provides summary statistics for all outcomes and control variables for the sample we use in our main specification. We can observe that, on average, individuals leave the labor market at age 61. As expected, the distribution of the age at last employment is very different for individuals that started contributing in 1966 and 1967. Figure 2 shows that almost 12% of individuals that started contributing in 1966 retire at age 60, while this percentage is almost zero for those individuals that started contributing in 1967. On the other hand, 38% of individuals that started contributing in 1967 leave the labor market at age 65, compared to 21% of those that started contributing in 1966. This figure suggests that the law of 1967 was binding, and individuals affected by the reform delayed their exit from the labor market.

There are five different pathways from the labor market to retirement. First, individuals can directly claim a pension after their last employment. We can observe in Table 1 that 39% of individuals in our sample claim old-age pension (or regular pension) right after their last job while 11% claim disability insurance benefits. Disability insurance is sometimes used to permanently leave the labor market before reaching the statutory eligibility age. In 2002, the possibility of combining income from work with old-age benefits (partial retirement) was introduced. In our sample, 14% of individuals choose this scheme. Finally, individuals could exit the labor market through unemployment insurance. In our sample, 29% of individuals ask for unemployment insurance benefit just before claiming either a regular pension (92% of the cases) or a disability insurance benefit. A minority (6% of our sample) ask for unemployment insurance but have a period of inactivity before claiming pension. In the end, 84% of our sample end up with a regular pension and the average age for receiving the old-age pension is 63 years old. The remaining 16% receive a permanent disability pension, and they receive it from a younger age, at around 57 years old.

In our sample, individuals receive, on average, 1,356€monthly pension benefits. We also have information on the pension base and the pension adjustment percentage. The pension base is the amount calculated from the individual's contributions before adjustment for early claim penalities. On average, the individuals have a pension base of 1,286€. The pension adjustment percentage expresses the share of pension base, which is used to determine the amount of the initially recognized pension. It depends on several factors, such as the degree of disability and age at claiming disability pensions, years of contributions, age at retirement, share of part-time work when claim partial pensions, or family responsibilities and income in widowhood pensions. Individuals in our sample have an average pension adjustment percentage of 78%. The total pension benefit is the pension base, multiplied by the pension adjustment percentage, plus some complements.

The control variables measure the labor market attachment and occupations of the individuals between the ages of 30 and 45. On average, individuals contribute monthly to the pension system 1,276€during these years. We use the share of days employed and unemployed between the ages

of 30 and 45 to proxy for labor market attachment. We also calculate the fraction of time self-employed, working in construction or mining by dividing the number of days the individuals are self-employed, working in construction or mining by the total number of days of employment between these ages. On average, 91% of the time are devoted to employment. Individuals are unemployed for less than 5% of the time. Self-employment during these ages seems to be also minor (4.2%). Moreover, individuals work in the construction sector 8.7% of this time and the mining sector a 0.28%. Finally, we also calculate the individual's highest occupation between the ages of 30 and 45. The *MCVL* divides occupations into 10 categories. In our sample, 5.3% are engineers, graduates or senior managers while 3% are technical engineers, experts and assistants. We will also consider these two categories as high skilled occupations. On the other hand, 36% of individuals are working in a semi-skilled occupation.[11] Finally, 42% of individuals work as officers, and 8% have non-qualified jobs.

3.3 Empirical Strategy

Estimating the causal effect of retirement age on mortality is difficult because many unobserved factors can influence both retirement age and mortality. To deal with endogeneity in retirement behavior, we exploit an exogenous variation in retirement age, provided by the rise in early retirement age for a subgroup of individuals as a result of the 1967 Spanish pension reform. We also use an instrumental variable (IV) approach to estimate the causal impact of age at least employment on mortality.

First, we estimate Equation 1, where $Treated_t$ is a dummy that takes the value one for those who started contributing to the pension system after 1st January of 1967. The treatment group can claim pensions between the age 61 and 65, while the control group can claim pensions as early as age 60.

$$R_{ict} = \beta_0 + \beta_1 \delta_c + \beta Treated_t + \gamma X_{ict}, + U_{ict} \tag{1}$$

R_{ict} represents age at last employment of individual *i* with birth year *c* that started contributing in the year *t*. δ_c is the month-year of birth fixed effects. We also control for a list of fixed effects, including province of first affiliation and highest occupation between the ages 30 and 45, and a list of other predetermined covariates, including mean monthly contribution and the fraction of time spent in construction, mining, employment, unemployed and self-employed between age 30 and 45. We cluster the standard errors at birth year level and also report the wild-bootstrap standard errors in the table. β measures the average treatment effect of the reform on age at least

[11] We consider a semi-skilled occupation: administrative and workshop heads, non-certified assistants, administrative officers, subaltern, or administrative assistants.

employment.

We use also Equation 1, to estimate the reduced-form effect of the reform over the different early retirement pathways, age at which individuals claim regular pension or disability insurance, or pension benefit.

The second stage of our Instrumental Variable estimates are given by Equation 2 , where the age at last employment (R) is replace by the predicted value ($\hat{R}$) from equation 1:

$$M_{ict} = \alpha_0 + \alpha_1 \delta_c + \theta \hat{R_{ict}} + \gamma X_{ict} + U_{ict} \tag{2}$$

M_{ict} represents the probability of dying of individual *i* with birth year *c* that started contributing in the year *t*. The same list of controls used in equation 1 are also included. The coefficient θ captures the local average treatment effect of age at last employment on mortality among the individuals who delay retirement in the new regime and who would not leave the labor force later had they be able to claim pension at age 60.

The key assumption for treatment status to be a valid instrument for access to early retirement is that individuals' date at starting contributing to the pension system is independent of unobserved characteristics that affect the age at last employment and mortality. We do the following steps to support the validity of our instrument. First of all, we control for province and occupation fixed effects and include birth month fixed effect. This allows us to estimate within occupation within birth month variations. Second, we restrict our sample to those who started contributing in 1966 and 1967. The treated and control people had similar labor market conditions when they began working: they were born in the same month and started working only one year apart.

Furthermore, we test the validity of the identifying assumption by checking whether the characteristics of the treated and control differ before they retire. Table A1 shows the impact of the treatment on a list of predetermined variables, including the faction of time spent in employment, unemployment, and self-employment between age 30 and 45; the fraction of time worked in different occupations; and average monthly earnings between age 30 and 45.[12] Except for the fraction of time spent in employment, we don't find any significant changes. This provides suggestive evidence that there is no manipulation of the treatment status. The higher share of employment spells are driven by women who have experienced a drastic liberalization during our sample period. It could be that starting working one year later is associated with a better employment environment. In the robustness test, we also show our reduced-form results with and without these controls, and the estimates are not sensitive to the inclusion of controls.

[12]One alternative way to check for manipulation is to check whether the characteristics of the treated and control differ at the beginning of their career. However the data quality is not very good around 1967. For some people, the first year or first five years of their career might be wrongly recorded. We, therefore, look at their characteristics between age 30 and 45. We have looked at other age brackets (35-45, 40-50, 30-40), and the results are similar.

Additionally, as a placebo test, we define the treatment status by using other dates at first contribution. The impacts of the reform disappear when we use the placebo cutoffs. This suggests that the estimated changes in the outcome variables are driven by the loss of early access to a pension rather than other confounding factors. Lastly, as a robustness check, we include age at first contribution fixed effect rather than birth month fixed effects. This robustness check estimates the impact of losing access to early retirement for people who start working at the same age. These estimates should be similar to the main estimates unless the different starting age is a confounding factor for our main specification. We discuss the robustness and placebo test results in more detail in the results section.

As for the exclusion restriction, we need to ensure that the treatment status affects mortality only through its impact on age at last employment. The only possible channel that the new regime can affect mortality is through changes in pension benefits. We, therefore, always control for the base pension benefits to wash out the possible income effect channel effect.

Finally, the monotonicity assumption requires that being in the new regime would not lead people to retire earlier. The monotonicity assumption is also satisfied in our context because the treated individuals do not have the option to retire as early as age 60 and the new system is overall less generous.

4 Results

4.1 The Reform Effect on Labor Supply

Table 2 shows the reduced-form impact of the reform on age at last employment. All specifications control for birth month-year fixed effects. Columns 1, 2 and 3 vary the sample selection to visualize the robustness of the findings to bandwidth choice. Column 1 takes the sample of individuals who contributed 24 months before and after the January 1st 1967. Column 2 uses the sample of individuals who contributed in 1966 and 1968. It is analogous to the donut-hole approach used in Regression Discontinuity design. Columns 3 and 4 use our baseline sample of individuals that contributed 12 months before and after the January 1st 1967. We can see that the coefficients are relatively stable. Individuals started contributing to the pension system after January 1967 increase their age at last employment by around 0.7 to 1 years. In addition, column 4 includes additional labor market and occupational control variables measured when the individuals where between 30 and 45 years old, as well as province of first affiliation fixed effects.[13] This is our preferred specification. Including additional controls does not change the magnitude of the coefficient much. Individuals that started contributing to the pension system after January 1967 increase their age at

[13] Section 3.2 explains in detail all the control variables and how they are constructed.

last employment by almost a year.

Table 3 further examines the reform impacts on different early retirement pathways. The reform not only modified the early retirement age, but also provided new pathways to exit from the labor market to the pension system. We find that individuals who started contributing to the pension system after January 1967 are less likely to directly transition from employment to regular pension. The probability of this pathway decreases by 7.9 percentage points ($\sim$ 20%). They are also less likely to use unemployment insurance to completely bridge to regular pension. The probability of the UI pathway decreases by 10 percentage points ($\sim$ 36%). In contrast, they are more likely to take up disability insurance and a partial pension after exiting employment. The probability of taking the DI pathway increases by 4 percentage points ($\sim$ 33 %), and the probability of taking the partial pension increases by 13 percentage points ($\sim$ 90%). These results indicate that individuals did not comply with the rise in statutory retirement age and utilized other ways to leave the labor market before the statutory retirement age, such as claiming disability insurance or a partial pension.

Finally, Table 4 shows the effect of the reform on pension benefit. The reform changed the way pension benefits were calculated, making it more generous for some workers. Moreover, the reform made individuals work longer, which should increase the pension base and decrease the penalty for early retirement. Furthermore, individuals affected by the reform are more likely to claiming disability insurance, which is typically less generous. We observe from Table 4 that the pension benefit of individuals that started contributing after 1967 increased by 141€($\sim$ 10%). This increase is driven by an increase in the base pension by 68€($\sim$ 5%) and an increase in pension adjustment by around 6 percentage points ($\sim$ 8%).

4.1.1 Robustness and Placebo Tests

When we analyze the direct effect of the reform on the different labor market outcomes, we compare individuals born in the same month and year that started contributing to the system one year apart (1966 vs. 1967). These individuals started contributing to the system at different ages, and this age difference could potentially be a confounding factor in our previous results. As a robustness check, we use age at first contribution fixed effect rather than birth month-year fixed effects. This robustness check estimates the impact of losing access to early retirement for people who start working at the same age. These estimates should be similar to the main estimates unless the different starting age is a confounding factor for our main specification. Table 5 shows the impact of the reform on labor supply when using age at first contribution fixed effect. Compared with the baseline results in Tables 2 and 3, the magnitudes are very similar.

Finally, our results could be potentially biased by unobserved characteristics that affect both the date starting contributing and their labor supply decisions. To test this possibility, we perform several placebo tests where we assign placebo treatment status to the individuals using other dates

at first contribution. Figure 3 plots the estimated changes using placebo treatment statues, which are defined as start contributing after years from 1968 to 1977. The placebo estimates are labeled in black, while our baseline estimates are labeled in red. We can see that almost all placebo estimates are close to zero. This suggests that the estimated changes in our baseline analysis result from the exogenous increase in ERA rather than other confounding factors.

4.1.2 Heterogeneous Effects

Table 6 and Table 7 show the heterogeneous impact of the reform by gender and individuals' last occupation. We can observe in Table 6 that the effect of the reform on the age at the last employment is similar for men and women (even though the impact on women is noisy). However, the reform had very different effects on early retirement pathways for men and women. Men who started contributing after 1967 are less likely to transition directly from employment to regular pension. Yet, the reform reduced the use of this retirement pathway for women by 14 percentage points ($\sim$ 30%). We also find gender differences in the disability insurance take-up. Treated women increase the use of disability insurance by 6.8 percentage points, while men only increase it by 3.4 percentage points. Finally, the reform decreased the unemployment insurance pathway for men by 12.5 percentage points ($\sim$ 36%) but not for women. These results suggest that men reacted to the reform by substituting unemployment insurance mainly by partial retirement. At the same time, treated women tried to leave the labor market before statutory retirement age mainly by the disability insurance pathway and only marginally through partial retirement.

Table 7 shows the effects of the reform by individual's last occupation. We aggregate occupations in three categories, namely high-skilled, semi-skilled and low-skilled occupations. We find that the reform delayed retirement more for high-skilled individuals. Individuals that started contributing after 1967 and held a high-skilled occupation before retirement, leave the labor market 1.6 years later compared with individuals that started contributing in 1966 with the same type of occupation. The delay was of 1 and 0.8 years for individuals with a semi-skilled and low-skilled occupation, respectively. The choice of pathway also differs by type of occupation. Individuals with a high-skilled occupation reacted to the reform by substituting the unemployment insurance pathway with partial retirement, which explains why they left the labor market much later. Conversely, individuals with a semi-skilled or low-skilled occupation responded to the reform mainly by taking up disability insurance.

4.2 The Effect of Age at Last Employment on Mortality

Table 8 reports the effects of age at last employment on mortality. The IV estimates in Panel 3 indicate that delaying the age at last employment by one year has no impact on the overall mor-

tality rate. It increases the probability of dying for women by 2.7 percentage points while reduces the probability of dying for men by 0.4 percentage points. However, none of the estimates are statistically significant. When we look at occupational heterogeneity, we find a statistically significant effect for people in high-skill occupations. Delaying retirement by one year increases the mortality rate for those in high-skilled occupations by 3.1 percentage points ($\sim$ 25%). The IV estimate is positive and quite large (3.2 percentage points or 25%) for those in semi-skill occupations. However, the estimates are not statistically significant. Finally, later retirement has no impact on mortality for those who worked in low-skill, physically demanding jobs. This result indicates the effect of early retirement on mortality is not universal and mask large heterogeneities among people with different labor market characteristics. The negative impact of age at last employment over mortality for individuals with high-skilled occupations is in line with the argument that early retirement for these individuals is detrimental. Their health deteriorates due to the loss of social networks, isolation, less physical and cognitive activity. On the contrary, the null impact on low-skilled workers can be explained by their higher probability of taking up disability insurance to exit early.

Panel 1 of Table 8 reports the simple OLS estimation where we regress age at last employment over mortality. For all our subgroups, delaying retirement has a negative and significant effect on mortality. This result is probably downward biased by the fact that unhealthier workers tend to retire early. When we compare these OLS results with the IV estimates, we can perceive that the IV strategy does a good job controlling for this negative bias.

Finally, Panel 2 of Table 8 shows the reduced form effect of the reform on mortality. Compared with the IV estimates, the reduced-form reform impact is very similar. Combined with the estimated one-year increase in age at last employment (Table 2), the similar magnitudes of IV estimates and estimated reform impact confirm the validity of the instrument.

5 Conclusion

This paper studies the effect of delaying retirement on mortality. We exploit a reform in 1967 in Spain that changed the access to early retirement for individuals that did not have contributed by then. Individuals who started contributing to the pension system before the 1st of January of 1967 maintained the right to retire early at age 60. Yet, individuals that have not contributed by that date are regulated by the new regime and can only retire at age 61 (involuntary early retirement), 63 (voluntary early retirement), or 65 (statutory retirement age), depending on their year of birth. We use Spanish administrative social security data from 2005 to 2019, which contains information about the date individuals started contributing, the individuals' employment history, the date they claim pension, the type of pension they are receiving, and monthly pension benefit.

If the individuals have deceased during that period, we also observe the exact date of death.

We restrict our sample to people who started contributing 12 months before and after the 1st of January of 1967. We first show the reform effect on several labor supply outcomes using a within-birth month OLS regression controlling for gender, province of the first affiliation, and the individuals' employment history between 30 and 45. We find that individuals who started contributing after 1967 delay labor market exit by around one year. The reform not only modified the early retirement age but also provided new pathways to exit from the labor market. We show that the treated individuals are less likely to transition from employment to regular pension directly and less likely to use unemployment insurance to bridge to a regular pension. In contrast, they are more likely to take up disability insurance and a partial pension after exiting employment. These results indicate that individuals did not embrace the increase of the retirement age and tried to leave the labor market before reaching the statutory eligibility age by using these alternative pathways.

We provide suggestive evidence that, for our sample of individuals, having contributed before or after 1967 is as good as random. First, we show that the treated and control individuals' labor market characteristics in their 30 and 40s do not differ significantly. Additionally, we show that the estimated reform effect disappears when we define the treatment status by using placebo dates at first contribution. Lastly, we perform within-age at first contribution analysis rather than within-birth month analysis. We obtain similar estimates. This result confirms that the different starting age is not a confounding factor in our main specification.

Finally, we estimate the effect of age at last employment on mortality by performing an IV estimation. The instrumental variable analysis shows substantial heterogeneity. Delaying retirement by one year increases the mortality rate for those in high-skilled occupations by 3.1 percentage points ($\sim 25\%$). The IV estimate is positive and large (3.2 percentage points or 25%) for those in semi-skilled. However, they are not statistically significant. Finally, later retirement has no impact on mortality for those who worked in low-skill, physically demanding jobs. Importantly, the IV estimates' magnitude is extremely similar to the reduced form analysis. It provides robust evidence that the treatment status is exogenous and our reduced-form estimates are not biased.

This paper contributes to previous literature that studies the mortality effects of retirement. While most previous studies have focused on reforms that changed the early retirement age for some special occupation groups, in this paper, we focus on a reform that affected all the population. It is an important contribution, as the mortality effects of retirement, as shown in this paper, might depend on the type of occupation the individual held before retirement.

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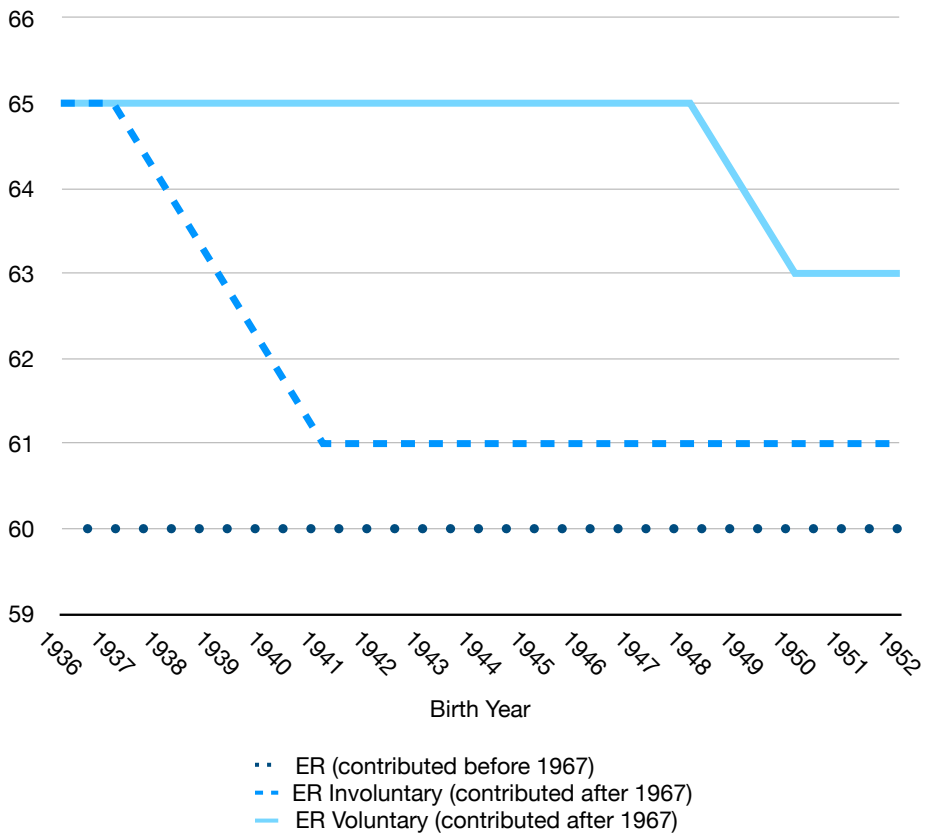
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6 Figures and Tables

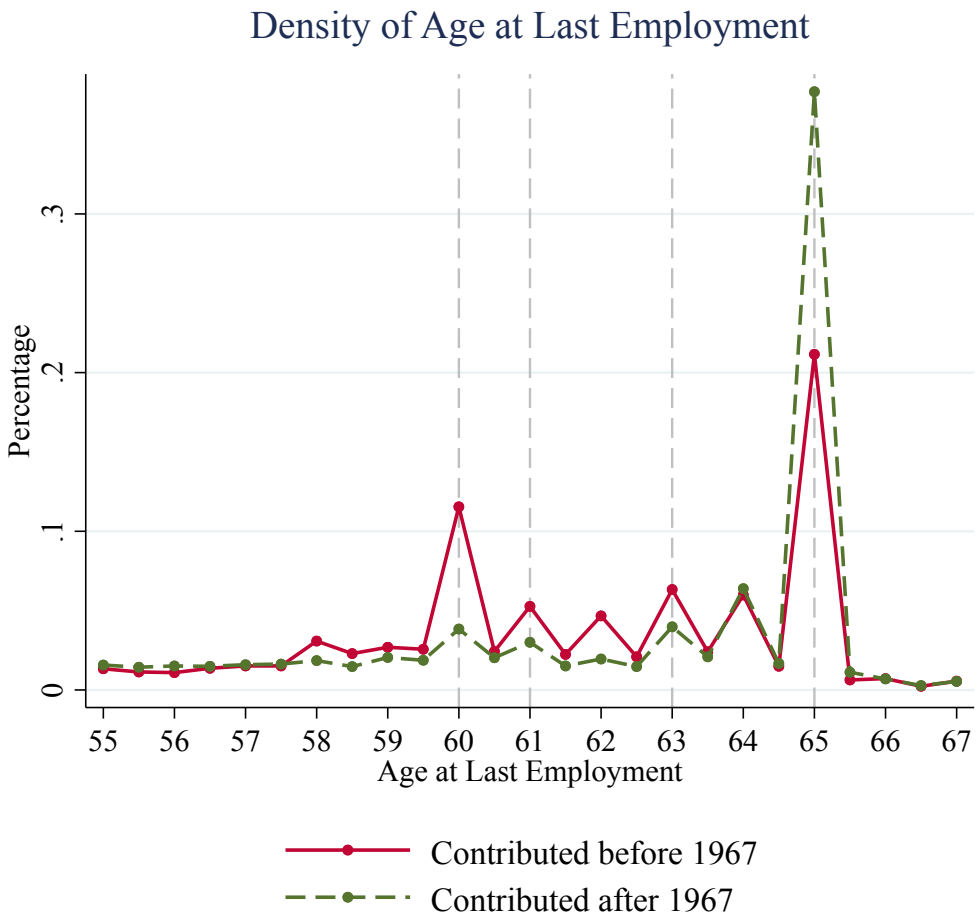
Figure 1: Early Retirement By First Year of Contribution and Cohort



Source: Authors' own construction according to the pension law.

Notes: This figure plots the the earliest possible retirement age for the treated and control individuals as a function of their birth years.The darker line shows the ERA for those start contributing before 1967 remains at age 60. The lighter blue lines show the ERA for those started contributing after 1967 ranges from 61 to 65 depending on their birth cohorts and whether they have experienced involuntary or voluntary unemployment before retirement.

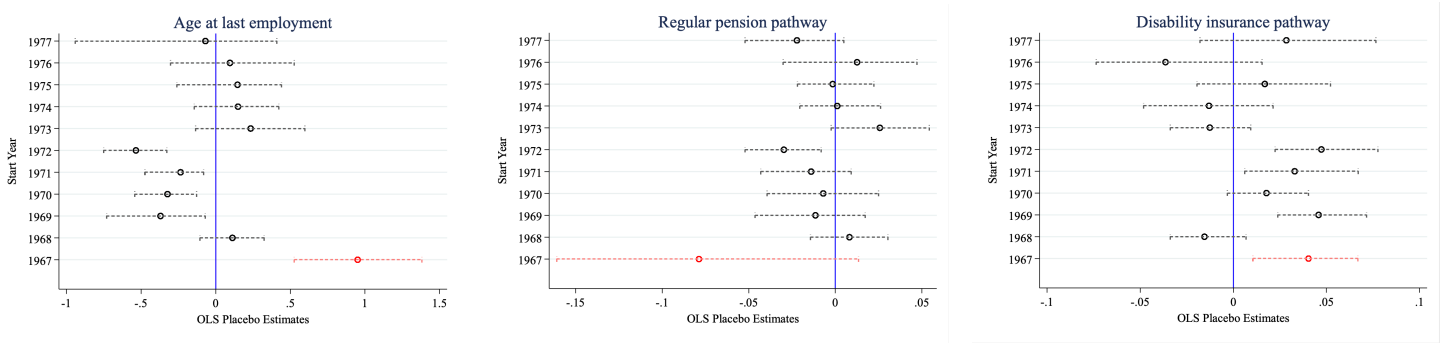
Figure 2: Density of Age at Last Employment By Treatment Status



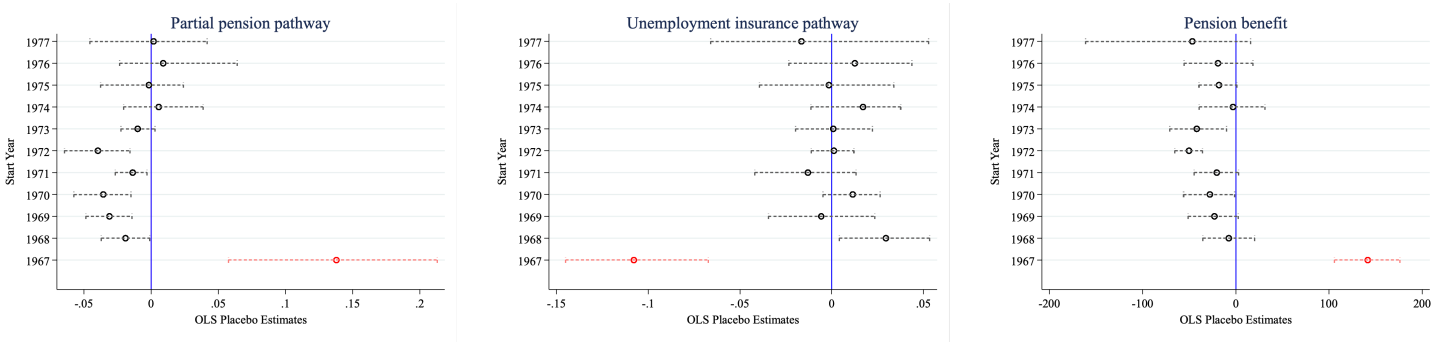
Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This figure plots the density of age at last employment for the treated and control groups. The Red solid lines shows that the age at last employment for those started contributing before 1967 bunches at age 60 and 65, while the green dashed lines shows the density for those started contributing after 1967. We can see that the treated group are mostly likely to exit the labor market at age 65.

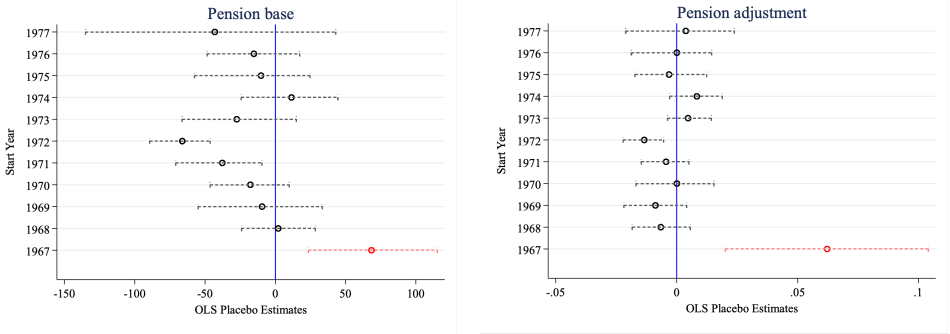
Figure 3: Figure 3: Placebo tests



(a) Age at last employment (b) Pathway: regular pension (c) Pathway: disability pension



(d) Pathway: partial pension (e) Pathway: unemployment Insurance (f) Pension benefits



(g) Pension benefits base (h) Pension adjustment factor

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This figure show the estimates of a list of placebos, estimating regression 1 using the years of y-axis as cutoff. 95 percent confidence intervals are also reported. The red estimate corresponds to the estimation of the regression 1 on the real cutoff: 1967. The outcomes considered are displayed on top of each figure.

Table 1: Descriptive Statistics

	Mean	SD	Min	Max	N
Dependent variables					
Age at last employment	61.067	4.963	21.667	82.333	13921
Exit pathway					
. Regular pension	0.390	0.488	0	1	13945
. Disability insurance	0.116	0.320	0	1	13945
. Partial pension	0.140	0.347	0	1	13945
. Unemployment insurance	0.297	0.457	0	1	13945
. Unemployment and inactivity	0.057	0.232	0	1	13945
Age at claiming any pension	61.710	3.394	10.083	76	13945
Prob (claim regular pension)	0.844	0.363	0	1	13945
Age at claiming a regular pension	63.406	2.162	60	76	11767
Age at claiming disability insurance	57.055	3.741	50	65.583	2413
Pension benefit	1356.610	643.385	0	3961.446	13945
Pension base	1286.855	775.595	0	3003.750	13945
Pension adjustment	0.782	0.247	0	1.440	13945
Mortality	0.173	0.378	0	1	13945
Control variables between the ages of 30 and 45					
Man	0.756	0.429	0	1	13945
Mean montly contribution	1276.770	812.234	0	5251.241	13945
Fraction employed	91.718	20.295	0	100	13945
Fraction unemployed	4.854	10.683	0	100	13945
Fraction selfemployed	4.266	16.174	0	100	13945
Fraction employed in construction	8.700	24.965	0	100	13945
Fraction employed in minery	0.287	4.644	0	100	13945
Maximum occupation between the ages of 30 and 45					
Engineers, graduates and senior managers	0.053	0.223	0	1	13945
Technical engineers, experts and assistants	0.030	0.171	0	1	13945
Administrative and workshop heads	0.079	0.270	0	1	13945
Non-certified assistants	0.060	0.237	0	1	13945
Administrative officers	0.133	0.339	0	1	13945
Subaltern	0.049	0.215	0	1	13945
Administrative assistants	0.038	0.192	0	1	13945
First and second class officers	0.302	0.459	0	1	13945
Third and fourth class officers	0.123	0.329	0	1	13945
Non-qualified	0.079	0.269	0	1	13945

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports summary statistics for outcome and control variables. The sample corresponds to individuals registered in the Social Security system between 2005 and 2019 under the general regime, that are born between 1935 and 1952 and contributed for the first time with the age of 14 to 30 years old. The control variables are measured from the individuals' employment history between the ages of 30 and 40.

Table 2: Impact of the Reform on Age at Last Employment

	Age exit the labor market			
	(1)	(2)	(3)	(4)
Individual contributed after 1967	0.710***	0.781**	1.016***	0.951***
	(0.221)	(0.282)	(0.217)	(0.206)
	[0.008]	[0.012]	[0.000]	[0.000]
Month-Year Birth FE	✓	✓	✓	✓
Controls				✓
Contributed 1965-1968	✓			
Contributed 1966 or 1968		✓		
Contributed 1966-1967			✓	✓
Observations	23,516	13,343	13,921	13,921
R^2	0.055	0.071	0.070	0.121
Mean Dep. Variable (Treated)	0.195	0.999	0.147	0.998
Mean Dep. Variable (Control)	0.095	0.998	0.767	0.998

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on age at last employment for a list of specifications. All specifications control for gender, month-year of birth, and province of first affiliation fixed effects. Column 1 takes the sample of individuals that contributed 24 months before and after the January 1st 1967. Column 2 use the sample of individuals that contributed in 1966 and 1968. It is in analogous as donut-hole approach used in Regression Discontinuity design. Column 3 and 4 use our baseline sample of individuals that contributed 12 months before and after the January 1st 1967. Column 4 controls for additional controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at the birth year level and wild-bootstrap standard errors in brackets.

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

Table 3: Impact of the Reform on Exit Pathways

	Exit of the labor market through				
	Regular pension	Disability insurance	Partial retirement	Unemployment insurance	Unemployment and inactivity
Individual contributed after 1967	-0.079*	0.040**	0.138***	-0.108***	0.008
	(0.039)	(0.013)	(0.034)	(0.018)	(0.007)
	[0.067]	[0.015]	[0.001]	[0.000]	[0.231]
Month-Year Birth FE	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓	✓
Observations	13,945	13,945	13,945	13,945	13,945
R^2	0.105	0.109	0.152	0.079	0.064
Mean Dep. Variable (Treated)	0.339	0.155	0.217	0.223	0.066
Mean Dep. Variable (Control)	0.415	0.097	0.102	0.334	0.052

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on the probability of leaving the labor market through regular pension (Column 1), disability insurance (Column 2), partial retirement (Column 3), unemployment insurance (Column 4), or unemployment insurance and inactivity (Column 5), obtained from the estimation of regression 1. The estimation sample includes individuals that started contributing 12 months before and after January 1st 1967. All specifications control for gender, age at first contribution, and province of first affiliation fixed effects. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at age of first contribution and wild-bootstrap standard errors in brackets.

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

Table 4: Impact of the Reform on Pension Benefit

	Pension benefit	Base pension benefit	Percent of base pension
Individual contributed after 1967	141.578***	68.503***	0.062***
	(16.153)	(21.288)	(0.019)
	[0.000]	[0.005]	[0.010]
Month-Year Birth FE	✓	✓	✓
Controls	✓	✓	✓
Contributed 1966-1967	✓	✓	✓
Observations	13,945	13,945	13,945
R^2	0.417	0.462	0.150
Mean Dep. Variable (Treated)	1430.566	1274.262	0.824
Mean Dep. Variable (Control)	1319.731	1293.134	0.761

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on monthly pension benefit (Column 1), pension base (Column 2) and pension adjustment factor (Column 3), obtained from the estimation of regression 1. The estimation sample includes individuals that started contributing 12 months before and after January 1st 1967. All specifications control for gender, age at first contribution, and province of first affiliation fixed effects. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at age of first contribution and wild-bootstrap standard errors in brackets.

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

Table 5: Robustness Age Start FE

		Exit of the labor market through				
	Age last employment	Regular pension	Disability insurance	Partial retirement	Unemployment insurance	Unemployment and inactivity
Individual contributed after 1967	1.082***	-0.078*	0.026*	0.151***	-0.103***	0.004
	(0.229)	(0.039)	(0.014)	(0.032)	(0.016)	(0.007)
	[0.002]	[0.078]	[0.088]	[0.000]	[0.002]	[0.567]
Age Start Contributing FE	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓	✓	✓
Observations	13,921	13,945	13,945	13,945	13,945	13,945
R^2	0.109	0.094	0.088	0.148	0.066	0.046
Mean Dep. Variable (Treated)	61.613	0.339	0.155	0.217	0.223	0.066
Mean Dep. Variable (Control)	60.795	0.415	0.097	0.102	0.334	0.052

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on age at last employment (Column 1), and the probability of leaving the labor market through regular pension (Column 2), disability insurance (Column 3), partial retirement (Column 4), unemployment insurance (Column 5), or unemployment insurance and inactivity (Column 6) using age at first contribution fixed effects. This robustness check estimates the impact of losing access to early retirement for people start working at the same age. The estimation sample includes individuals that started contributing 12 months before and after January 1st 1967. All specifications control for gender, age at first contribution, and province of first affiliation fixed effects. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at age of first contribution and wild-bootstrap standard errors in brackets.

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

Table 6: Heterogeneity by Gender

		Exit of the labor market through				
	Age last employment	Regular pension	Disability insurance	Partial retirement	Unemployment insurance	Unemployment and inactivity
Men contributed after 1967	0.978***	-0.061	0.034**	0.144***	-0.125***	0.009
	(0.155)	(0.037)	(0.016)	(0.039)	(0.019)	(0.006)
	[0.000]	[0.114]	[0.058]	[0.001]	[0.000]	[0.146]
Women contributed after 1967	0.817	-0.147**	0.068***	0.121***	-0.048	0.006
	(0.568)	(0.052)	(0.012)	(0.023)	(0.028)	(0.019)
	[0.171]	[0.046]	[0.001]	[0.000]	[0.113]	[0.757]
Month-Year Birth FE	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓	✓	✓
Observations	13,921	13,945	13,945	13,945	13,945	13,945
R^2	0.159	0.129	0.139	0.173	0.102	0.093
Mean Dep. Variable Men (Treated)	61.820	0.328	0.162	0.229	0.217	0.064
Mean Dep. Variable Men (Control)	61.133	0.388	0.109	0.116	0.341	0.045
Mean Dep. Variable Women (Treated)	60.794	0.380	0.126	0.171	0.247	0.077
Mean Dep. Variable Women (Control)	59.855	0.490	0.062	0.060	0.316	0.072
P-value difference	0.760	0.007	0.063	0.352	0.014	0.871

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on age at last employment (Column 1), and the probability of leaving the labor market through regular pension (Column 2), disability insurance (Column 3), partial retirement (Column 4), unemployment insurance (Column 5), or unemployment insurance and inactivity (Column 6), obtained from the estimation of regression 1. The estimation sample includes men (Panel 1) or women (Panel 2) that started contributing 12 months before and after January 1st 1967. All specifications control for month-year of birth and province of first affiliation fixed effects. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at the birth year level and wild-bootstrap standard errors in brackets.

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

Table 7: Heterogeneity by Occupation

		Exit of the labor market through				
	Age last employment	Regular pension	Disability insurance	Partial retirement	Unemployment insurance	Unemployment and inactivity
Contributed after 1967* High skilled occ	1.644***	-0.038	-0.009	0.203***	-0.155***	-0.001
	(0.264)	(0.075)	(0.017)	(0.051)	(0.039)	(0.012)
	[0.000]	[0.646]	[0.611]	[0.001]	[0.007]	[0.916]
Contributed after 1967* Semi skilled occ	1.056***	-0.081*	0.039***	0.156***	-0.108***	-0.006
	(0.309)	(0.044)	(0.010)	(0.033)	(0.024)	(0.010)
	[0.001]	[0.105]	[0.003]	[0.000]	[0.001]	[0.556]
Contributed after 1967* Low skilled occ	0.841***	-0.061	0.050***	0.131***	-0.133***	0.014
	(0.205)	(0.036)	(0.016)	(0.036)	(0.023)	(0.009)
	[0.000]	[0.107]	[0.013]	[0.000]	[0.001]	[0.142]
Month-Year Birth FE	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓	✓	✓
Observations	12,738	12,762	12,762	12,762	12,762	12,762
R^2	0.179	0.164	0.122	0.191	0.125	0.111
Mean Dep. Variable High Skilled (Treated)	64.290	0.618	0.065	0.215	0.078	0.024
Mean Dep. Variable High Skilled (Control)	61.056	0.364	0.103	0.151	0.326	0.056
Mean Dep. Variable Semi Skilled (Treated)	62.267	0.409	0.119	0.239	0.199	0.034
Mean Dep. Variable Semi Skilled (Control)	61.006	0.366	0.099	0.142	0.335	0.058
Mean Dep. Variable Low Skilled (Treated)	61.059	0.242	0.161	0.234	0.278	0.085
Mean Dep. Variable Low Skilled (Control)	61.172	0.402	0.087	0.133	0.329	0.048

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on age at last employment (Column 1), and the probability of leaving the labor market through regular pension (Column 2), disability insurance (Column 3), partial retirement (Column 4), unemployment insurance (Column 5), or unemployment insurance and inactivity (Column 6), obtained from the estimation of regression 1. The estimation sample includes individuals that started contributing 12 months before and after January 1st 1967 that held a high-skilled (Panel 1), semi-skilled (Panel 2), or low-skilled (Panel 3) occupation before retirement. All specifications control for gender, month-year of birth, and province of first affiliation fixed effects. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at the birth year level and wild-bootstrap standard errors in brackets.

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

Table 8: IV: Impact of Age at Last Employment on Mortality

	Probability of dying					
	All	Men	Women	High-skilled occ	Semi-skilled occ	Low-skilled occ
OLS:						
Age at last employment	-0.007***	-0.010***	-0.003**	-0.011***	-0.008***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)
	[0.000]	[0.000]	[0.004]	[0.007]	[0.000]	[0.000]
Reduced form:						
Individual contributed after 1967	0.001	-0.003	0.009	-0.026*	0.027*	-0.002
	(0.011)	(0.010)	(0.016)	(0.020)	(0.014)	(0.012)
	[0.905]	[0.817]	[0.617]	[0.097]	[0.096]	[0.863]
IV:						
Age at last employment	0.005	-0.001	0.027	-0.031***	0.032	0.001
	(0.014)	(0.012)	(0.051)	(0.012)	(0.025)	(0.016)
	[0.746]	[0.938]	[0.421]	[0.013]	[0.185]	[0.934]
Month-Year Birth FE	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓	✓	✓
Observations	13,921	10,534	3,387	960	4,789	6,989
Mean Dep. Variable (Treated)	0.196	0.220	0.099	0.107	0.177	0.212
Mean Dep. Variable (Control)	0.162	0.192	0.076	0 .122	0.125	0 .187
First-stage F-stat	17.341	33.188	0.764	25.658	8.668	16.240

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of age at last employment on the probability of dying between 2005 and 2019. The first panel reports the OLS results, the second panel shows the reduced form effect using regression 1, and the IV estimates, obtained from the estimation of regression 2, are reported in the third panel. The estimation sample includes all individuals that started contributing 12 months before and after January 1st 1967 (Column 1), only men (Column 2), only women (Column 3), or those whose last occupation was high-skilled (Column 4), semi-skilled (Column 5) or low-skilled (Column 6). All specifications control for month-year of birth, province of first affiliation fixed effects, and pension benefit. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at the birth year level and wild-bootstrap standard errors in brackets.

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

7 Appendix

Table A.1: Covariates

	Predetermined covariates between the ages of 30 and 45 (fraction of time)							
	Employed	Unemployed	Self-employed	Construction	Minery	Low-skilled occupation	High-skilled occupation	Av. monthly contribution
Individual contributed after 1967	1.929***	-0.302	-0.201	-0.518	-0.058	0.000	0.014	32.450
	(0.442)	(0.291)	(0.282)	(0.712)	(0.084)	(0.012)	(0.010)	(19.209)
	[0.001]	[0.317]	[0.508]	[0.464]	[0.487]	[0.993]	[0.199]	[0.119]
Month-Year Birth FE	✓	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓	✓	✓	✓	✓
Observations	13,945	13,945	13,945	13,945	13,945	13,945	13,945	13,945
R^2	0.088	0.039	0.025	0.058	0.028	0.060	0.044	0.205
Mean Dep. Variable (Treated)	93.298	4.655	4.207	9.326	0.299	0.618	0.161	1255.964
Mean Dep. Variable (Control)	90.931	4.953	4.296	8.388	0.280	0.587	0.162	1287.145

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on a list of predetermined variables: fraction of time spent in employment (Column 1), fraction of time spend unemployed (Column 2), fraction of time self-employed (Column 3), fraction of time employed in the construction sector (Column 4), fraction of time employed in the mining sector (Column 5), fraction of time employed in a high-skilled occupation (Column 6), fraction of time employed in a high-skilled occupation (Column 7), and average monthly contribution (Column 8), obtained from the estimation of regression 1. The estimation sample includes individuals that started contributing 12 months before and after January 1st 1967. All specifications control for month-year of birth, gender, and province of first affiliation fixed effects. All standard error are clustered at the birth year level and wild-bootstrap standard errors in brackets.

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

Table 2: Other Outcomes

	Age any pension	Regular pension	Age regular pension	Age disability
Individual contributed after 1967	0.104	-0.062***	1.322***	0.227
	(0.200)	(0.017)	(0.123)	(0.194)
	[0.593]	[0.005]	[0.000]	[0.311]
Month-Year Birth FE	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Contributed 1966-1967	✓	✓	✓	✓
Observations	13,945	13,945	11,767	2,413
R^2	0.101	0.161	0.141	0.128
Mean Dep. Variable (Treated)	61.749	0.784	64.353	57.230
Mean Dep. Variable (Control)	61.691	0.873	62.981	56.910

Source: MCVL 2005-2019, cohorts 1935-1952.

Notes: This table reports the impact of the reform on age at claiming any pension (Column 1), probability of claiming regular pension (Column 2), age at claiming regular pension (Column 3), and age at claiming disability pension (Column 4), obtained from the estimation of regression 1. The estimation sample includes individuals that started contributing 12 months before and after January 1st 1967. All specifications control for gender, month-year of birth, and province of first affiliation fixed effects. Each regression also includes the following controls measured when the individuals was between 30 and 45 years old: average monthly contribution, fraction of time employed, fraction of time unemployed , fraction of time in self-employment, fraction of time employed in the construction sector, fraction of time employed in the mining sector and highest occupation fixed effects. All standard error are clustered at the birth year level and wild-bootstrap standard errors in brackets.

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