

## Retirement Age: One size does not fit all

Idade da Reforma: *One size does not fit all*

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### ABSTRACT

The European population is aging and, by 2050, Portugal will face a most alarming scenario, with an old-age dependency ratio — i.e. the number of individuals aged 65 or older as a share of the active age population — above 65%, almost double the figure for 2016. Portugal has already undertaken measures to improve the financial resilience of the pension system, but still lacks a better understanding of its social sustainability. We resort to the Survey of Health, Aging and Retirement in Europe (SHARE) to study individual heterogeneity on pension preferences and find that poor health and unemployment are, together with age and the length of the contributory career, key elements to understand early retirement, while late retirement is associated with higher income. Identifying socioeconomic groups with incentives to deviate from the statutory retirement age is crucial to policy makers currently debating the retirement age in Portugal.

**Keywords:** Retirement age, Aging, Pensions, SHARE.

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**RESUMO**

A população europeia está a envelhecer e, até 2050, Portugal enfrentará um cenário preocupante, com um índice de dependência de idosos — i.e. o número de pessoas com idade igual ou superior a 65 anos em percentagem da população em idade ativa — acima dos 65%, quase duplicando o valor de 2016.

Portugal já tomou medidas para melhorar a solidez financeira do sistema de pensões, mas ainda carece de uma melhor compreensão da sua sustentabilidade social. Recorremos ao Inquérito sobre Saúde, Envelhecimento e Reforma na Europa (SHARE) para estudar a heterogeneidade individual sobre as preferências da população no que concerne à idade da reforma. O estudo permitiu verificar que os problemas de saúde aliados ao desemprego, idade e duração da carreira contributiva, são elementos-chave para compreender a reforma antecipada, enquanto as carreiras profissionais com remunerações mais elevadas estão associadas ao adiamento das reformas. A identificação de grupos socioeconómicos com incentivos para se manterem ativos para além da idade legal da reforma é crucial para os decisores políticos que atualmente debatem a idade da reforma em Portugal.

**Palavras-chave:** Idade da reforma, Envelhecimento, Pensões, SHARE.

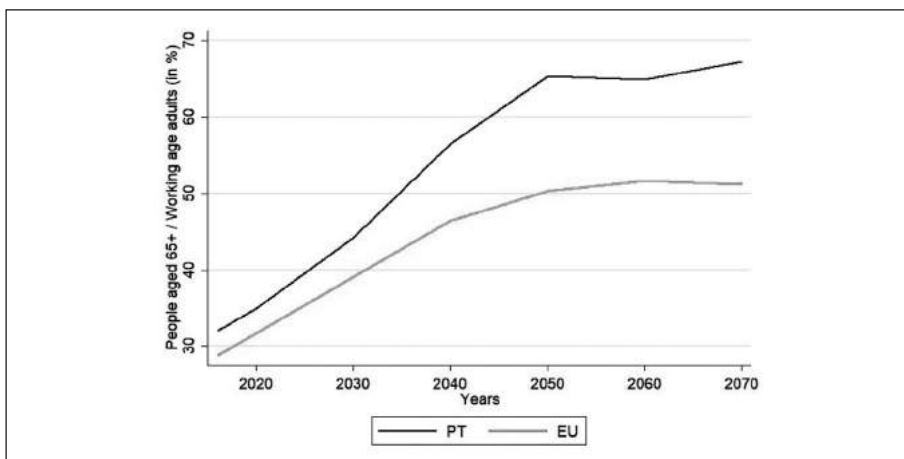
**1. Introduction: Addressing the challenge of aging**

The European population is aging. Portugal is expected to experience one of the most severe aging processes, resulting from a combination of life expectancy increases and the lowest fertility rate amongst the 27 European Union (EU) countries and the United Kingdom. In this context, the old-age dependency ratio — i.e. the number of people aged 65 years old or more for every 100 working age adults — is forecast to increase from its current level of 35% to more than 60% in 2050. As depicted in Figure 1, the gap vis-à-vis the EU average will increase markedly, reaching more than 10 percentage points (pp) in the last decades of the forecast horizon.

The aging process has profound consequences for the economic and social fabric of a country. As discussed by the European Commission (2018), its economic and fiscal implications go beyond the impact on pensions, such as health care or long-term care.

Pension spending is, however, the most significant of these. In the context of Pay-as-you-go (PAYG) pensions, where current workers finance the pensions of the current elderly, there are financial sustainability issues, since contributions may be insufficient to pay for benefits (see Willmore, L., 2004).

Measures to address the financial challenges risk endangering the adequacy of pensions to maintain a certain level of income in old-age. But even more fundamental than the financing challenge, there is, as Barr et al. (2001) puts it, the challenge of production: who will produce the goods and services that everyone consumes?



**FIGURE 1.** Old-age dependency ratio

Source: Author's own computation based on the European Commission (2018)'s estimates.

In past decades, countries have introduced important reforms to their pension systems, to contain the pressures of an ever-older population. In Portugal, two major reforms were introduced. Decree Law 35/2002 significantly reduced the generosity of the benefits paid, which are now based on lifetime average earnings and not on the best 10 of the last 15 years of contributions<sup>[1]</sup>. The second major reform promulgated by Decree-Law 167-E/2013 introduced the automatic indexation of the retirement age to life expectancy<sup>[2]</sup>. Due to this reform, the legal retirement age (LRA) increased from 65 to 66 years and 4 months in 2018, although long contributory careers (more than 40 years) benefit from a 4-month reduction per year after the 40th year.

These reforms were important steps to increase the financial sustainability of the system. As estimated by the European Commission (2018), the increase in the old-age dependency ratio will be counterbalanced by both the decrease in the coverage ratio (i.e. the number of pensioners per person aged 65 or more) and the decrease in the benefit ratio (i.e. the average pension relative to the average wage). This means that people will retire later and receive lower benefits. It is therefore important to understand whether the adequacy of pensions is not endangered,

1. Workers joining the system after 2002 are fully covered by these new rules. For those with more than 40 years of contributions, the best 40 years are considered.

2. Initially, the reform entailed a sustainability factor that decreased the value of the pension. Currently, the factor applies only to early and disability retirement.

both in terms of benefit level and in terms of age of take-up. In this project, we focus on the latter — the age at which people decide to retire.

As discussed by the OECD (2017), the automatic increase in the LRA does not compensate the effect of aging (figure 2). The legal retirement age will increase by two years up to 2050, but it would have to increase by close to 10 years to maintain the current old-age dependency ratio at the same level. Besides, the OECD (2017) predicts that the increase in the LRA will not to be matched by an increase in the effective retirement age, which will stagnate below 67 years of age while the statutory retirement age will continue to increase (figure 3). If there are no significant productivity gains to compensate for the reduction in the relative number of the working-age population<sup>3</sup>, and given the already large expected reduction in pension generosity<sup>4</sup>, the age of retirement will be a key element to address the challenges of population aging.

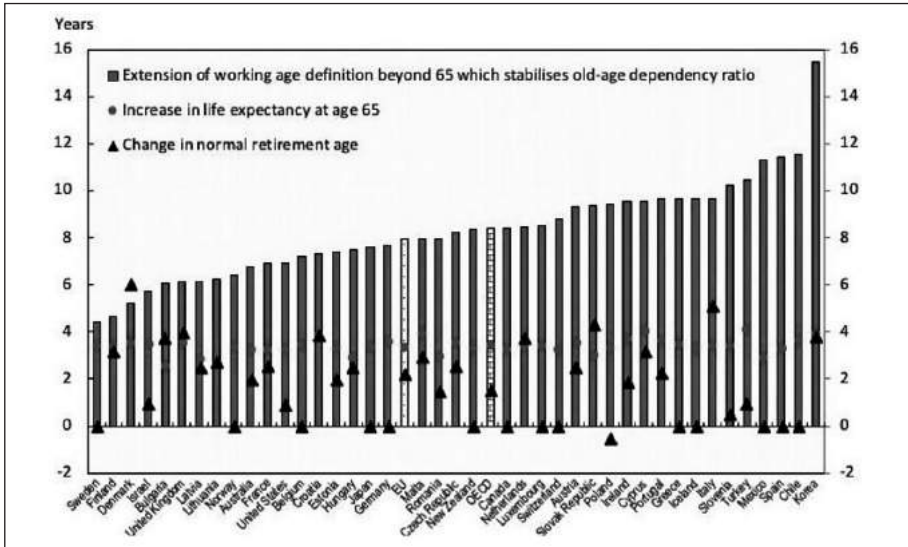
Active aging — where older workers remain in the labour market, in similar or in other functions, in full-time or in part-time — is frequently discussed as a possible option. Indeed, life expectancy increases have generally occurred in good health. However, there are important differences across socio-economic groups. Life expectancy is highly dependent on one's gender, education and income. Figure 4 shows that, according to the OECD (2017), a highly educated male is expected to live on average five more years than a low-educated male (three years more for females). In the same vein, there is a difference of more than 20 pp between high-income and low-income individuals reporting to be in good health (figure 5), indicating that the capacity to work also varies according to one's income (the same results hold for education differentials).

Departing from this heterogeneity across individuals in their ability to remain in the labour force, this study explores a micro-level database covering adults with 50 years or more, allowing for a better understanding of the forces shaping individuals' decision of when to retire. These results are informative for policy makers seeking public policy solutions to the aging challenge, particularly on how to ensure a stability of the system from both a financial and social perspective. We find that age, physical health, length of the contributory career and current employment status are the main factors impacting the expected retirement age for individuals that plan to do so before or at the LRA. Disentangling the effects of the covariates on these individuals from those that expect to postpone retirement, we

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3. In the past decades, productivity growth in Portugal — like in other OECD countries — has been decelerating, which hints that it may be difficult to rely on productivity increases.

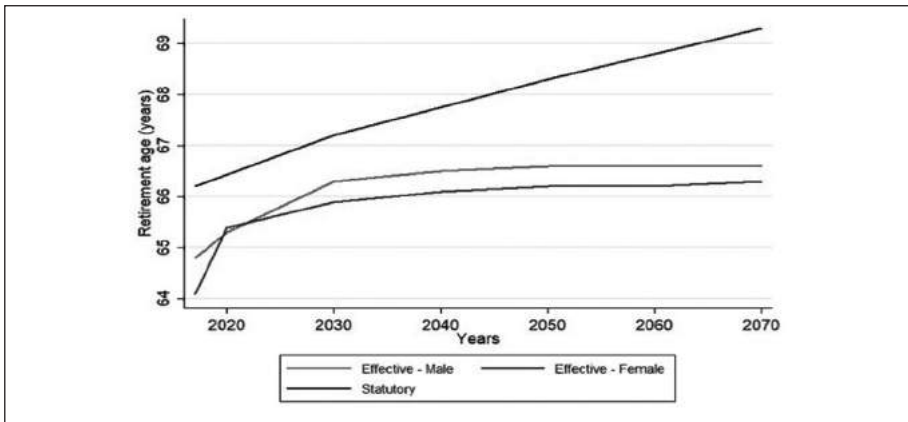
4. In line with the European Commission (2018), the gross replacement rate, i.e. the relation between the first pension and the last wage, is forecast to decrease by 12 pp between 2016 and 2050, from 68% to 56%.



**FIGURE 2.** Working life extension that ensures the current old-age dependency ratio by 2050

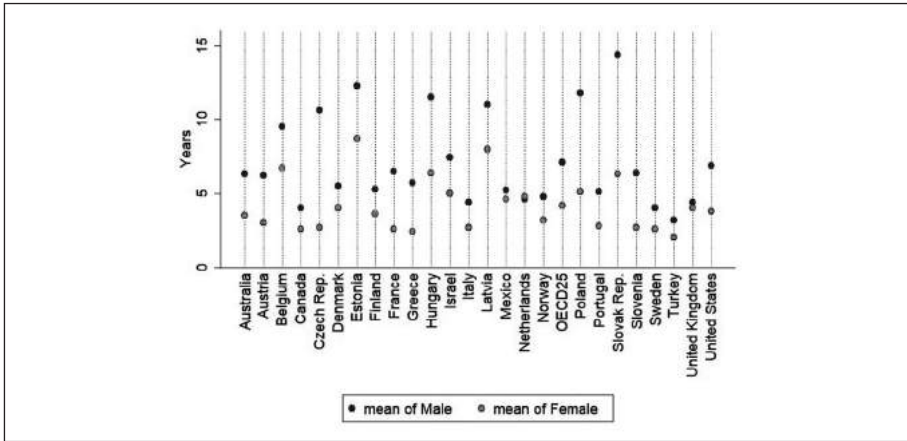
Source: VOX, CEPR Policy Portal (computations of Hervé Boulhol, Christian Geppert).

Note: The graph also compares changes in the LRA and life expectancy at 65.



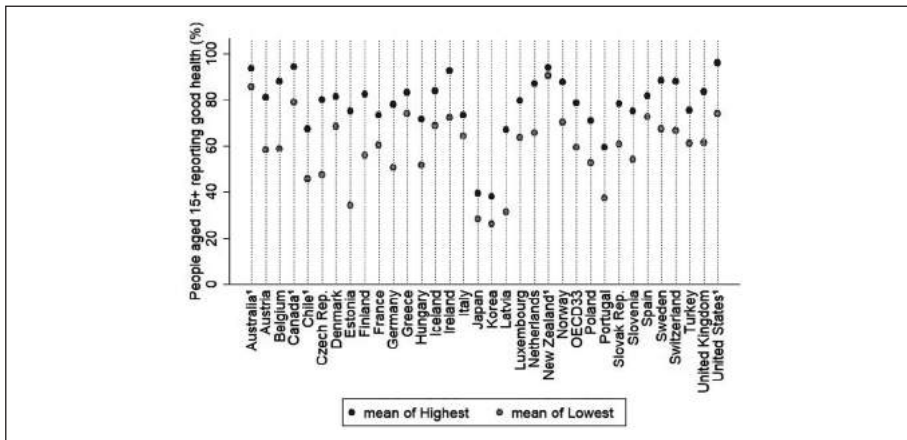
**FIGURE 3.** Projections on the statutory and effective retirement rates until 2070

Source: Author's own computation based on European Commission data.



**FIGURE 4.** Differences in life expectancy at 30, depending on education level (2015)

Source: Author's computation based on data from *Health at a Glance 2017: OECD indicators*. Note: We compare individuals with tertiary education with those with less than upper secondary education (by gender).



**FIGURE 5.** Self-reported health condition, depending on income level (2015)

Source: Author's computation based on data from *Health at a Glance 2017: OECD Indicators*.

find that being highly depressed, having a higher income and being satisfied with the job further increase the age at which individuals expect to retire.

The study is structured as follows: section 2 provides a brief overview of the history of the Portuguese pension system and revises the literature on the determinants of the retirement age (expected and effective) per category and section

3 presents the data set used to conduct the empirical study as well as a statistical overview of the variables retrieved from the sample. Consecutively, we present the empirical model used to model the determinants of different preferences regarding the planned retirement age in section 4. Section 5 is dedicated to the results of the previous analysis and robustness checks, succeeded by a discussion and conclusions in section 6.

## **2. Literature review**

In this section, we first provide a brief overview of the history of the Portuguese pension system. It is crucial to understand the way the system has evolved and the incentives it entails for individuals to remain in the workforce until or after the LRA.

### **2.1 Evolution of the Portuguese pension system**

#### **The retirement age in Portugal**

In 1886, individuals working in the manufacturing industry at 60 years of age or above became entitled to a pension. More than 40 years later, the system widened its personal and material applications, protecting employees of the trade, industrial and services sectors against sickness, disability, aging and death. From the 70's onward, the coverage of the system has been constantly changing (mostly expanding), reflecting the augmentation of workers' social rights and the fluctuations in economic cycles. In 1987, the LRA rose to 65 for men and 62 for women, as a result of a shorter career trend for women. Later in 1993, the LRA was standardized across genders to 65 with a transitory period of 6 years. Hence the adjustment only came into force in 1999. As of 2014, the LRA is indexed to the sustainability factor and is adjusted each year by  $2/3$  of the life expectancy gains. In 2018, it was 66 years and 4 months and is expected to grow close to one year every two decades, reaching 69 years and 4 months in 2070 (European Commission, 2018). However, the actual retirement age of new pensioners has always been inferior to the statutory age of the corresponding year. In 2001 and 2017, the mean effective retirement age was about 64 years old, having fluctuated slightly during that interim period. (Pordata, 2018).

#### **Early retirement**

In 1991, workers with at least 55 years of age and 30 years of contributions became entitled to early retirement benefits. As the scheme encompassed a large proportion of the active population, it was suspended between 2005-2007 and again in 2012-2014 due to financial distress. After 2007, a Sustainability Factor (SF) reduc-

ing the pension benefit was applied to old-age pensions, with a monthly penalty of 0.5% on early-retirement benefits. For each contributory year above the 40th year of contributory career, the penalty reduces by 4 months (OECD, 2017).

Following the second suspension period, the scheme suffered many modifications (back and forth) but the predominant one changed the SF formula by making it more severe — although only applicable to early-retirement pensioners — and narrowed the criteria for access to early retirement, requiring individuals to be at least 60 years of age and having 40 years of contributions to the system. In contrast, as of 2014 (set to 66), the LRA is indexed to life expectancy gains, enlarging the spectrum of individuals covered by the option of early retirement (in detriment of retirement at the LRA). For long contributory careers<sup>5</sup>, no penalties are applied (OECD, 2017).

Early retirement is also accessible to the long-term involuntary unemployed if they are: 1) at least 62 years old, became unemployed at the age of 57 or more and had at least 15 years of contributions or 2) at least 57 years old, became unemployed at the age of 52 or more, had at least 22 years of contributions and have exhausted the unemployment subsidy (a monthly penalty applies).

Together with Ireland and the UK, Portugal displays one of the lowest early-retirement pensions of the EU for individuals retiring 2 years before the LRA. If these same beneficiaries waited for the LRA to retire, their pension could increase at least 10 pp (European Commission, 2018). Nonetheless, with regards to pension and labour income combination, Portugal has relatively loose rules compared to its European peers. Individuals collecting early-retirement benefits are only restricted from receiving work-related income if it is paid by their former employer.

### Late retirement

The system features an option rewarding individuals to keep on working beyond the LRA until they are 70 years old. A monthly rate set according to the length of the individual's contributory career is multiplied by the number of months worked beyond the LRA. The pension amount will increase by this factor, with a maximum ceiling of 92% of the best reference earnings used to calculate the pension. According to the OECD (2017), the rewarding scheme on late retirement makes Portugal one of the five OECD countries with the highest financial incentives for working after the LRA. Also, the non-existence of barriers to accumulating pensions with paid work after the LRA, makes Portugal one of the countries with the largest incentives to postpone retirement.

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5. Since October 2018, long contributory careers concern individuals who are at least 62 years old and have more than 46 years of contributions to SS.



## 2.2 Previous studies on the retirement age

Resorting to the empirical literature on the topic, this section presents the existing results on the key variables impacting expected and effective retirement ages. The first is in general considered a good proxy of the second (e.g. Henkens & Tazelaar, 1997 on Dutch civil servants and Harkonmäki et al., 2009 for Finland), although they may not always coincide<sup>6</sup>.

Several demographic factors seem to impact individuals' retirement age though. For instance, gender is often discussed in retirement age models as the direction and significance of its effect varies across studies. While some find no impact (for example, Disney et al., 2006), others, such as Hank and Korbmacher (2013), argue that gender effects are actually significant once interacted with income, age and parenthood (for instance, male fathers staying longer in the labour market). Larsen and Pedersen (2017) focused on the probability of late retirement for older individuals and report heterogeneous effects of gender. For example, while Swedish low-educated women have a lower probability of retiring after the LRA, being Danish has the opposite effect. This is likely the result of cultural preferences rather than national incentive schemes.

When restricting to a younger Norwegian cluster, Dahl et al. (2003) show that male early retirement takes place, on average, earlier than female retirement. Still on early retirement, Alavinia and Burdorf (2008) find that it is negatively linked to individuals having a partner, which may be a consequence of matching employment behaviour with one's partner, if the latter works.

Demographic characteristics are only a small piece of a larger puzzle. Education seems to be another dimension playing a role in retirement age decisions. According to Alavinia & Burdorf (2008), early retirement is positively linked to lower levels of education. Blöndal & Scarpetta (1997) find that lower-educated individuals are more prone to respond to financial incentives for early retirement. De Preter et al. (2013) and Larsen & Pedersen (2017) find a positive impact of high education levels on late retirement, although with some exceptions in the latter, which might reflect higher financial needs faced by less educated individuals, having the obligation to remain at work.

Health often impacts retirement age decisions. Poor general health is frequently found to be a key factor decreasing actual (Dwyer & Hu, 2000 and Karpansalo et al., 2004) and planned (Mein et al., 2000 and Roberts et al., 2009) retirement ages. Bound et al. (1999) stress the relevance of timing and direction of

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6. Solem et al. (2016) and Carr et al. (2016) find mismatches between the two which may be the result of low education levels, potentially associated with competencies less valued in later stages of the career; poor health conditions, forcing individuals to exit the labour market earlier; and financial constraints, obliging the workers to remain in the labour force.

health condition variations, suggesting that declines tend to push individuals out of the labour force but the sooner they occur, the lower impact they have. Cai & Kalb (2006) and Alavinia & Burdorf (2008) observed individuals under 65 and found that self-reported poor health conditions are positively impacting early retirement. For Danish, German and Swedish individuals over 65 years old, Larsen and Pedersen (2017) found good health conditions to be positively associated with labour force participation after the LRA.

Kerkhofs et al. (1999) found the health status' effect on Dutch retirement decisions significant yet of volatile magnitude depending on the measure used, over-predicting its impact with self-reported health status measures. On the contrary, Dwyer & Mitchell (1999) and Blau & Gilleskie (2001) argue that the variation in the estimated coefficients is not significant in the US.

Studies that distinguish physical and mental health find both measures to be relevant determinants per se. Wahrendorf et al. (2012) focus on 11 European countries and estimate a positive linkage between lower retirement age and poor mental health conditions and high levels of stress, which according to Karpansalo et al. (2005) is increasingly impacting the number of disability pension recipients. Jokela et al. (2010) empirically corroborate such a relation with both poor physical and mental health conditions, which can be expected these conditions are the criteria for the attribution of such pensions.

Regarding the impact of income on retirement, the results of Mein et al. (2000) point to a positive association between high-labour-income earners and early retirement, possibly resulting from higher financial security and capacity to meet financial commitments with a reduced pension. The results of the empirical study conducted by Moreira et al. (2018) are in the same direction as these, although they discuss the possibility of non-linear effects, since individuals with household income on the 2nd quintile also display a higher propensity to plan an early retirement in some specifications of their model. This may be the result of low early-retirement pensions (which still grant more financial security than those of the 1st quintile) combined with the appealing scheme discussed in section 1.2.1, which allows their accumulation with additional labour income.

In this same study, Moreira et al. (2018) analyse the Portuguese case using the SHARE and find that the higher the replacement rate, the more prone respondents are to plan and early retirement. Inversely, their study suggests that the higher the expectation that the government will raise the LRA, the lower the probability of expecting to retire early. An expected rise of the LRA unmatched by a rise of the planned retirement age would most likely imply higher cuts on early-retirement pensions, hence individuals forecast this loss and delay their withdrawal from the labour market.

For 11 European countries, De Preter et al. (2012) look at sectorial differences and their results suggest that industrial workers prefer to retire at lower ages, on average, which is linked to the sector's increased propensity for poor health conditions (Blöndal and Scarpetta, 1997).

Job satisfaction is also empirically measured by different indicators throughout the literature, such as job demand and workplace social support (De Jonge et al., 2001) or recognition, job control and pay levels (Mansell et al., 2006). High levels are positively associated with the intended age of retirement, since individuals deriving higher satisfaction from work prefer staying longer in the job market (Mein et al., 2000, Blekesaune & Solem, 2005 and Siegrist et al., 2007). Poor job conditions positively impact retirement anticipation, and the effect is intensified once interacted with poor health conditions, as stressed by Moreira et al. (2018).

Cai (2010) cautions that health and job satisfaction may be highly correlated, since bad health may result from bad working conditions or lead to a lower working capacity, triggering early retirements. Mein et al. (2000) and Siegrist et al. (2007) find empirical evidence on the association of the two variables but independence of their effects on the dependent one. The latter argue that the variables display an association via factors that impact them both, such as depressive symptoms, but that there is no direct influence of one on the other, and hence no room for a correctly specified statistically significant joint effect on the expected retirement age.

Retirement incentives hinge critically on the features of the pension system and the incentives it embeds. Therefore, cross-country studies need to be complemented with national level analyses that can better inform on the impact of individual characteristics in particular national settings.

Regarding the UK, Mein et al. (2000) emphasize the significant impact of financial variables in early retirement decisions but note that the country's pension system is particularly less generous than most industrialized countries, which implies that the results cannot be generalized to other countries ~since the incentives for early (and late) retirement are country specific. Larsen & Pedersen (2017) focus on individuals with or over 65 years of age and study the late retirement determinants for Denmark, Germany and Sweden, identifying education, health and gender as the main drivers of employment in this stage of the individuals' life. However, the magnitude and shape of the effect varies deeply across countries (e.g., U-shaped effects of education interacted with gender for Germany and Denmark, but not for Sweden).

### 3. Data

#### 3.1 Dataset

The empirical analysis is performed using the Survey of Health, Aging and Retirement in Europe (SHARE) that comprises micro-data on health, socio-economic status and social and family networks of more than 120,000 individuals aged 50 or older from 27 European countries and Israel. Where possible, individuals are kept in the sample from one wave to the other, allowing for a panel structure. We use the easySHARE database, a simplified version of the main SHARE dataset (see Gruber et al., 2014 and Börsch-Supan et al., 2018 for methodological details), to which we have added several additional variables<sup>7</sup>.

Given our goal of assessing the determinants of retirement age for the specific setting of Portugal, we focus on waves 4 and 6, the only two waves that include data on Portugal. The first wave collected data from respondents in 2011 and the second in 2015. While a cross-country analysis may provide useful insights, the focus on a single country allows us to capture important national specificities that go beyond those captured by country fixed effects.

Our main model focuses on wave 6, using, in some specifications, lags of the explanatory variables or their change from one period to the other. We depart from a total of 1,676 individuals interviewed in wave 6, of which 1,505 are also part of wave 4. Of these, we target all those who are not yet retired, which represent around 34% of the sample.

#### 3.2 Variables and descriptive statistics

In this section, we provide an overview of the variables used in this paper. For additional details on the variables, please refer to Figure 6.

Our key dependent variable is the expected retirement age (ERA). In SHARE, respondents are asked which type of pensions they will be entitled to in the future among the following: public old-age, public early retirement/pre-retirement, public sickness/invalidity/incapacity, private (occupational) old-age or private early retirement. Subsequently, individuals report the age at which they expect to start collecting each type of pension (if entitled to)<sup>8</sup>. Since future disability pension recipients are substantially different from the other individuals (e.g., health condition), they are excluded from the analysis. We focus on those entitled to old-age

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7. The age at which individuals expect to collect one or more pensions, per pension; a measure of financial risk aversion; the replacement rate; the number of years of contributions; the expectation of the government raising the retirement age; and the sector of activity.

8. Apart from one observation, regardless of the number of pensions planned to be collected in the future (10 respondents are entitled to more than one pension), the respondents' reported age is unique (for that observation, the lowest value provided was the one assumed to be true).

pensions. Observations on retired individuals expecting to collect more funds in the future were also excluded.

Our final sample comprises 379 individuals (312 in the model with lagged variables), with 43% planning on taking an early retirement (on average, three years before the LRA) and 14% a late retirement (on average, two years after the LRA). The overall planned retirement age of the sample is close to 65 years of age (one year before the LRA).

For our set of regressors, and drawing from the literature, we focus on six main groups of variables, namely demographic characteristics, education and cognitive abilities, health condition, income indicators, pension features and job-related aspects. For some variables, the effects are likely non-linear and therefore categorical variables (dummy or not) are created by natural clusters or by visual inspection of the variables' distribution (residence location, education, cognitive capabilities, health (overall, chronic illnesses, limitations and depression indicators), household income and respective variations, expectations regarding the LRA and job satisfaction).

Table 1 presents the descriptive statistics for all variables, broken down by three main groups according to the reported expected age of retirement: before LRA, at LRA or after LRA. The section proceeds referring to statistically significant differences among those groups.

The average age of the respondents in our sample is close to 59 years of age and increases with the expected retirement age groups (i.e., before, at and after LRA), which may hint at a dynamic adjustment of the planned age of retirement, as individuals get older and therefore closer to their initial plans. More than half of the sample (61%) is female, with a significantly higher representativeness in the group that plans to retire at the LRA compared to the other two. In the sample, 87% of the individuals live with their partner and 29% dwell in a rural area or village<sup>9</sup>.

Close to 40% of the respondents have, at most, 4 years of schooling, 34% have between 5 and 8 years and 27% studied 9 years or more. The percentage of individuals who have studied between 4 and 9 years is significantly higher for early retirement seekers, reaching almost 40%, compensated by less highly educated respondents.

Based on the joint result of the cognitive capabilities tests (an equally weighted average of the numeracy, memory and orientation tests' scores, ranging from 0 to 15), we visually inspected the distribution of the variable and split respondents

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9. Individuals reported if their home was situated in a "big city", "the suburbs or outskirts of a big city", a "large town", a "big town" or a "rural area or village". Given the sample size, with the help of a visual inspection exercise, we transformed the original categorical variable into a dummy variable and tested if there is a significant impact of living in a "rural area or village" in the ERA.

into three groups: those with a score above 12 (at percentile 90 that is the score registered, so it falls slightly below that percentile), those with a score of up to 7 (grade associated to percentile 10, hence including individuals marginally above that percentile) and all others (reference group). Those planning on an early retirement have a significantly higher share of low scoring individuals and a corresponding lower share of high performing ones.

Using a self-assessed measure on physical health with five levels, ranging from poor to excellent, we constructed a variable that distinguishes the individuals who identify themselves as being in one of the two bottom levels, which we define as poor health individuals. 54% of the respondents report to be in poor health. From the 312 individuals who self-reported on their health status also in 2011, 22% claim to have suffered a deterioration in their health between waves.

Objective measures of health are also considered. One out of ten respondents face physical limitations, captured by a dummy that distinguishes individuals who have physical constraints when performing some basic physical activities. Sixty-four percent of the sample suffers from at least one chronic disease but this weight is significantly lower for the cohort planning on a late retirement vis-à-vis the at LRA group, which is an expected result since individuals free of (chronic) diseases are in better conditions to postpone retirement.

Regarding mental health, 11% of the respondents show high levels of depression. We classify as very depressed all those who report a level such as the one observed for percentile 90 (or above), corresponding to the last six levels of a twelve-layer scale, the EURO-D.

Household income is split into three groups: the reference group (category 0) for those with incomes between the percentiles 25 and 75; the poor (category 1), those below or at percentile 25; and the rich (category 2), those above or at percentile 75. Those planning to retire before and after the LRA do not show significant income differences when compared to those in the at LRA group.

In terms of income variation, we separate individuals into those who saw their income increase by 10% or more than the others. Until percentile 74, income only drops or increases by 1%, a fluctuation considered negligible. Above, changes start to display a higher magnitude and we draw a limit at 10%, creating a dummy variable for which 13% of the sample reports such an increase between waves. With regards to financial risk aversion, 12% are very risk averse, “not willing to take any financial risks”.

The average length of the contributory career is 32 years, with the group intending to retire early having the highest average length, more than 34. Around 6% of the respondents contribute to at least one private (occupational) pension scheme.

In terms of future prospects, the first wave in Portugal includes a question on expectations.

Forty-three percent of the respondents think that the government will raise the LRA. Those reporting that they want to retire at the current LRA are more confident that the government will not change the rules, which may indicate that people who have such strong convictions either adjust their behaviour expectations by projecting an earlier retirement to avoid future reforms or a late retirement to match the expected modifications.

The replacement rate, i.e., the ratio between the first pension and the last wage, is only available in the first wave, with reference to 2011 data, and is only reported by 58 respondents. This may hint that many respondents are not informed about their future pension entitlement, hence we use this as a proxy for whether individuals are informed or not about their future pension-related income. Bearing in mind the fragility of this indicator, 15% of respondents are classified as informed on their future pension entitlements.

Concerning the current employment status, 70% of the sample is employed, 18% unemployed and 12% are homemakers. For those looking for an early retirement, the weight of the unemployed is significantly higher while homemakers are over-represented in the group expecting to retire at the LRA. In 2011, more than three-fourths of the respondents work in the tertiary sector, 8% have a job in the primary sector and 14% in the secondary sector.

Respondents were asked to evaluate their job satisfaction on a four-level scale. Based on the answers to this question we constructed two indicators. The first distinguishes individuals who “strongly agree” to be satisfied with their job from the other three less satisfied levels. We find 11% of very satisfied respondents. The second level identifies 4% of the sampled individuals experiencing a decline in the job satisfaction self-reported level between waves.

Although just under one-fifth of the sample works in the public sector, when focusing on individuals predicting a late retirement, their weight rises to 32%, possibly due to the higher prevalence of highly qualified jobs in this sector, potentially more suitable for older workers.

TABLE 1. Descriptive statistics

VARIABLE	Total		Before LRA		At LRA		After LRA		
	OBS	% / MEAN	OBS	TO / MEAN	OBS	% / MEAN	OBS	TO / MEAN	
Age of expected retirement	379	65	163	63***	162	66	54	68***	
<b>Demography</b>									
Age	379	59	163	58**	162	59	54	60**	
Female	379	61%	163	56%**	162	68%	54	54%*	
Partner in the Household	379	87%	163	87%	162	87%	54	85%	
Rural	360	29%	157	26%	152	34%	51	24%	
<b>Education</b>									
Education (years)									
	[0;4] - ref	372	39%	162	38%	158	42%	52	35%
	]4;9]	372	34%	162	40%**	158	29%	52	31%
	]9;24]	372	27%	162	22%	158	29%	52	34%
Cognitive capabilities (score)									
	[0;7]	379	13%	163	17%*	162	11%	54	9%
	]7;12] - ref	379	74%	163	73%	162	72%	54	76%
	]13;15]	379	13%	163	10%*	162	17%	54	15%
<b>Health</b>									
Poor health		379	54%	163	53%	162	56%	54	50%
Health got worse		312	22%	137	24%	132	18%	43	26%
Chronically ill		379	64%	163	66%	162	69%	54	48***
Physical limitations		379	11%	163	11%	162	11%	54	11%
Very depressed		379	11%	163	12%	162	11%	54	6%
<b>Income</b>									
Household income									
	[p0;p25]	379	25%	163	23%	162	25%	54	30%
	]p25;p75[ - ref	379	50%	163	55%	162	47%	54	44%
	]p75;p100]	379	25%	163	22%	162	28%a	54	26%
Significant income variation		307	13%	133	14%	131	15%r	43	7%
<b>Pensions</b>									
Years of contributions		367	32	158	34***	157	30	52	32
Private		379	6%	163	8%	162	4%	54	2%
Expects government to raise LRA (lag)		219	43%	98	49%**	89	34%	32	50%*
Information on pensions (lag)		379	15%	163	13%	162	17%	54	15%
<b>Job</b>									
Current situation									
	Employed	289	70%	163	67%	162	70%	54	82%
	Unemployed	289	18%	163	27%***	162	11%	54	11%
	Homemaker	289	12%	163	6%***	162	19%	54	7%**
Sector of activity (lag)									
	Primary	289	8%	129	10%	118	8%	42	2%
	Secondary	289	14%	129	15%	118	13%	42	17%
	Tertiary	289	78%	129	75%	118	79%	42	81%
Very satisfied		379	11%	163	10%	162	11%	54	13%
Decline satisfaction		139	10%	57	12%	59	12%	23	0%
Public sector		379	18%	163	14%	162	19%	54	32%**

Note: Statistically significant difference in the percentage (average) observed for the before (or after) LRA vis-à-vis at LRA group with 1% (\*\*\*) , 5% (\*\* ) or 10% (\*) confidence. All values represent the share of individuals in the sample (or sub-samples) that display a certain characteristic, except for *age of expected retirement, age, and years of contribution*, for which we find average number of years. Source: author's own computation using micro data from SHARE.



## 4. Empirical strategy

### 4.1 The age of retirement

We want to test which individual characteristics have an impact on the decision regarding at which age an individual plans to retire. Our model is as follows:

$$ERA_i = \beta_0 + \sum_{(n=1)}^N \beta_n X_i + \varepsilon_i \quad (1)$$

where denotes the expected retirement age of individual  $i$  and  $X$  stands for the explanatory variables as presented in Table 2. After performing the White test and finding evidence of heteroskedasticity in the sample, we resorted to robust standard errors via the so-called sandwich estimator proposed by White (1980), which corrects for this misspecification.

Furthermore, as discussed in Section 2, the drivers of the retirement age may be different depending on whether the individual wants to take early retirement or , on the contrary, postpone retirement beyond the legal retirement age. For example, being one year older may be associated with an increase in the reported ERA for those who seek to retire before (or at) the LRA but has no such impact on the group planning on a late retirement.

We re-estimated our model, interacting the covariates with a dummy that equals 1 for those seeking a late retirement and 0 otherwise, capturing group-specific effects of a single variable. This model allows us to test the hypothesis that drivers of the retirement age vary between those who expect to retire before the LRA and those who plan to retire after it. Equation 2 allows to understand the intensive margin and is specified as follows:

$$ERA_i = \beta_0 + \sum_n \beta_n X_i + \sum_k \beta_k POST_i + \sum_j \beta_j X_j * POST_i + \varepsilon_i \quad (2)$$

where is equal to 1 if the respondent reported an beyond the and 0 otherwise.

It looks at individuals postponing retirement, and how late they will retire. Or equivalently, by how much they will postpone retirement. It still analyses all other individuals.

Following the same approach, we re-estimated the model using a dummy equivalent to 1 if the person seeks to retire early. As the construction is close to the symmetric of the first, we will not be scrutinizing the results obtained.

## 5. Results

### 5.1 Understanding the retirement age

The first three columns of Table 2 display the results of different specifications of equation 1, with the dependent variable being the age at which one predicts to retire. Coefficients are measured in years. Models (1) and (2) are based on 341 observations and differ only in the way health is measured (self-assessed in the first; observed in the second). Model (3) additionally controls for lagged or first differenced explanatory variables based on the previous wave. This allows for time dynamic effects at the cost of less observations (199 observations).

Living in rural areas does not seem to impact the expected retirement age. The more obvious connection between location area and expected retirement age would be due to higher prevalence of lower income families in these areas, which we control for with household income.

Turning to education and skills, and contrasting with Alavinia & Burdorf, 2008 and Solem et al., 2016, whose results point to a positive relation between early retirement and low education levels, we find no relation between education and retirement age nor with cognitive abilities. It may be that potential differences are captured by the employment status and income levels, as the first study does not account for these variables and the second only does so for income (in our literature research, we did not come across any study controlling for the current employment status). Focusing on health variables, we find individuals with physical health problems expecting to retire 0.9 to 1.4 years earlier than those in good health conditions, an effect that is in line with the vast literature on the subject (e.g., Roberts et al., 2009). Intuitively, we understand that being in poor physical health makes working less desirable from both demand and supply sides, as a low-health individual has less capability to work. To address a concern raised by several authors regarding the potential bias in the impact of different health measures — in particular self-assessment vs. observed health status — model 2 provides an alternative to the self-reported physical health measure used in model 1. According to Achdut et al. (2015), using more objective measures, e.g., being chronically ill and experiencing limitations in daily activities, does not lead to significantly different results. Also, we compared individuals who see their health condition deteriorate between the two waves (model 3) but find no impact on one's forecasted retirement age.

Concerning mental health, highly depressed respondents are expected to retire at least 1 year before individuals in better mental health conditions, a result in line with Wahrendorf et al. (2012). In our assessment, we show its relevance and while the sign of the coefficient is an expected (and consistent) result, there could

**TABLE 2.** Different specifications of the model

DEPENDENT VARIABLE: AGE OF EXPECTED RETIREMENT						
		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	
					EARLY	POST
<b>Demography</b>						
Age		0.22***	0.24***	0.26***	0.20***	0.05
Female		0.33	0.25	0.11	0.51	-0.26
Partner in the household		0.20	0.22	-0.79*	0.33	0.21
Rural		0.29	0.27	0.64	0.45	0.27
<b>Education and skills</b>						
Education						
	]4;9]	-0.24	-0.17	-0.12	-0.40	-0.23
	]9;24]	-0.38	-0.11	-0.57	-0.66	0.11
Cognitive capabilities						
	[0;7]	0.01	0.31	-0.07	-0.02	-0.52*
	]13;15]	0.27	0.32	-0.10	0.68	-0.80*
<b>Health status</b>						
Poor health		-0.88***		-1.13**	-1.11***	0.06
Health became worse				0.16		
Chronically ill			-0.75***			
Physical limitations			-0.21			
Very depressed		-1.04*	-1.28**	-1.87**	-0.97	1.11**
<b>Income</b>						
Household income						
	Poor	0.29	0.19	-0.08	0.17	0.04
	Rich	0.39	0.27	0.35	0.41	1.20***
Significant income variation				0.8		
<b>Pension-related</b>						
Years of contributions		-0.06***	-0.05***	-0.05**	-0.05***	-0.02
Private		-0.30	-0.39	-1.03	-0.10	0.48*
Expects government raises retirement age				-0.26		
Information scenario on pensions				0.02		
<b>Job-related</b>						
Current job situation						
	Unemployed	-1.77***	-1.72***	-2.34***	-1.83***	-0.06
	Homemaker	-0.95**	-0.9**	-0.3	-0.7	-0.24
Sector						
	Secondary			0.18		
	Tertiary			-0.43		
Very satisfied		0.35	0.29	0.22	0.38	0.92*
Public sector		0.22	0.34	0.32	-0.18	0.33
Constant		53.87***	52.94***	53.32***	54.76***	64.67***
Observations		341	341	199	341	
R-squared		25%	24%	30%	39%	

Note: The effects of the covariates on the ERA are statistically significant with 1% (\*\*\*) , 5% (\*\*) or 10% (\*) confidence. Source: author's own computation using micro data from SHARE.

be uncertainty in the magnitude of the effect (which depending on the specification, can vary by almost 1 year).

Income variables — both the level and the change from previous periods — are found not to be significant. This could result from an interaction of substitution and income effects, which are possibly cancelling out (e.g., a poorer household would need to continue working to keep a certain income stream, but the cost of leisure is low — the foregone wages v. retirement benefit differential — which may induce retirement). In a study including Portugal, Moreira et al. (2018) found non-linear significant effects as opposed to our study, which could already be indicative of forces pushing in opposite directions in one's ERA.

For robustness check purposes, education (years), cognitive abilities (test score) and household income are controlled for in the base model in a categorical form to allow for non-linear effects. We also test them in a continuous setting (or the entire score interval, in the cognitive test's case), but no statistically significant effects are found.

Concerning pension related variables, only the length of the contributory career impacts retirement plans, with longer careers reducing the planned retirement age, an expected result as this is a key element of pension entitlements. A respondent with a standard deviation above the average contributory career (respectively 41.2 and 30.6 years) will plan to retire close to half a year before those with an average contributory career's length. Because the minimum pension value changes according to the number of years of contributions (at 15, 20 and 30, more precisely), we substituted the length of the contributory career in the base model to check if the variable has non-linear effects. The results indicate that contributors with 15 to 20 years of contributions or more than 30 years expect to retire 1.8 years earlier than the others. Also, the length of the contributory career is expected to grow with age<sup>10</sup>, hence we included an interaction term between age and years of contribution in the model. The effect of one additional year of age on the expected retirement age is no longer significant but the joint test on years of contribution still indicates that this impacts the dependent variable. This result corroborates that age's significant effect in the base model is due to its interaction with the contributory career's length.

Private pension entitlements do not impact retirement plans. We also tested whether expectations of the government raising the retirement age impact retirement plans, a result found in Moreira et al. (2018). The authors use a cross-country sample, arguing for a small yet significant negative effect because people want to

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10. The average length of contributory careers of individuals interviewed in both waves is 29.7 in 2011 and 32.6 in 2015, corroborating this linkage.

retire before to avoid the application of new reforms. We found a negative yet not significant effect, which may be due to the reduced size of our sample. The replacement rate is certainly a key factor for retirement plans but as it is only answered by one-fourth of the respondents, we can only use this to build an information measure with regard to the future pension-related income, but we find no association with the dependent variable.

Regarding job-related regressors, we find the current employment situation to be one of the major determinants of the ERA, with unemployed individuals retiring at least 1.8 years before the employed and homemakers 0.9 years (in model 3, the unemployed retire 2.3 years before on average but being a homemaker has no statistically significant effect). Unemployed individuals anticipating retirement is in line with the expected as the pension system allows for long-duration unemployed to start collecting full-benefits earlier (see section 1.2.1). For homemakers, no such incentive exists so we suspect they expect to retire almost 1 year before the LRA due to increased financial needs as they grow older, making pension collection more urgent<sup>11</sup>, but this should be better explored in further research. In opposition to the findings of De Preter et al. (2012) on a negative association between working in the industrial sector and retirement age predictions, we find no sectorial differences.

Concerning job satisfaction, we find a positive yet not significant effect, but it may be that our measure is a crude one. Siegrist et al. (2007) follow a different approach, whereby satisfaction on the job is measured by a balance between efforts and rewards. We would like to test such an alternative measure of job satisfaction but the necessary variables for the ratio's computation have significantly less observations than the measure we use. Moreover, we include a variable accounting for declines in job satisfaction.

It would seem these are negatively linked to the ERA but, once included, we lose more than 200 observations and the coefficients on different employment status due to collinearity, and ultimately the variable is not linked to the expected retirement age. Likewise, belonging to the public sector does not impact the dependent variable. This is reasonable as we are controlling for the variables via which this condition could more obviously impact the dependent one, e.g., income or job satisfaction.

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11. Currently being a homemaker does not invalidate these individuals' years of past contributions, which is why they are entitled to pensions in the future.

## 5.2 Heterogeneous effects

As in Section 4, there may be important differences between the factors relevant for early and late retirement, which can be captured by model 4 that follows equation 2. For ease of exposition, we rearranged the coefficients and display directly the early and late retirement coefficients.

We find that age, physical health, length of contributory career and being unemployed are only relevant for those seeking to retire before the LRA. For individuals expecting to retire late, the ERA is negatively affected by both poor and good cognitive capabilities. The first can reflect low expectations on low-skilled job demand in older ages, and the second may be mirroring a preference for self-employment or leisure activities of older highly skilled workers. Inversely, it is positively impacted by high depression levels, private pension entitlements, higher job satisfaction (an effect widely observed in the literature, e.g. Davies et al., 2017) and relatively rich household incomes. The latter may actually be linked to less physically demanding jobs and a higher opportunity cost of retiring (that could be better analysed in possession of the respondents' future replacement rates).

## 6. Conclusions and way forward

Portugal is aging at a higher rate than its European peers. The old-age dependency ratio — i.e., the number of individuals aged 65+ compared to working age population — will increase from the current 32% to 67% by 2070. As put forward by the European Commission (2018) in its flagship publication *The Aging Report 2018*, the aging of the Portuguese population puts the fiscal sustainability of the pension system at stake, unless the envisaged reduction of pension benefits and increase in the legal retirement age are strictly maintained. The latter is the focus of our study. Given the important socio-economic differences in life expectancy and health in older ages, we explore the determinants of retirement age preferences in Portugal<sup>[12]</sup>. Understanding these differences is critical for policy makers to ensure the right incentives for late retirement while allowing those that cannot continue to work to leave the labour market at an earlier date. Our study could not be timelier, as the retirement age has been at the heart of the public policy debate<sup>[13]</sup>. The government has put forward the notion of a personal statutory retirement age — in the current proposal, based on length of the contributory career and age — acknowledging the fact that no individual path is the same.

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12. We focus solely on Portuguese data, as previous studies — e.g. Dal Bianco et al., 2015 — show that there are important differences across countries, beyond those captured by country fixed effects.

13. During the month of December 2018 alone, there were, according to Google data, more than 100 related news stories in Portuguese newspapers.

We find physical health and job market status, in particular, being unemployed or a homemaker, to be key determinants of the retirement age, reducing the planned retirement age. An unemployed person in poor health is likely to plan to retire 2 to 4 years before a healthy worker. As could be expected, these effects are only relevant for early retirement seekers, having no impact for those planning on retiring later. This means that policies aimed at increasing the effective retirement age, thereby reducing early retirement, need to be broadly based, namely by ensuring a more inclusive health system that mitigates health differences across individuals and by promoting labour market participation, for instance via effective active labour market policies as discussed by Boone, J., & van Ours, J. C. (2009). Nonetheless, the pension system needs to be flexible enough so that individuals in poor health are allowed to retire with adequate pension benefits. The incentives embedded directly in the pension system are also relevant for early retirement, as younger individuals with longer contributory careers opt to retire earlier.

The effect of mental health deserves further attention, as we show that depressed individuals tend to move away from the LRA, either by retiring earlier or by postponing retirement. This may be linked to different underlying reasons for the mental health condition, in some cases aggravated by the work environment (and thus calling for early retirement) and in other cases attenuated by it (and therefore warranting late retirement). Given the specificities of mental health conditions, a more detailed assessment should be done to understand the underlying causes and the possible policy answers.

Interestingly, income is not related to early retirement (apart from its impact on physical health) but it does impact late retirement. Richer individuals want to retire on average more than 1 year later than less wealthy counterparts. This may be linked to the generous late retirement incentives in Portugal, which can increase pension benefits by 92%, and therefore increase the opportunity cost of not postponing retirement for the richer household group. However, in a context of decreasing marginal utility of income, for those households, the value of each additional euro is lower. In that case, richer individuals may prefer to retire later because they have better, less physically demanding and more rewarding jobs (factors not well captured by our other covariates), meaning they would opt for late retirement irrespective of pecuniary incentives, challenging the effectiveness of the current late retirement incentive scheme.

While these results bring some light on the factors (positively or negatively) associated with the retirement age in Portugal, they do not allow to infer causal relations. As more data for Portugal is collected in the SHARE, the above analysis can be further developed, possibly relying on alternative, more robust identification strategies. It would also allow for a better understanding of dynamic effects —

e.g., changes in income or in health status — that, despite equally important, turn out to be not significant in our analysis based on a limited number of observations. Additional waves are also crucial to follow individuals across time. This would allow, for instance, for a deeper understanding of individual preference changes, a better comprehension of the effects of policy changes or to assess the link between planned and effective retirement age.

Finally, to fully understand retirement incentives, it is also important to duly capture cultural attitudes towards work in old age. The low old-age participation rates observed in Portugal (vis-à-vis those in other OECD countries — OECD, 2017) may also be linked to negative perceptions on active aging, both by younger employees and by employers. According to Eurobarometer data<sup>[14]</sup>, 82% of the respondents believe that older workers are not perceived positively by employers and more than 50% think that people should be forced to retire once they reach the legal retirement age. Hence, it is of great importance that further research focuses on labour demand factors, as employers play an active role in pushing (or pulling) individuals out of (into) the labour market, and on the role of social perceptions, in particular the relation between youth employment and labour market participation of older workers. Only an encompassing view of the determinants of the retirement age can lead to resilient public policy solutions.

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14. Eurobarometer 378 on Active Aging published by the European Commission in January 2012.



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## APPENDIX

**TABLE 1.** Description of the variables used in the main models

	VARIABLE	DESCRIPTION
<b>DEPENDENT (OR RELATED)</b>		
	Age of expected retirement	Age at which the respondent expects to collect either a private or public old-age or early retirement pension
	Early expected retirement	Dummy variable that equals one if individuals expect to collect a private or public retirement pension before the LRA in the corresponding year and zero otherwise
	Posterior expected retirement	Dummy variable that equals one if individuals expect to collect a private or public retirement pension after the LRA in the corresponding year and zero otherwise
<b>INDEPENDENT</b>		
<b>Generic</b>	Female	Female respondent
	Age	Age the respondent will complete by the end of the year (youngest individuals considered are 46 years old in 2011 or 50 years old in 2015)
	Education	Number of years of education completed by the respondent into three categories: 0 = [0,4], 1 = [5,9], 2 = [10,+∞[
	Rural	Dummy variable that equals one if the respondent lives in a village or rural area and zero if he/she reported living in an area different than these two
	Partner in the household	Dummy variable that equals one if the respondent lives with the partner in the household and zero otherwise
<b>Health-related</b>	Poor health	Dummy variable that equals one if the respondent self-reported his/her health status as fair or poor and zero otherwise
	Became in poor health	Resorting to Poor health, this dummy variable is set to one if the respondent did not have poor health in 2011 but had it in 2015, and zero otherwise
	Cognitive capabilities	Sum of the score of the respondent's results in a memory, orientation and numeracy tests categorised into two groups: 1 = [0,7], 2 = [8,15] (and 0 for those that did not take the tests)
	Very depressed	Dummy variable that equals one if the respondent's score in the EURO-D depression scale is between 9 and 12 and zero otherwise

**TABLE 1.** (cont.)

	<b>VARIABLE</b>	<b>DESCRIPTION</b>
<b>Income-related</b>	Household income percentile	The respondent's household income is categorised into three groups, per wave, with the first being individuals in the bottom 25% of household income and the second in the top 75% (the reference group is composed by the in between household incomes)
	Significant income variation	Categorical variable that takes the value one if the respondent's income was in the bottom 25% in the first wave and moved to the top 75% in the second wave and two if the inverse transition occurred (and zero otherwise)
	Risk averse	Dummy variable that equals one if the respondent reported the highest level of aversion regarding financial risks and zero otherwise
	Expected replacement rate	The percentage of the last salary the respondent expects to receive as a pension
	Years of contributions	Number of years the respondent has contributed to a private or public old-age or early retirement pension scheme
	Private scheme	Dummy variable that equals one if the respondent contributes for a private old-age or early retirement scheme and zero otherwise
	Expectation on government raising LRA	Dummy variable that equals one if the respondent expects his/her government to rise the LRA with 90% confidence or more and zero otherwise
<b>Job-related</b>	Current job situation	Categorical variable that differentiates the employment status of the respondent between employed, unemployed or homemaker
	Public sector	Dummy variable that equals one if the respondent is a civil servant and zero otherwise
	Very satisfied	Dummy variable that equals one if the respondent strongly affirms to be satisfied with his/her job and zero otherwise
	Decline satisfaction	Dummy variable that equals one if the respondent's level of satisfaction with his/her job falls from 2011 to 2015 and zero otherwise
	Sector	Respondent's kind of professional business, industry or services recoded in the three sectors of activity

