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On the Political Feasibility of Increasing the Legal Retirement Age

Abstract

Within a politico-economic model we first establish three hypotheses: (i) Retirees generally prefer a higher retirement age than workers, whereby just retired individuals prefer the highest retirement age, (ii) in equilibrium the level of the legal retirement age is increasing in longevity and (iii) decreasing in the public pension replacement rate. We then test these hypotheses empirically. Employing micro data for Germany we corroborate the first hypothesis with descriptive regressions and a fuzzy regression discontinuity (FRD) design. We show that just retired individuals are indeed most in favor of an increase in the legal retirement age. On the basis of cross country panel IV regressions we provide evidence for the second and third hypothesis. We demonstrate that a one percentage point increase in the share of the elderly increases the legal retirement age by 0.3 to 0.5 years, and that a 10 percentage point increase in the replacement rate reduces the legal retirement age by 0.5 to 3 years. We conclude that if policy contains the generosity of public pensions, increasing the legal retirement age becomes politically more feasible.

JEL-Codes: D720, H550, J260.

Keywords: retirement age, pension reform, longevity, replacement rate.

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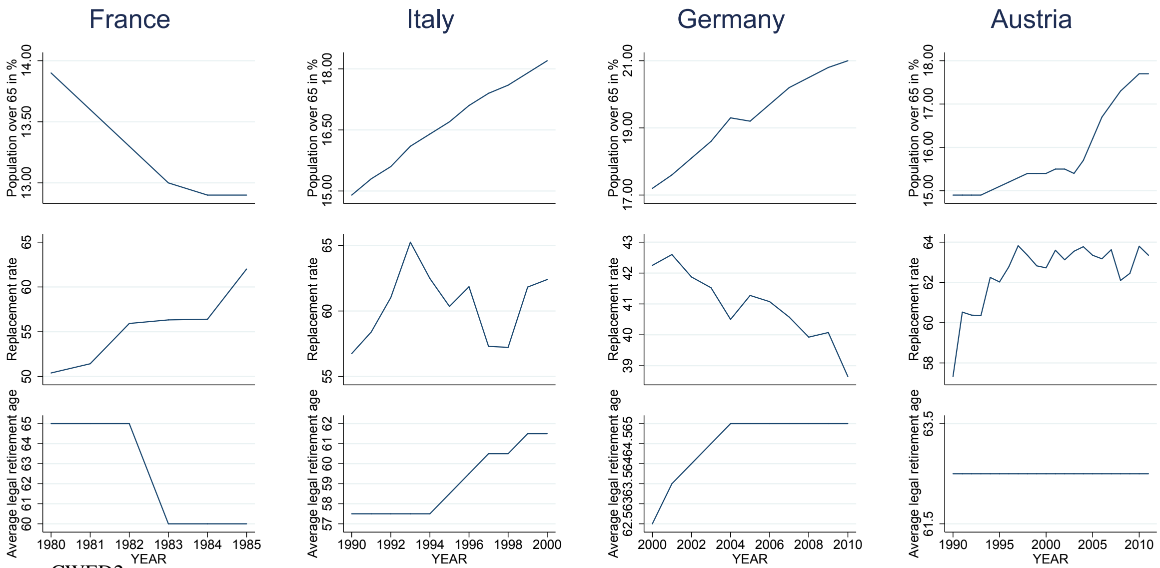
1 Introduction

Virtually all modern societies devote a substantial part of public funds to old age security. From 1990 to 2013, expenditure for public pensions rose from 5.8% to 8.2% of GDP on average in the OECD countries, accounting for 18% of government spending (OECD 2017). This trend, which can be expected to continue as the share of the elderly will increase further, challenges the sustainability of public pension financing and requires changes in public pension systems. However, pension reform is a delicate issue as the share of pensioners among the electorate is large and the median age of voters is increasing as well. Consequently, policy makers are often hesitant in reforming the pension system and carefully ponder advantages and disadvantages of potential pension policy measures. As pension cuts are unpopular and public debt is already high in most countries, an increase in the legal retirement age may be seen as a viable policy option to contain pension spending. In the present paper we study what aspects contribute to the political feasibility of an increase in the legal retirement age. Our analysis points to a systematic relationship between the aging process, the generosity of a public pension system and the readiness of society to increase the legal retirement age. In fact, we identify two opposing trends. While the aging process as such leads to more political support for an increase in the legal retirement age, the generosity of a pension system, measured by the replacement rate, undermines such support.

Recent German pension policies offer a typical example. In the face of population aging the government implemented various factors in the public pension system between 2001 and 2004 in order to limit the increase in pension benefits. Then, in 2007 the federal government decided to increase the legal retirement age gradually up to 67 years. These reforms led to severe political opposition by labor unions and other interest groups. As a response, the government in 2009 introduced a public pension benefit guarantee ensuring that pensions cannot be nominally lowered anymore. Then, in 2014 the government reduced the legal retirement age by two years for individuals with a long contribution history.

Such opposing effects of population aging and the replacement rate on the legal retirement age are not peculiar to Germany, but can be found in other countries as well. Figure 1 depicts the trends of population aging and the replacement rate for France, Italy, Germany and Austria and the evolution of the legal retirement age. In the face of a rejuvenating population, France went through a pension reform in the 1980s increasing the replacement rate and lowering the legal retirement age. A reverse pattern obtained in Italy during the 1990s, with an aging population, a reduction in the replacement rate and an increase in the legal retirement age. A similar pattern as in Italy arose in Germany during the 2000s. These three examples suggest that opposing trends in population aging and the replacement rate systematically affect the legal retirement age. The example of Austria, in contrast, suggests that if both population aging and the replacement rate move in the same direction, the legal retirement age stays constant. It thus seems likely, that the political feasibility of an increase in the legal retirement age is positively associated with population aging, but presupposes that the generosity of the pension system is sufficiently contained.

Figure 1: Share of the elderly, replacement rate, and legal retirement age in France, Italy, Germany and Austria



Source: CWED2

Note: Replacement rates are an average of standard and social pension benefit replacement rates for single and a couple. Legal retirement age is the average between female and male legal retirement age.

The present paper elaborates this supposition. We first consider a simple politico-economic model in which the legal retirement age is determined by majority voting. Within this model we characterize the preferences of the working and the retired population for legal retirement and identify the effects of increasing longevity and pension generosity on the legal retirement age. We show that retirees generally prefer a higher retirement age than workers, whereby those retirees who have just retired prefer the highest retirement age. Furthermore, we show that in the politico-economic equilibrium the legal retirement age is increasing in longevity and decreasing in the replacement rate. Subsequently, we test these three hypotheses empirically. We first consider a micro data approach for Germany and then a comparative cross country analysis. The empirical analysis corroborates the predictions of the theoretical model. In general, retirees are significantly more likely to opt for an increase in the legal retirement age than workers. In particular, support for increasing the retirement age is the highest for those individuals who have just retired.

On a cross country level we then demonstrate that a one percentage point increase in the share of the elderly increases the legal retirement age by 0.3 to 0.5 years. Given that the share of the elderly in our sample of 20 countries rose from 12.5% in 1980 to 16.6% in 2010, population aging over these three decades is associated with an increase in the legal retirement age by 1.2 to 2 years. However, the positive effect of population aging on the legal retirement age is offset by the degree of generosity embodied in the pension system. We show that a 10 percentage point increase in the replacement rate reduces the legal retirement age by 0.5 to 3 years. This effect is substantial given that major retirement reforms often involve changes in the replacement rate in the order of 10 percentage points (see Figure 1).

In the remaining four sections we elaborate the proposition that longevity as such makes an increase in the legal retirement age politically more feasible, whereas this effect is thwarted if pension generosity is increased simultaneously. Section 2 discusses some related literature. Section 3 establishes a simple theoretical mechanism that supports our main proposition. Section 4 provides the empirical analysis. Finally, Section 5 concludes.

2 Related Literature

Our paper adds to the literature on the political economy of the legal retirement age. An early theoretical study on the retirement age is Sheshinski (1978), which is concerned with individual retirement decisions. A number of more recent papers that study the economic and political determinants of the legal retirement age build on Sheshinski's theoretical framework.[1] These papers include Lacomba and Lagos (2006), Lacomba and Lagos (2007) and Casamatta and Gondim (2011). Lacomba and Lagos (2006) distinguish between contribution defined and benefit defined pension systems and show that population aging will lead to an increase in the legal retirement age in the former case and a decrease in the latter case. Lacomba and Lagos (2007) emphasize intragenerational redistributive aspects of public pensions by considering high and low wage earners contributions to the public pension system. Casamatta and Gondim (2011) analyze the political support of an increasing legal retirement age after a decline in fertility.

Further contributions to the impact of intragenerational redistribution implicit in a pension scheme on the legal retirement age are Cremer and Pestieau (2003) and Casamatta et al. (2005), who consider two-period overlapping generations models rather than the Sheshinski multi-period model. Conde-Ruiz and Galasso (2004) also consider a two-period model with

[1] Another strand of literature considers *individual* decisions to retire taken the *legal* retirement age as given (see for instance Profeta (2002b) or Conde-Ruiz et al. (2013)).

endogenous retirement and study the macroeconomic ramifications of early retirement. They demonstrate that early retirement to support unemployed middle aged workers results in a politico-economic equilibrium although other measures would lead to less distortionary effects on human capital accumulation and economic growth.

While the theoretical literature on the politico-economic determinants of the legal retirement age is rather vast, the empirical literature related to our analysis is less frequent. Boeri et al. (2002) analyze individual reform preferences in Italy and Germany. The role of information concerning the support for an increased retirement age is studied in Boeri and Tabellini (2012). Galasso (2008) conducts simulations of political support for postponing retirement in France, Italy, the UK, and the US. Profeta (2002a) studies how demographic factors influence retirement. Using cross-country regressions the paper demonstrates that in countries with a larger share of elderly in the population the length of retirement is longer. The paper also shows that retirement policies and the size of social security size are related. It provides evidence that the relevance of retirement policies significantly affects the size of social security and that the total amount of social security transfers is positively related to the increase of the elderly population, though this relation is not significant in per capita terms. Bütler (2000) investigates different reform options for the Swiss public pension system and finds that low internal rates of return and high distortions reduce political support for earmarked taxes. In a subsequent paper Bütler (2002) exploits a Swiss referendum on an increase in the legal female retirement age. Using municipality data she finds that groups not (or less) affected by an increasing female retirement age (young agents, elderly and middle aged men) favor the reform, while the most affected (middle-aged women) strongly oppose it.

3 A Simple Politico-Economic Model

We start our main analysis by considering a simple model that allows us to disclose a theoretical mechanism behind the opposing effects of population aging and the generosity of a public pension system on the legal retirement age. We determine the legal retirement age as the outcome of majority voting, taking individual lifetime and the replacement rate as given. In this way, we can identify the effect of the generosity of the pension system on the retirement age. Of course, replacement rates are also politically determined in reality. Therefore, in the empirical part of the paper we explicitly take the endogeneity of the replacement rate into account. However, since the replacement rate is one of our central explanatory variables, we treat it as an exogenous quantity in the theoretical part.[2]

In our model the population consists of overlapping generations. We normalize the size of each generation to 1 and assume that each individual lives for T time units, so that total population size also amounts to T. During the first R time units of life each individual exchanges one unit of labor for one currency unit in the labor market, where R denotes the legal retirement age. For the remaining $T-R$ time units the individual is retired and lives on the proceeds of private savings and a benefit from the public pension system.

Consider an individual of age A at some point in time, say the current time period. This individual enjoys remaining lifetime utility of

$$U_A = \int_0^{T-A} u[c_A(\theta)]d\theta \; - \int_0^{\max\{0,R-A\}} z(A+\theta),d\theta,$$

where u denotes instantaneous utility from consumption, with $u' > 0$ and $u'' < 0$, and c_A denotes periodical consumption of an individual of age A. The function $z = z(A) > 0$ measures instantaneous disutility which an individual of age A derives from labor. We assume that $z' \geq 0$, so that labor disutility is non-decreasing in age. For expositional simplicity we assume no discounting.

The remaining lifetime budget of an individual of age A is given by

$$B_A = S_A + \int_0^{\max\{0,R-A\}} 1-\tau\, d\theta \; + \int_{\max\{0,R-A\}}^{T-A} \pi\, d\theta, \tag{1}$$

where $\tau \in (0,1)$ is the contribution rate of the public pension system and π is the public pension benefit. S_A denotes the amount of cumulated savings or debt of an individual of age A. It is predetermined by decisions, the individual made in the past. We assume that individuals are not endowed with any inherited wealth or debt, so that $S_0 = 0$.

The public pension system is based on the pay-as-you-go principle and balances at each point in time. Thus, for R workers and $T-R$ retirees, the individual pension benefit reads

$$\pi = \frac{R}{T-R}\tau. \tag{2}$$

An individual of age A chooses a flow of instantaneous consumption c_A that maximizes (remaining) lifetime utility U_A taking the budget B_A into account. Given strict concavity of the instantaneous utility function u, this leads to a constant remaining consumption flow of an

[2]For a model in which both the replacement rate and the legal retirement age are endogenously determined by majority voting see Galasso (2008) who employs the concept of structure induced voting equilibrium.

individual of age A as follows

$$c_A = \frac{B_A}{T - A}, \tag{3}$$

where it has been considered, that the individual's amount of cumulated savings, S_A, is predetermined by consumption decisions the individual made prior to the age of A. For further reference we determine the amount of cumulated savings of an individual that is not yet retired. This amount depends on the legal retirement age, the contribution rate, and the lifespan that have prevailed until the current period. So, let the legal retirement age that has prevailed so far be given by $\bar{R}$, the contribution rate by $\bar{\tau}$ and the lifespan by $\bar{T}$. Then, with c_A determined by (3), the amount of cumulated savings of an individual of age $A < \bar{R}$ can be written as

$$S_A = \left(1 - \bar{\tau} - \frac{\bar{R}}{\bar{T}}\right) A. \tag{4}$$

Note that neither a current change in the legal retirement age R nor a current change in the contribution rate τ or the lifespan T affect S_A, as S_A has been based on the magnitudes of these variables that have prevailed until the current time period.

Next, we determine the preference for the legal retirement age of an individual of age A. In doing so, we assume that there is a grandfathering clause in place, saying that the legal retirement age, which has prevailed so far, $\bar{R}$, continues to apply to the current retirees. Thus, no retired individual has to go back to work in order to qualify for pension benefits, when the legal retirement age increases. Furthermore, we assume that the change in the legal retirement age has been unexpected, and that each individual considers the change as permanent in the sense that it will not change again in the individuals's lifetime.

Preferences for the legal retirement age of retired individuals can be readily determined. Starting from $\bar{R}$, a rise in the legal retirement age unequivocally increases remaining lifetime utility of all individuals of age $A \geq \bar{R}$. This is because an increase in the legal retirement age leads to higher future pension benefits. As a consequence, retirees generally approve an increase in the legal retirement age. In fact, an individual of age $A = \bar{R}$, that is, an individual that has just retired, prefers a legal retirement age as high as possible, that is, $R = T$. In this case the individual's future stream of pension benefits assumes a maximum. More generally, the stream of future pension benefits of an individual of age $A \geq \bar{R}$ assumes a maximum for all $R \in [T - A + \bar{R}, T]$. This is because once the legal retirement age has reached the amount $R = T - A + \bar{R}$, a further rise in R only increases pensions benefits beyond the lifespan of an individual of age A. Thus, an individual of age $A \geq \bar{R}$ strictly prefers an increase in the legal retirement age as long as $R < T - A + \bar{R}$ and is indifferent with respect to further increases. This implies that retirees have weakly single-peaked preferences with respect to the legal retirement age.

Workers, that is, individuals younger than $\bar{R}$ face a trade-off with respect to an increase in the legal retirement age. Such an increase leads to higher future pension benefits but also to a longer spell of labor disutility. To determine this trade-off differentiate remaining lifetime U_A with respect to R, considering (1) to (3) and taking into account that S_A is predetermined by history. For $A < \bar{R}$ this yields

$$\frac{\partial U_A}{\partial R} = u'(c_A) - z(R),$$
$$\frac{\partial^2 U_A}{\partial R^2} = \frac{1}{T-A} u''(c_A) - z'(R) < 0$$

Thus, for all individuals of age $A < \bar{R}$ preferences are strictly concave in R, which implies that workers have strictly single-peaked preferences with respect to the legal retirement age.

Since individuals of all ages have single-peaked preferences with respect to R, it will be the preference of an individual with median age M, which obtains if the legal retirement age is determined by majority voting.[3] As individuals only differ by age, the median voter is the individual with median age. Since the age distribution is uniform by assumption, the median age ist given by $M = T/2$. Let $M < \bar{R}$ so that the median voter belongs to the labor force and let R_M denote the most preferred legal retirement age of the median voter. Then, if the median voter prefers a retirement age R_M, with $M < R_M < T$, that is, if the median voter neither wants to become retired instantly nor wants to work her whole life, R_M is implicitly determined by the following first order condition

$$u'(c_M) - z(R_M) = 0. \tag{5}$$

Later on we will impose a precise condition on utility of consumption u and disutility of labor z so that R_M is in fact a solution to (5).

From the first order condition (5) we will derive three hypotheses on the determination of the legal retirement age to be tested in the empirical part of the paper. We first establish a testable hypothesis on the preferences for legal retirement of workers and retirees. We already know that retirees prefer a legal retirement age higher than the initial legal retirement age, $\bar{R}$. In order to specify the legal retirement age preferred by workers more precisely, we eliminate

[3] Only workers have strictly single-peaked preferences, whereas retirees have weakly single-peaked preferences in the sense that they are indifferent between retirement ages in the set $[T - A + \bar{R}, T]$. However, since retirees' preferences are strictly monotone below their most preferred retirement ages, they fulfill the criterion of single-plateau preferences. Single-plateau preferences allow for a consistent application of the median voter concept, see Moulin (1984).

S_M in (5) by considering (4), and assume that the contribution rate and the lifespan do not vary, so that $\bar{\tau} = \tau$ and $\bar{T} = T$. The legal retirement age preferred by the median voter, R_M, is then determined

$$u' \left[\frac{1}{T-M} \left(R_M - \frac{\bar{R}}{T} M \right) \right] - z(R_M) = 0. \tag{6}$$

This equation has a single fixed point, R^*, implicitly determined by

$$u' \left(\frac{R^*}{T} \right) - z(R^*) = 0, \tag{7}$$

so that the median voter prefers $R_M = R^*$ if the initial legal retirement age is $\bar{R} = R^*$. From (6) it follows that

$$0 < \frac{dR_M}{d\bar{R}} = \frac{u''}{u'' - (T-M)z'} \frac{M}{T} < 1,$$

implying that R^* is a stable fixed point. Thus, if there was repeated voting on the legal retirement age under the conditions outlined above, $R = R^*$ would eventually emerge as an outcome that perpetuates itself. Therefore, we assume that the initial retirement age is given by $\bar{R} = R^*$, in which case the median voter prefers $R_M = R^*$.

We are now in a position to identify the conditions, which guarantee that R_M is in fact an inner solution of the first order condition (5). If the initial retirement age is R^*, it follows from (7) that $R_M > M = T/2$ if $u'(1/2) - z(T/2) > 0$ and $R_M < T$ if $u'(1) - z(T) < 0$. Thus, R_M solves (5) if $u'(1) - z(T) < 0 < u'(1/2) - z(T/2)$.

The legal retirement age $R_M = R^*$ as determined by (7) does not depend on the specific age of the median voter. In fact, for individuals of all ages $A < \bar{R}$ the most preferred legal retirement age is $R_A = R^*$, if the initial legal retirement age is given by $\bar{R} = R^*$. This is because for all workers the marginal disutility of an additional time unit of work at the age of R is $z(R)$, whereas for $R = R^*$ instantaneous consumption for all workers amounts to $c_A = R^*/T$, which implies that marginal utility of consumption from additional income associated with an additional time unit of work is the same for all workers. Consequently, for all workers R^* is a solution to $u'(c_A) - z(R) = 0$.

Figure 2 illustrates the legal retirement preferences in case that the initial legal retirement age is $\bar{R} = R^*$. All workers then prefer a legal retirement age of $R = R^*$, whereas retirees prefer a higher legal retirement age. The shaded area indicates the set of legal retirement ages between which an individual of age $A > R^*$ is indifferent.

We are now in a position to formulate our first testable hypothesis.

Hypothesis 1 *Retirees prefer a higher legal retirement age than workers. Retirees who have just retired prefer the highest legal retirement age.*

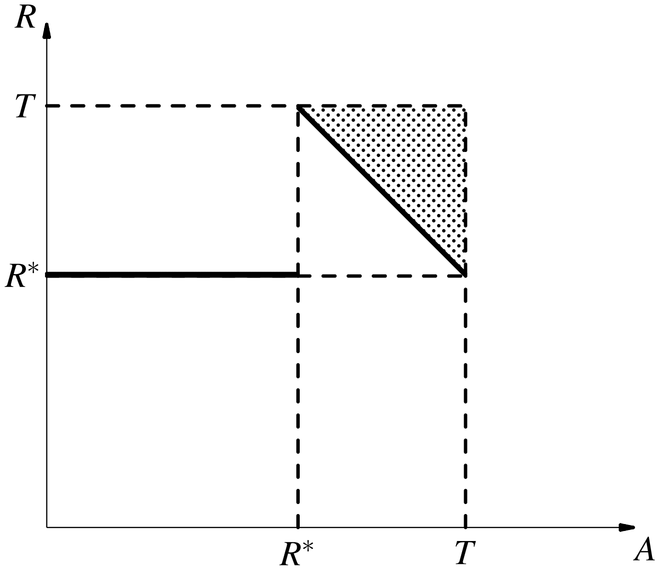


Figure 2: Legal retirement preferences across age

Next we study, how an increase in the lifespan T affects the legal retirement age that obtains in a politico-economic equilibrium, R_M. Note that an exogenous increase in the lifespan does not affect the age of the current median voter. It means that all current individuals and all future individuals will live longer, so that the future median age will increase but not the current one. Since accumulated savings of the median voter, S_M, are predetermined by history, it follows from implicitly differentiating (5), while considering (1), (2) and (3), that

$$\frac{\partial R_M}{\partial T} = \frac{u''}{u'' - (T-M)z'} \frac{1}{T-M} B_M > 0.$$

This leads us to our second testable hypothesis.

Hypothesis 2 *An increase in live expectancy leads to an increase in the legal retirement age.*

Finally, we consider the effect of an increase in the contribution rate τ on the legal retirement age. Taking again into account that S_M is given by history, it follows from (5) that

$$\frac{\partial R_M}{\partial \tau} = -\frac{u''}{u'' - (T-M)z'} M < 0. \tag{8}$$

Thus, a higher contribution rate leads to a lower legal retirement age. In the empirical part of the paper we consider the effect of an increase in the replacement rate of the public pension system rather than the contribution rate. In the present model the replacement rate is given by

$\lambda = \pi/1-\tau$. In the appendix we demonstrate that an increase in the contribution τ goes along with an increase in the replacement λ if $\lambda \leq 1$. This condition says that pension benefits should not exceed net labor income. Since real world public pension systems are generally consistent with this condition, we can state our third testable hypothesis.

Hypothesis 3 *An increase (decrease) in the replacement rate of the public pension system leads to a decrease (increase) in the legal retirement age.*

The intuition behind this result is as follows. When the replacement rate increases, the public pension system becomes more generous in the sense that pension benefits relative to net labor income increase. After the increase in the replacement rate workers find themselves in a position where they have saved more for old age than they perceive as optimal. Thus, they can afford to become retired earlier and, consequently, prefer a decrease in the legal retirement age. If, on the other hand, the replacement rate decreases workers find themselves in a position where they have saved to less for old age and are willing to work longer.

It should be noted that in the present model the replacement rate effect on the legal retirement age is of a transitory nature. This is because over time individuals adjust their savings to the new legal retirement age, which implies that in future voting they will support a legal retirement age which comes closer to the long-run retirement age R^* again. However, such adjustment will be time-consuming as the stock of savings of the median voter will only adjust gradually. Moreover, to the extent that the legal retirement age is not changed on a frequent basis, the change in the replacement rate has a longer-term effect on the legal retirement age.

4 Empirical Analysis

In the following, we assess empirically the validity of the three hypotheses developed in the theoretical model. We investigate Hypothesis 1 with individual micro data using descriptive regressions and a fuzzy regression discontinuity (FRD) design. To test Hypotheses 2 and 3 we employ fixed effects ordinary least squares regressions (FE-OLS) and IV-regressions for a panel of 20 OECD countries.

4.1 Political Preferences on Pension Reform

For the analysis of individual pension reform preferences we employ the representative German ALLBUS survey, which is biannually conducted since 1980. The wave we use is from 2006 and contains an explicit question on different pension reform options including the attitude towards an increase in the legal retirement age. We are not aware of other surveys retrieving data to compare different pension reform preferences. Moreover, 2006 was a year with an intense discussion on pension reforms in the public and in parliament. The outcome of this discussion was a gradual increase in the legal retirement age starting in 2007, which will become fully effective in 2029 (Heinemann et al. 2013).

Descriptive analysis

For the descriptive regressions we use a reform dummy as dependent variable to measure preferences for an increasing legal retirement age. The survey question to construct the dummy is: "To solve the problems in the public pension insurance should (i) the retirement age be increased, (ii) pension contributions be increased, (iii) public pensions be cut." We assign option (i) the value 1 and options (ii) and (iii) the value 0. The main variable of interest is a pension dummy indicating whether the respondent is a pensioner. Additionally, we control for education, gender and political preference with a 10 point left-right scale[4] and estimate the following equation:

$$\text{Reform dummy} \quad = \quad \beta_0 + \beta_1 \,\text{Pension} + \beta_2 X + \varepsilon$$

Table 1 depicts the results from these regressions. It becomes evident that the individual preferences to increase the retirement age are consistent with Hypothesis 1 of the theoretical model. Retirees have a significantly higher probability to opt for an increase in the legal retirement age. More precisely, the increase in the probability amounts by 9.2% percentage points. When we add the control variables, the probability increase even amounts to 12.3% percentage points. To rule out a functional form misspecification we also estimate a logit model (column 3), which leads to a qualitatively similar result. The odds of opting for an increase in the legal retirement age is 1.9 for pensioners compared to employees. Figure 2 from the previous section suggests that employees, irrespective of age, do not differ in their preferences for an increase in the legal retirement age. Column 4 provides evidence for this presumption. We regress the reform dummy to increase the legal retirement age on 10-year age groups under 65 (the legal retirement age). It becomes evident that all age groups below 65 are less likely to opt for an increase in the legal retirement age. Moreover, performing a Wald test for the equality of the age-group coefficients, we cannot reject the hypothesis of equality of the age-group coefficients, which is in line with our theoretical model.

[4]Summary statistics for all variables used in this regression and the following FRD design are given in Table A1 in the appendix.

Table 1: Pension reform preferences – descriptive regressions

	(1) LPM Increase legal retirement age	(2) LPM Increase legal retirement age	(3) LOGIT Increase legal retirement age	(4) LPM Increase legal retirement age
Pension-Dummy	0.092**	0.123***	1.881***	
	(0.029)	(0.030)	(0.281)	
Age<25 years				−0.184***
				(0.049)
Age 25-35				−0.189***
				(0.043)
Age 35-45				−0.157***
				(0.040)
Age 45-55				−0.128**
				(0.041)
Age 55-65				−0.085*
				(0.043)
Constant	0.241***	0.244***	0.321***	0.395***
	(0.014)	(0.025)	(0.042)	(0.038)
Controls	NO	YES	YES	YES
Observations	1,279	1,279	1,279	1,279
Adj. R^2	0.008	0.025		0.029
Pseudo R^2			0.026	

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Control variables: Education, gender, political self-assessment on a 10 point left-right scale. Estimations with robust heteroskedasticity-consistent standard errors.
Performing a Wald test for equality of the different coefficients on the age variables in column 3 gives an F-statistic of 1.78 (with 4 numerator and 1,267 denominator degrees of freedom). The significance level of the test is 0.13 and therefore we cannot reject the equality hypothesis at conventional significance levels.
The full table with all control variables is given in Table A2 in the appendix.

FRD Design

The regressions of the previous section are supportive for our Hypothesis 1. However, these results may suffer from endogeneity and may thus not reveal a causal effect. In particular, the pension dummy does not distinguish between legal retirement age preferences and individual retirement age preferences. Although our theoretical model does not consider early retirement age, the results of our model suggest that an individual who retires early opts for a higher legal retirement age immediately after early retirement. This causes a downward bias of the pension coefficients of the regressions presented above. To allow for a causal interpretation, we employ a FRD design. The treatment, denoted by D, that we observe is 'pension', which, according to our theory, sharply increases the political support for an increase in the legal retirement age.[5] Pension take-up, however, does not take place at the legal retirement age, rather the legal retirement age is the latest point of pension take up, and thus makes the RD design fuzzy. In reality, the jump in the probability of receiving the treatment 'pension' becomes maximal around the

[5]See, for instance, Battistin et al. (2009) or Müller and Shaikh (2018) for similar FRD strategies.

effective retirement age, which therefore forms the cutoff, denoted by c, in our FRD design. According to OECD figures for the year 2006 in Germany this is at age 60.8/61.8 for women/men. The assignment variable or score, X, then is the difference between the age of an individual and the cutoff age.[6] While individual pension entry, and thus the individual retirement age is manipulable on the individual level, this is not the case for the effective retirement age, which results from the total of all retirement decisions of a society. As no individual can influence the effective retirement age,[7] the threshold is exogenous from the individual perspective and thus fulfills a key identifying FRD assumption. Therefore, we use the passing of the threshold age, T=1[X>c], as an instrument for the endogenous pension dummy. Thus, in our FRD design the outcome equation is

$$\text{Reform dummy} = \alpha + \tau \,\text{Pension} + f(X-c) + \varepsilon,$$

and the first stage equation is

$$\text{Pension} = \gamma + \delta T + f(X-c) + \nu.$$

The treatment effect in a FRD design can be estimated with an IV-regression and the resulting estimates can be interpreted as a local average treatment effect (Lee and Lemieux 2010). In the estimation we use heteroskedasticity robust standard errors and estimate $f(X-c)$ in both stages with a first degree polynomial. Figure 3 illustrates the discontinuity effect of pension entry.[8] The x-axis depicts the distance to the effective legal retirement age in years, i.e., the score, and the y-axis the probability of a reform preference for an increase in the legal retirement age. The left graph of Figure 3 plots the raw data with a first degree polynomial before and after the effective retirement age and the right graph uses a second order polynomial. It should be noted that the raw data plot strongly resembles Figure 2 of the theoretical model and thus supports Hypothesis 1, i.e., a strong discontinuity in reform support for an increase in the legal retirement age after retirement.

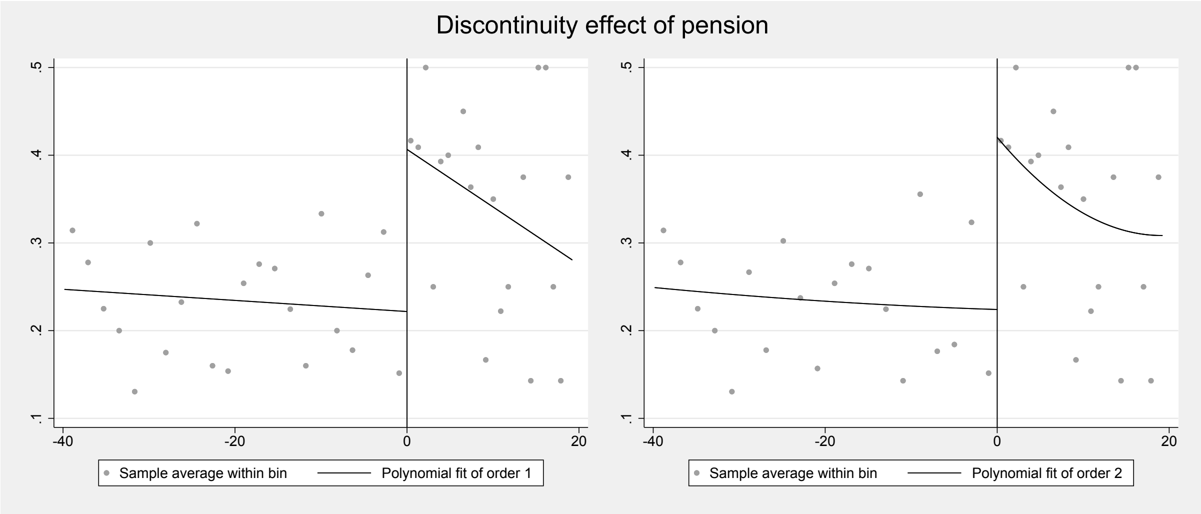
Table 2 shows that the FRD design leads to a higher pension dummy coefficient compared to the descriptive regressions. The increase in the probability of voting for an increase in the legal retirement age becomes 19.7 percentage points. The first stage F-statistic is very strong and the instrument coefficient is highly significant. Adding control variables does neither affect significance nor the magnitude of this effect. In the FRD design it is important to check

[6]Figure A1 in the appendix shows the development of the probability of receiving the treatment 'pension' between the age 45 and 70.

[7]In 2006, a single individual influenced the effective retirement age with a weight of 1/1,300,000.

[8]For plotting we use the STATA commands `rdplot`, which offers data-driven regression-discontinuity plots (Calonico et al. 2014).

Figure 3: Time before/after effective retirement age and pension reform preferences



Note: Own calculations based on ALLBUS data.
Left graph: RD plot with first degree polynomial with evenly spaced bins that mimic the underlying variance of the data implemented by spacings estimators. 858 observations left of cutoff, 326 right of cutoff. Average bin length left of cutoff 2.2 and 1.1 right of cutoff.
Right graph: RD plot with second order polynomial with evenly spaced bins that mimic the underlying variance of the data implemented by spacings estimators. 858 observations left of cutoff, 326 right of cutoff. Average bin length left of cutoff 1.99 and 0.87 right of cutoff.

the sensitivity of this result to a range of bandwidths and especially to scrutinize individuals close to the cutoff. Therefore, we decrease in a first step the bandwidth to ± 20 years around the cutoff. This increases the effect size of the pension treatment to 37.2 percentage points (32.8 percentage points with control variables). Localizing the treatment effect further to a bandwidth of ±15 or ±10 years around the cutoff comes at the cost of a loss in statistical power as the number of observations is halved or reduced to one third of the original sample size, respectively. As a consequence, the first stage F-statistic shrinks and the standard errors of the instrument become larger. Still, the effect is statistically significant and becomes even larger. Columns 5 and 7 of Table 2 say that the probability of supporting an increase in the legal retirement age increases by 47 and 123 percentage points after retirement, respectively. As columns 6 and 8 show, adding control variables reduces the effect to 39 and 92 percentage points, respectively.

A crucial assumption in the FRD design is that neither the score nor the sorting can be manipulated around the cutoff. We test the robustness of this assumption by investigating whether there are any significant differences in other predetermined characteristics, which we use as control variables. Columns 1 and 2 of Table A4 in the appendix demonstrate that the pension treatment has no significant influence on education or gender, which supports the assumption of no sorting around the cutoff. Moreover, we can also show that pension has no statistically significant influence on policy preferences in general. This could happen if, for instance, retirees devoted more time to political participation which would shape political preferences in a way

Table 2: Pension reform preferences - FRD

	(1) FRD Increase legal retirement age	(2) FRD Increase legal retirement age	(3) BW ±20y Increase legal retirement age	(4) BW ±20y Increase legal retirement age	(5) BW ±15y Increase legal retirement age	(6) BW ±15y Increase legal retirement age	(7) BW ±10y Increase legal retirement age	(8) BW ±10y Increase legal retirement age
Pension-Dummy	0.197*	0.191*	0.372**	0.328**	0.472*	0.394*	1.229*	0.923*
	(0.078)	(0.077)	(0.125)	(0.119)	(0.190)	(0.176)	(0.626)	(0.470)
Score	0.000	0.001	−0.008	−0.006	−0.009	−0.005	−0.076	−0.056
	(0.001)	(0.001)	(0.005)	(0.005)	(0.009)	(0.009)	(0.042)	(0.032)
Instrument x score	−0.004	−0.003	−0.006	−0.003	−0.017	−0.013	0.000	0.006
	(0.005)	(0.005)	(0.007)	(0.006)	(0.010)	(0.009)	(0.022)	(0.019)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
First stage	Pension	Pension	Pension	Pension	Pension	Pension	Pension	Pension
T=1[X>c]	0.677***	0.679***	0.538***	0.547***	0.423***	0.435***	0.223*	0.248**
	(0.039)	(0.039)	(0.054)	(0.053)	(0.068)	(0.066)	(0.089)	(0.087)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Observations	1,279	1,279	793	793	604	604	427	427
SW-F	296.531	307.788	98.240	107.297	38.672	43.489	6.194	8.160

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Control variables: Education, gender, political self-assessment on a 10 point left-right scale. Estimations with robust heteroskedasticity-consistent standard errors. The same control variables are used for the first and second stage of the regression.
The full table with all control variables is given in Table A3 in the appendix.

that would not happen without retirement. Again, this would invalidate a causal interpretation of our results. However, columns 3 to 5 in Table A4 show that pension does neither change individual preferences on a self-assessed left-right policy scale nor does it affect general political interest or party affiliation.

4.2 Cross-country Panel Analysis

For the cross-country analysis we use the Comparative Welfare Entitlements Dataset (CWED) by Scruggs et al. (2014). The CWED data offers information on institutional features of social insurance programs in 33 countries from 1970 onwards. It provides complementary information to mere spending data and covers information about institutional features of national social insurance programs in 27 OECD and six non-OECD countries. This information comprises for instance the generosity of various components of the respective social security systems, such as unemployment, sickness insurance and pensions.

In the present analysis we use the legal retirement age as the dependent variable. We differentiate between an average (male+female/2) legal retirement age and male and female retirement ages separately. As our main variable of interest we use an average replacement rate to approximate the prevailing replacement rates. The average replacement rate is based on the standard pension benefit replacement rate and the social pension benefit replacement rate. The standard replacement rate is the average for a single person and couple with one earner and the social pension replacement rate is the average for a single person and couple with no credited earnings (see Scruggs et al. (2014) for more details). The second crucial component from the theoretical model is longevity. In the theoretical model the demographic structure is fully determined by the life span. Empirically, however, the demographic structure of a population is determined by cohort specific fertility, mortality and migration. We therefore employ the share of the elderly (i.e. the population older than 65 in % of the total population) as explanatory variable to approximate longevity as it incorporates all the different demographic factors. However, the share of the elderly does not contain information about future longevity. Therefore, we also include life expectancy at age 65 as an additional demographic control variable. We add parsimoniously further economic and political control variables in order to avoid over controlling and the associated problem of bad controls, which is a frequent problem in cross-country regression analyses. To capture differences in income and economic performance across countries we include GDP per capita and GDP growth rates. To capture political reform support we include a variable measuring the seat share of all parties in government weighted by the numbers of days in office in a given year.[9] A descriptive overview of the magnitudes of all variables used in the regressions can be found in Table A5 in the appendix. We further include country fixed effects to control for unobserved heterogeneity and for country specific institutional features. In our case the concentration on the within country variance captures for instance the different ways of financing social security, such as Bismarck or Beveridge systems. Additionally, we use time fixed effects to control for common time specific shocks across all countries.

FE-OLS Approach

Our baseline regression specification for the FE-OLS approach reads:

$$\text{Legal ret. age}_{it} = \beta_0 + \beta_1 \text{Replacement rate}_{it} + \beta_2 \text{Elderly}_{it} + \beta_3 X_{it} + \theta_t + \sigma_i + \varepsilon_{it}, \quad (9)$$

where i and t indicate country and time, X is the vector of controls, θ and σ are time and country fixed effects and ε is the error term.

Table 3 contains the results of the FE-OLS regressions.[10] The results demonstrate that, as predicted by the theoretical model, the replacement rate and thus the generosity of the pension system is negatively associated with the average legal retirement age. In contrast, an aging population, approximated by the share of the elderly, influences the legal retirement age positively. In the baseline scenario without control variables (column 1) we find that an increase in the replacement rate by 10 percentage points[11] decreases the average legal retirement age

[9] This variable is taken from the Comparative Political Data Set (CPDS) by Armingeon et al. (2015).

[10] The 20 countries included in all regressions are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

[11] This order of magnitude is common for pension reforms as can be seen from Figure 1 in Section 1.

by 0.7 years. In contrast, the share of the elderly increases the average legal retirement age by 0.35 years if the population above 65 increases by one percentage point. As the share of the elderly in the regression sample rose from 12.5% in 1980 to 16.6% in 2010, population aging over these three decades is associated with an increase in the legal retirement age of 1.4 years. This order of magnitude is very stable and changes little with additional control variables.

Looking at the female and male results separately (columns 6 to 9 in Table 3), it becomes evident that in the specification without controls the replacement rate effects on the legal retirement age are comparable in magnitude. However, the population aging effect is much stronger for women. In the regression with all controls the population aging effect for men becomes insignificant, whereas for women this effect implies an increase of half a year for a one percentage point increase in the share of the elderly. Overall, the results of the FE-OLS regressions support the predictions of the theoretical model. Detailed results for women and men separately can be found in Tables A6 and A7 in the appendix. Finally, we will assess the effects of replacement rate changes and population aging on the legal retirement age employing IV regressions in order to give the results a more causal interpretation.

Table 3: Fixed effects regression – Average

	(1) Legal ret. age Average	(2) Legal ret. age Average	(3) Legal ret. age Average	(4) Legal ret. age Average	(5) Legal ret. age Average	(6) Legal ret. age Women	(7) Legal ret. age Women	(8) Legal ret. age Men	(9) Legal ret. age Men
Replacement rate	-0.073^{***}	-0.071^{***}	-0.061^{***}	-0.061^{***}	-0.050^{**}	-0.083^{***}	-0.065^{**}	-0.063^{**}	-0.035^{*}
	(0.025)	(0.023)	(0.021)	(0.020)	(0.020)	(0.026)	(0.023)	(0.025)	(0.020)
Population over 65	0.352^{***}	0.436^{***}	0.373^{***}	0.376^{***}	0.364^{**}	0.511^{***}	0.543^{***}	0.194^{*}	0.185
	(0.092)	(0.143)	(0.126)	(0.123)	(0.130)	(0.092)	(0.121)	(0.112)	(0.157)
Life expectancy at age 65		−0.135	0.318	0.316	0.243		0.152		0.334
		(0.206)	(0.386)	(0.380)	(0.507)		(0.677)		(0.444)
GDP per capita			−2.928	−2.916	−3.594		−3.205		-3.983^{*}
			(1.814)	(1.800)	(2.084)		(2.174)		(2.072)
GDP growth			0.010	0.009	0.017		−0.005		0.038
			(0.029)	(0.028)	(0.038)		(0.045)		(0.039)
Government support				−0.009	−0.007		−0.003		−0.011
				(0.012)	(0.013)		(0.013)		(0.013)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	YES	NO	YES	NO	YES
Observations	713	703	700	700	700	713	700	713	700
Countries	20	20	20	20	20	20	20	20	20
Adj. R^2	0.247	0.256	0.314	0.316	0.305	0.335	0.359	0.122	0.217

Standard errors (clustered at the country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

IV Approach

The FE-OLS regression results might not reflect a causal relationship, when the replacement rates and the legal retirement age influence each other simultaneously.[12] This will be the case, if a higher legal retirement age is compensated by a higher replacement rate or if countries with a higher legal retirement age are able to afford higher pension generosity. If such a simultaneity problem arises, the FE-OLS regression results are biased. We therefore employ IV regressions to assess the robustness of our results. We use two different types of instruments. First, we consider the lagged replacement rate and the average replacement rate of the last three years. These instruments appear as natural in order to avoid bias due to a contemporaneous influence of the legal retirement age on the replacement rate. Second, we use lagged values of public debt and average public debt of the last three years as instruments. The idea underlying these instruments is as follows. Since we only consider within country variation, we measure the country-specific effect of a change in public debt on the replacement rate. For a country under fiscal pressure it should be more difficult to increase public debt. This is particularly true if the public budget is subject to a legal fiscal restraint.[13] Since annual pension payments account for a substantial part of public expenditure, containing the replacement rate becomes immediately effective in order to weaken financial pressure.[14] Therefore, an increase in public debt should be associated with an increase in the replacement rate, whereas a decrease in public debt should be associated with a decrease in the replacement rate. In contrast, increasing the legal retirement age does not mitigate fiscal pressure immediately, but only becomes effective in the longer run. This suggests that public debt does not directly affect the legal retirement age.

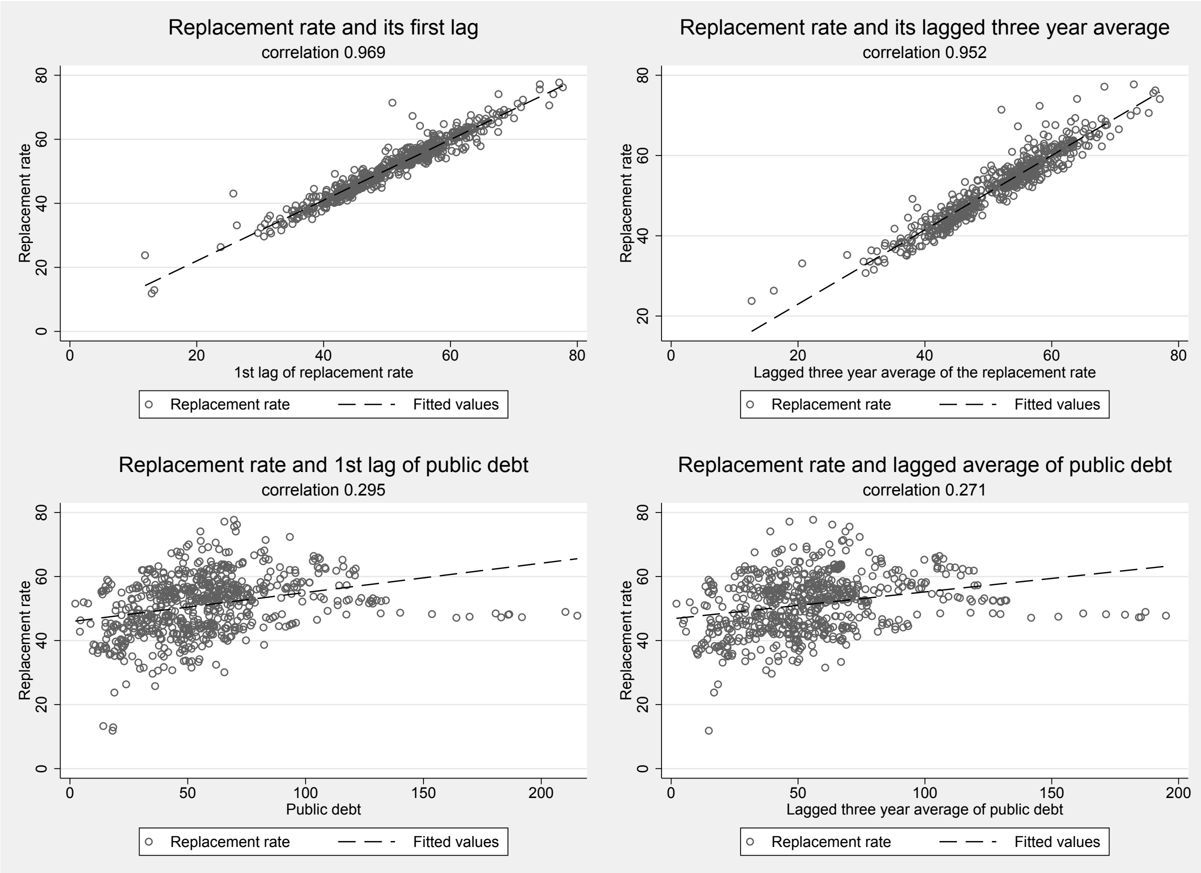
Figure 4 displays first-stage evidence of the correlation between the instruments and the replacement rate and may indicate the instruments' relevance. However, the more critical part is the fulfillment of the exclusion restriction, at least conditional on the control variables. More precisely, the identifying assumption is that the lagged values of the replacement rate and public debt influence the legal retirement age only via the replacement rate. In practice we are confronted with the fact that social policy intended for old age security might not be conducted exclusively over the pension system but also through other areas of social security. For instance, countries often contain access to the pension system by means of sickness, incapacity or unemployment benefits or adopt measures of active labor market policy. Therefore, if our

[12]We are confident that we can rule out the other suspects of endogeneity, omitted variable bias and measurement error, as (i) the theoretical model gives us guidance on the main influence factors and (ii) the main variables in use can be relatively precisely measured.

[13]On the impact of fiscal restrains on public expenditures see e.g. Dulleck and Wigger (2015).

[14]In fact, Bottazzi et al. (2006) provide evidence that the decrease in the replacement in the 1990s in Italy was mainly motivated by the desire to reduce the public deficit (see also Figure 1 in Section1).

Figure 4: Graphical first-stage evidence



Source: Replacement rates: CWED; Public debt: OECD

instruments directly affected expenses in these areas of social security, we would violate the exclusion restrictions and the IV regressions would lead to biased estimates.

To check such confounding effects we regress expenditures in other parts of the social security systems on our instruments and the control variables used in the IV regressions. More precisely, we use health expenditures, spending on incapacity benefits, active labor market expenditures and unemployment benefit expenditures as dependent variables and our instruments and the same control variables as in the FE-OLS approach as dependent variables. As shown in Tables 4 and 5 there is not much influence of our instruments on other social expenditures. However, health expenditures are significantly influenced by the first lag of the replacement rate and active labor market policies are significantly influenced by the first lag of public debt. In both cases economic significance is small and statistical significance is only at the 10% level. Nevertheless, to ensure the validity of the exclusion restriction, we include health expenditures and active labor market expenditures as additional control variables in the respective IV regressions.

Table 4: Influence of the instruments on other social security measures

	(1) Health exp.	(2) Health exp.	(3) Health exp.	(4) Health exp.	(5) Incapacity benef.	(6) Incapacity benef.	(7) Incapacity benef.	(8) Incapacity benef.
1st lag of public debt	−0.002				−0.001			
	(0.004)				(0.005)			
3 year avg. of public debt		−0.007				−0.002		
		(0.005)				(0.005)		
1st lag replacement rate			0.032*				0.001	
			(0.018)				(0.011)	
3 year average of rep. rate				0.033				0.004
				(0.019)				(0.014)
X_{it}	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	604	587	580	556	596	579	572	549
Countries	20	20	20	20	20	20	20	20
Adj. R^2	0.631	0.646	0.663	0.656	0.191	0.216	0.186	0.189

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Influence of the instruments on other social security measures

	(1) Active labor market exp.	(2) Active labor market exp.	(3) Active labor market exp.	(4) Active labor market exp.	(5) Unemployment benefit exp.	(6) Unemployment benefit exp.	(7) Unemployment benefit exp.	(8) Unemployment benefit exp.
1st lag of public debt	0.004*				0.003			
	(0.002)				(0.004)			
3 year avg. of public debt		0.003				0.000		
		(0.002)				(0.004)		
1st lag replacement rate			0.006				0.011	
			(0.009)				(0.015)	
3 year average of rep. rate				0.008				0.011
				(0.010)				(0.017)
X_{it}	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	527	516	516	502	589	574	564	541
Countries	20	20	20	20	20	20	20	20
Adj. R^2	0.209	0.196	0.180	0.184	0.384	0.402	0.446	0.460

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The regression equation of interest is similar to equation (9). As we address a potential endogeneity problem by an IV approach, the following first-stage regressions precede equation (9):

$$\text{Replacement rate}_{it} = \beta_0 + \beta_1 Z_{it} + \beta_2 X_{it} + \theta_t + \sigma_i + \varepsilon_{it}$$

with Z being one of the four instruments mentioned above. The vector X contains the same control variables as in equation (9) plus health expenditures in % of GDP as a control in the IV regression with the lagged replacement rate, and plus active labor market expenditures in % of GDP in the IV regression with lagged public debt, respectively. To avoid the problem of overcontrolling, we again start by reporting the effect of the two variables of interest and then include stepwise additional controls (detailed results for each step are reported in Tables A12, A13 and A14 in the appendix).

The results of the IV regressions are reported in Table 6 and demonstrate that the effects of the replacement rate and the share of the elderly are again in line with the theoretical model. Moreover, the IV regressions with the lagged replacement rate instruments are comparable in magnitude and significance to the FE-OLS regressions. In contrast, the regressions with the public debt instruments show a higher economic significance, but a somewhat reduced statistical significance. In the baseline specification without additional controls, an increase of 10 percentage points in the replacement rate leads to a decline in the legal retirement age of 0.9 to 1.1 years (columns 1 and 3), using lagged values of the replacement rate as instruments, and of 1.8 to 2.0 years (columns 5 and 7) using lagged values of public debt as instruments. In contrast, an increase of one percentage point in the share of the elderly (again in the baseline specification without controls) leads to a rise in the legal retirement age of 0.4 years (columns 1 and 3), using lagged values of the replacement rate as instruments, and of half a year (columns 5 and 7) using lagged values of public debt as instruments. The coefficients of the IV regressions with lagged replacement rates as instruments and all control variables (columns 2 and 4) are lower than in the model without controls and comparable in magnitude with the FE-OLS results. In the IV regressions with the first lag of public debt as instrument and all control variables the coefficient for the replacement rate approximately doubles and the elderly coefficients reduce to the common 0.3 years increase for a one percentage point increase in the share of the elderly (column 6). However, this specification is statistically not significant. In contrast, for the lagged three year average of public debt we find again statistically significant effects with an increased magnitude compared to the effects found in the other regressions. More precisely, we find that an increase in the replacement rate of 10 percentage points reduces the legal retirement age by 3.1 years, whereas an increase in the share of the elderly of one percentage point increases the legal retirement age by 0.5 years (column 8).

The lower part of Table 6 reports the results of the first-stage regressions. The effects of the instruments on the replacement rate are strongly significant in all specifications, with the exception of the regression with the first lag of public debt as instrument and all control variables. An increase in the instruments always leads to a rising replacement rate. The first-stage F-statistics for the lagged replacement rates are well above the benchmark value of 10. This does not hold true for the public debt instrument that becomes weak when we introduce time fixed effects. However, we follow the argumentation of Angrist and Pischke (2008, page 209) and Angrist and Pischke (2009) that "[...] bias with a just-identified model is not usually worth worrying about because if the instruments are so weak that just-identified IV is seriously biased, then you'll easily see the cosmic weakness of your first stage in such cases by virtue of large second-stage standard errors." As our IV regressions are just-identified and in case of the lagged three year average of public debt our first stage coefficients are strongly significant, we are confident that this regression reports unbiased estimates.

Also the gender specific effects in the IV regressions are in line with the FE-OLS effects (see Tables A10 and A11 in the appendix). The population aging effect is much more pronounced for women than for men. For women this effects is strongly significant at the 1% significance level across all specifications (again with the exception of the first lag of public debt). For men, in contrast, the aging effect is only significant in the model without controls and insignificant when all controls are introduced, while, the magnitude of the coefficients is also lower for men compared to women. For women, the aging effect is approximately a 0.5 (0.6) year increase in the legal retirement age for a one percentage point increase in the share of the elderly with the replacement rate (public debt) as instrument. Concerning the replacement rates the coefficients of the IV regressions are similar for men and women with the lagged replacement rates as instruments, albeit slightly lower in magnitude for men. When the public debt instruments are used, the coefficients are significant only for men and in magnitude two to six times larger compared to the lagged replacement rate instruments.

Table 6: IV regressions

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age	(6) Legal ret. age	(7) Legal ret. age	(8) Legal ret. age
Replacement rate	−0.091***	−0.058**	−0.111***	−0.084***	−0.180*	−0.381	−0.196*	−0.311*
	(0.031)	(0.028)	(0.038)	(0.029)	(0.100)	(0.286)	(0.110)	(0.172)
Population over 65	0.360***	0.269***	0.357***	0.338***	0.516***	0.343	0.520***	0.504**
	(0.089)	(0.104)	(0.089)	(0.122)	(0.184)	(0.370)	(0.173)	(0.221)
Life expectancy at age 65		0.690*		0.530		1.459**		0.667
		(0.414)		(0.484)		(0.669)		(0.604)
GDP per capita		−3.647**		−3.557*		−0.962		−2.249
		(1.438)		(1.929)		(3.161)		(1.882)
Health exp. % GDP		0.122						
		(0.251)						
Act. lab. market exp. % GDP						0.458		
						(1.059)		
GDP growth		0.025		0.007		−0.112		−0.070
		(0.032)		(0.034)		(0.123)		(0.068)
Government support		−0.007		−0.007		−0.009		−0.010
		(0.011)		(0.011)		(0.019)		(0.013)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	YES	NO	YES	NO	YES	NO	YES
First stage	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate
1st lag rep. rate	0.893***	0.880***						
	(0.030)	(0.028)						
Avg. rep. rate			0.879***	0.896***				
			(0.045)	(0.045)				
1st lag public debt					0.102***	0.062		
					(0.021)	(0.047)		
Avg. public debt							0.094***	0.065**
							(0.022)	(0.027)
Observations	676	571	621	611	702	509	662	650
Countries	20	20	20	20	20	20	20	20
SW-F	901.061	1021.759	378.749	398.553	23.206	1.769	18.223	5.868

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Conclusion

The present paper has provided theoretical and empirical evidence that population aging and pension generosity exert opposing effects on the political feasibility of increasing the legal retirement age. While an increase in the share of the elderly can be expected to strengthen political support for an increase in the legal retirement age, higher levels of pension generosity embodied in the public pension scheme weaken such support.

The results presented in this paper have a clear-cut policy implication. If policy manages to limit the generosity of the public pension system expressed by the replacement rate, an increase in the legal retirement age as a response to aging can be expected to find political support. Policy should thus refrain from compensating workers for an increase in the legal retirement age by granting more generous pension benefits. Such a compensation policy would not only challenge public pension financing per se, but would also undermine political support for an increase in the legal retirement age. Our results also imply that especially those individuals who have just retired support an increase in the legal retirement age. This may have implications for the timing of pension reform. In many rich countries the baby boomer generation will retire in the not too distant future. Our results suggest that from a political economy point of view this will be a favorable moment to increase the legal retirement age.

In sum, this paper offers a balanced view on the feasibility of public pension reform. Aging as such does not need to jeopardize pay-as-you-go public pensions. Unlike prior work that described population aging in democracies as an inevitable way into a gerontocracy (see, e.g., Sinn and Uebelmesser (2003)) our paper is more in line with recent theoretical contributions which show that population aging is not necessarily economically detrimental. Irmen (2017) demonstrates that population aging does not hinder economic growth and Lancia and Russo (2016) show that, even without being altruistic, elderly voters support public investment in the human capital of future generations since it expands future pension possibilities. Our paper is in line with such more favorable views on population aging. However, we also show that to fully exploit the positive effects of population aging for sustainable pension finances it is key to contain the generosity of pension systems.

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A Appendix

A.1 Contribution rate and replacement rate

In order to demonstrate that an increase in the contribution rate τ implies an increase in the replace rate λ if $\lambda \leq 1$, we prove the following proposition.

Proposition A.1 *Let the initial retirement age be given by $\bar{R} = R^*$. Then, an increase in τ leads to an increase in λ if $\lambda \leq 1$.*

Proof: Replace π in $\lambda = \pi/1-\tau$ by means of (2) to get the replacement rate in the majority voting equilibrium as

$$\lambda = \frac{R_M}{T - R_M} \frac{\tau}{1-\tau}.$$

Differentiation with respect to τ leads to

$$\frac{d\lambda}{d\tau} = -\frac{T}{(T-R_M)^2} \frac{\tau}{1-\tau} \frac{\partial R_M}{\partial \tau} + \frac{R_M}{T-R_M} \frac{1}{(1-\tau)^2}$$

It follows that $d\lambda/d\tau > 0$ is equivalent to

$$T\tau(1-\tau)\frac{\partial R_M}{\partial \tau} + R_M(T - R_M) > 0. \tag{A.1}$$

Considering (8), it follows that

$$\frac{\partial R_M}{\partial \tau} \geq -M,$$

so that (A.1) holds if

$$-TM\tau(1-\tau) + R_M(T-R_M) > 0. \tag{A.2}$$

Now define $\zeta \equiv R_M/T$. Considering that $M = T/2$, (A.2) then becomes

$$\zeta(1-\zeta) > \frac{1}{2}\tau(1-\tau). \tag{A.3}$$

Since $M = T/2 < R_M < T$, it follows that $\zeta \in (1/2, 1)$. Observe that the lefthand side of (A.3) strictly decreases in ζ for all $\zeta \in (1/2, 1)$. For the definition of ζ, the replacement rate λ can be written as

$$\lambda = \frac{\zeta}{1-\zeta} \frac{\tau}{1-\tau},$$

from which it follows that $\lambda \leq 1$ ist equivalent to

$$\zeta \leq 1 - \tau \equiv \hat{\zeta}. \tag{A.4}$$

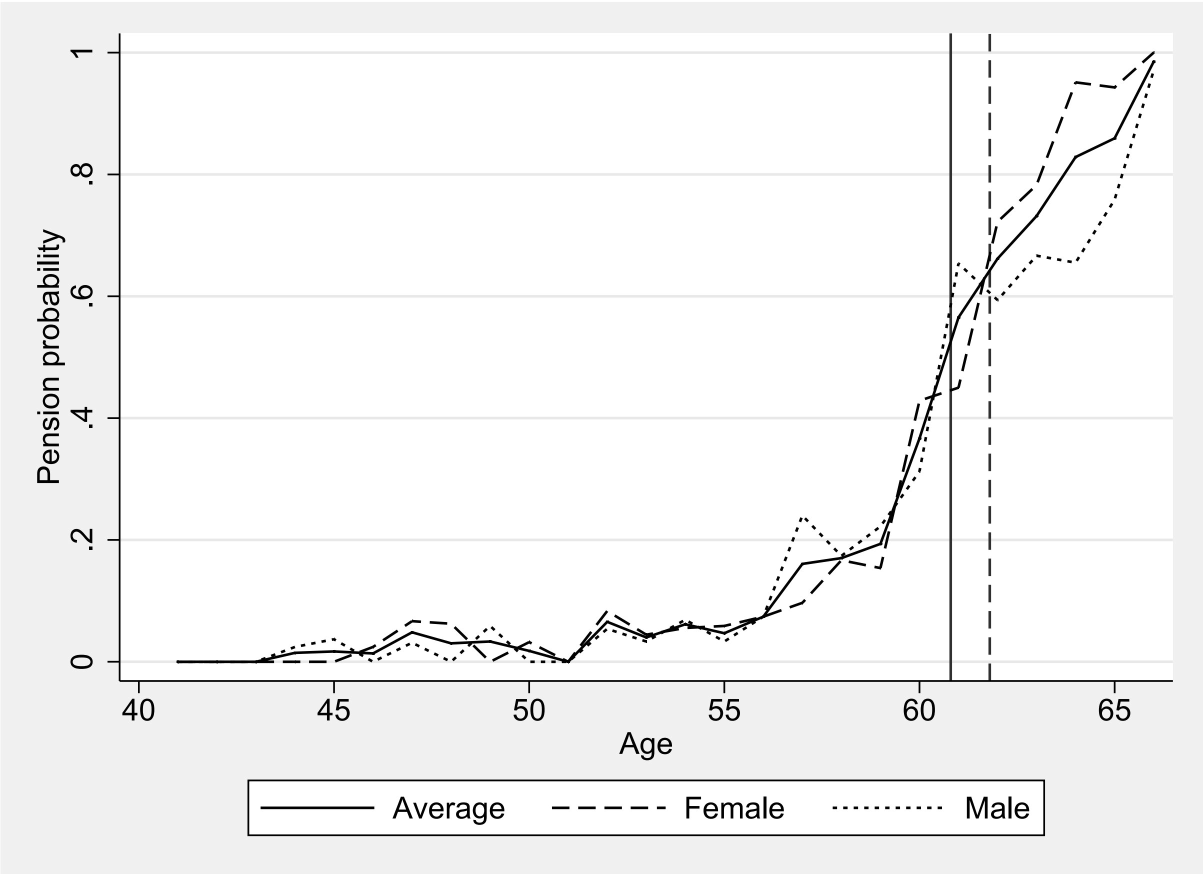
Since the lefthand side of (A.3) strictly decreases in ζ for all $\zeta \in (1/2, 1)$, a sufficient condition for (A.3) to hold is

$$\hat{\zeta}(1-\hat{\zeta}) > \frac{1}{2}\tau(1-\tau).$$

Replacing $\hat{\zeta}$ by (A.4), this inequality reduces to $1 > 1/2$. QED

A.2 Tables and Figures

Figure A1: Pension probability and age



Note: Own calculations based on ALLBUS data. The solid line in the left graph is the effective legal retirement age in 2006 for women (60.8 years). The dashed line is the effective retirement age for men (61.8 years) in 2006.

Table A1: Summary statistics for pension reform preferences

	Observations	Mean	Std. Dev.	Minimum	Maximum
Reform preference: Increase legal retirement age	1279	0.266	0.442	0	1
Pension-Dummy	1279	0.275	0.447	0	1
Education	1279	3.089	1.142	1	5
Male	1279	0.494	0.500	0	1
Left wing preference	1279	0.304	0.460	0	1
Political interest	1279	0.303	0.460	0	1
Party affiliation	1278	0.031	0.174	0	1

Source: Allbus 2006.

Table A2: Pension reform preferences – descriptive regressions

	(1) LPM Increase legal retirement age	(2) LPM Increase legal retirement age	(3) LOGIT Increase legal retirement age	(4) LPM Increase legal retirement age
Pension-Dummy	0.092**	0.123***	1.881***	
	(0.029)	(0.030)	(0.281)	
Education: General Certificate of Secondary Education (GCSE) - reference category				
Without formal education		0.145	1.867	0.138
		(0.114)	(0.893)	(0.116)
Secondary school		−0.078**	0.649**	−0.089**
		(0.029)	(0.108)	(0.029)
Upper secondary		−0.033	0.834	−0.030
		(0.054)	(0.248)	(0.055)
A levels		0.091**	1.556**	0.089*
		(0.035)	(0.261)	(0.035)
Male		0.019	1.099	0.016
		(0.024)	(0.142)	(0.024)
Left wing preference		−0.046	0.781	−0.042
		(0.026)	(0.111)	(0.026)
Age: older than 65 - reference category				
Age<25 years				−0.184***
				(0.049)
Age 25-35				−0.189***
				(0.043)
Age 35-45				−0.157***
				(0.040)
Age 45-55				−0.128**
				(0.041)
Age 55-65				−0.085*
				(0.043)
Constant	0.241***	0.244***	0.321***	0.395***
	(0.014)	(0.025)	(0.042)	(0.038)
Observations	1,279	1,279	1,279	1,279
Adj. R^2	0.008	0.025		0.029
Pseudo R^2			0.026	

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3: Pension reform preferences - FRD

	(1) FRD Increase legal retirement age	(2) FRD Increase legal retirement age	(3) BW ±20y Increase legal retirement age	(4) BW ±20y Increase legal retirement age	(5) BW ±15y Increase legal retirement age	(6) BW ±15y Increase legal retirement age	(7) BW ±10y Increase legal retirement age	(8) BW ±10y Increase legal retirement age
Pension-Dummy	0.197*	0.191*	0.372**	0.328**	0.472*	0.394*	1.229*	0.923*
	(0.078)	(0.077)	(0.125)	(0.119)	(0.190)	(0.176)	(0.626)	(0.470)
Score	0.000	0.001	−0.008	−0.006	−0.009	−0.005	−0.076	−0.056
	(0.001)	(0.001)	(0.005)	(0.005)	(0.009)	(0.009)	(0.042)	(0.032)
Instrument x score	−0.004	−0.003	−0.006	−0.003	−0.017	−0.013	0.000	0.006
	(0.005)	(0.005)	(0.007)	(0.006)	(0.010)	(0.009)	(0.022)	(0.019)
Education: General Certificate of Secondary Education (GCSE) - reference category								
Without formal education		0.120		0.018		−0.074		−0.269
		(0.115)		(0.126)		(0.133)		(0.258)
Secondary school		−0.100***		−0.103**		−0.139**		−0.152*
		(0.030)		(0.039)		(0.045)		(0.065)
Upper secondary		−0.040		−0.085		−0.094		−0.083
		(0.053)		(0.065)		(0.077)		(0.114)
A levels		0.091**		0.150**		0.153*		0.197*
		(0.035)		(0.051)		(0.060)		(0.090)
Male		0.018		0.049		0.043		0.050
		(0.024)		(0.032)		(0.037)		(0.052)
Left wing preference		−0.045		−0.053		−0.083*		−0.103
		(0.026)		(0.035)		(0.040)		(0.066)
First stage	Pension	Pension	Pension	Pension	Pension	Pension	Pension	Pension
T=1[X>c]	0.677***	0.679***	0.538***	0.547***	0.423***	0.435***	0.223*	0.248**
	(0.039)	(0.039)	(0.054)	(0.053)	(0.068)	(0.066)	(0.089)	(0.087)
Score	0.003***	0.003***	0.012***	0.012***	0.022***	0.022***	0.049***	0.048***
	(0.001)	(0.001)	(0.003)	(0.003)	(0.005)	(0.005)	(0.009)	(0.009)
Instrument x score	0.011***	0.011***	0.009*	0.009*	0.010	0.009	0.003	0.003
	(0.003)	(0.003)	(0.004)	(0.004)	(0.007)	(0.007)	(0.013)	(0.012)
Education: General Certificate of Secondary Education (GCSE) - reference category								
Without formal education		0.112		0.114		0.140		0.276
		(0.064)		(0.074)		(0.081)		(0.162)
Secondary school		0.029		0.015		0.018		0.012
		(0.015)		(0.022)		(0.027)		(0.037)
Upper secondary		0.027		0.029		0.058		0.088
		(0.023)		(0.036)		(0.050)		(0.067)
A levels		−0.026		−0.057*		−0.066		−0.076
		(0.015)		(0.026)		(0.034)		(0.046)
Male		0.006		0.010		0.002		0.002
		(0.011)		(0.017)		(0.022)		(0.029)
Left wing preference		0.025		0.049*		0.059*		0.073*
		(0.013)		(0.021)		(0.026)		(0.034)
Constant	0.097***	0.075***	0.193***	0.169***	0.257***	0.234***	0.385***	0.348***
	(0.019)	(0.017)	(0.038)	(0.036)	(0.050)	(0.049)	(0.069)	(0.067)
Observations	1,279	1,279	793	793	604	604	427	427
SW-F	296.531	307.788	98.240	107.297	38.672	43.489	6.194	8.160

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Left-wing preference: We generate a dummy variable from a 10 point left-right scale, assigning the left leaning values 1-4 the value 1 and the remaining self-assessments (5-10) the value zero.

Table A4: Robustness checks - Balance of Covariates

	(1) Education	(2) Male	(3) Left-wing preference	(4) Political interest	(5) Party affiliation
Pension-Dummy	0.302	0.077	−0.148	−0.008	0.008
	(0.190)	(0.081)	(0.078)	(0.074)	(0.034)
Score	−0.016***	−0.001	0.003*	0.009***	−0.001*
	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)
Instrument x score	−0.028**	−0.007	−0.006	−0.016***	0.003
	(0.010)	(0.005)	(0.004)	(0.004)	(0.002)
Male	0.017		0.026	0.190***	−0.025*
	(0.062)		(0.026)	(0.024)	(0.010)
Left wing preference	0.208**	0.028			
	(0.070)	(0.030)			
Education: General Certificate of Secondary Education (GCSE) - reference category					
Without formal education		0.128	−0.029	−0.255***	0.033***
		(0.113)	(0.099)	(0.074)	(0.010)
Secondary school		0.112**	−0.025	−0.127***	−0.002
		(0.035)	(0.032)	(0.029)	(0.011)
Upper secondary		0.118	−0.004	−0.007	−0.033
		(0.065)	(0.060)	(0.058)	(0.031)
A levels		0.112**	0.085*	0.189***	−0.007
		(0.038)	(0.037)	(0.035)	(0.013)
T=1[X>c]	0.678***	0.680***	0.677***	0.677***	0.677***
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Controls	YES	YES	YES	YES	YES
Observations	1,279	1,279	1,279	1,279	1,278
SW-F	299.057	308.869	301.697	301.697	301.341

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Left-wing preference: We generate a dummy variable from a 10 point left-right scale, assigning the left leaning values 1-4 the value 1 and the remaining self-assessments (5-10) the value zero.

Political interest: Measured on a five point scale. We use a dummy variable assigning the first two categories (very strong and strong) the value one, and the remaining three categories (medium, little, not at all) the value zero.

Party affiliation: Takes value one if the respondent indicates a party membership.

The same control variables are used for the first and second stage of the regression.

Table A5: Summary statistics for cross country regressions

	Observations	Mean	Std. Dev.	Minimum	Maximum	Source
Legal retirement age - Average	700	63.552	2.628	57.50	70.00	CWED
Legal retirement age - Women	700	62.834	3.285	55.00	70.00	CWED
Legal retirement age - Men	700	64.270	2.295	60.00	70.00	CWED
Replacement rate	700	51.095	9.060	11.85	77.72	CWED
Population over 65, % of population	700	14.098	2.660	7.20	23.00	CWED
Life expectancy at age 65	700	17.148	1.674	13.60	21.45	CWED
Log GDP	700	10.294	0.320	9.45	11.14	CWED
Real GDP growth (% change from previous year)	700	2.500	2.337	-8.27	11.27	CWED
Government support (seat share of all parties in government)	700	54.429	10.986	2.49	86.50	CPDS

CWED: Comparative Welfare Entitlements Dataset, see Scruggs et al. (2014); CPDS: Comparative Political Data Set, see Armingeon et al. (2015). The summary statistics refer to the full sample specified in regression 9.

Table A6: Fixed effects regressions – Legal retirement age women

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age
Replacement rate	−0.083***	−0.082***	−0.074***	−0.074***	−0.065**
	(0.026)	(0.026)	(0.022)	(0.022)	(0.023)
Population over 65	0.511***	0.604***	0.549***	0.550***	0.543***
	(0.092)	(0.123)	(0.117)	(0.116)	(0.121)
Life expectancy at age 65		−0.143	0.242	0.240	0.152
		(0.209)	(0.439)	(0.436)	(0.677)
GDP per capita			−2.497	−2.490	−3.205
			(2.164)	(2.159)	(2.174)
GDP growth			−0.005	−0.005	−0.005
			(0.030)	(0.029)	(0.045)
Government support				−0.005	−0.003
				(0.013)	(0.013)
Country FE	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	YES
Observations	713	703	700	700	700
Countries	20	20	20	20	20
Adj. R^2	0.335	0.344	0.372	0.372	0.359

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Fixed effects regressions – Legal retirement age men

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age
Replacement rate	−0.063**	−0.060**	−0.049**	−0.049**	−0.035*
	(0.025)	(0.023)	(0.021)	(0.021)	(0.020)
Population over 65	0.194*	0.268	0.197	0.201	0.185
	(0.112)	(0.176)	(0.155)	(0.150)	(0.157)
Life expectancy at age 65		−0.127	0.395	0.392	0.334
		(0.214)	(0.371)	(0.361)	(0.444)
GDP per capita			−3.359*	−3.342*	−3.983*
			(1.677)	(1.650)	(2.072)
GDP growth			0.024	0.024	0.038
			(0.031)	(0.029)	(0.039)
Government support				−0.013	−0.011
				(0.012)	(0.013)
Country FE	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	YES
Observations	713	703	700	700	700
Countries	20	20	20	20	20
Adj. R^2	0.122	0.130	0.223	0.228	0.217

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Influence of the instruments on other social security measures

	(1) Health exp.	(2) Health exp.	(3) Health exp.	(4) Health exp.	(5) Incapacity benef.	(6) Incapacity benef.	(7) Incapacity benef.	(8) Incapacity benef.
1st lag of public debt	−0.002				−0.001			
	(0.004)				(0.005)			
3 year avg. of public debt		−0.007				−0.002		
		(0.005)				(0.005)		
1st lag replacement rate			0.032*				0.001	
			(0.018)				(0.011)	
3 year average of rep. rate				0.033				0.004
				(0.019)				(0.014)
Population over 65	0.037	0.075	−0.067	−0.071	−0.120*	−0.109	−0.143*	−0.148*
	(0.097)	(0.106)	(0.047)	(0.049)	(0.065)	(0.067)	(0.069)	(0.071)
Life expectancy at age 65	0.072	0.080	0.143	0.121	0.236	0.290	0.268	0.322
	(0.255)	(0.243)	(0.257)	(0.275)	(0.279)	(0.297)	(0.278)	(0.297)
GDP per capita	−1.094	−1.342	−1.840***	−1.840***	−2.551***	−2.725***	−2.656***	−2.671***
	(1.039)	(0.981)	(0.505)	(0.515)	(0.686)	(0.632)	(0.765)	(0.758)
GDP growth	−0.064***	−0.062***	−0.056**	−0.060**	−0.030**	−0.026*	−0.031**	−0.028**
	(0.019)	(0.019)	(0.022)	(0.024)	(0.014)	(0.013)	(0.014)	(0.012)
Government support	0.002	0.003	0.006	0.006	−0.001	0.001	−0.001	−0.000
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.005)	(0.007)	(0.007)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	604	587	580	556	596	579	572	549
Countries	20	20	20	20	20	20	20	20
Adj. R^2	0.631	0.646	0.663	0.656	0.191	0.216	0.186	0.189

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Influence of the instruments on other social security measures

	(1) Active labor market exp.	(2) Active labor market exp.	(3) Active labor market exp.	(4) Active labor market exp.	(5) Unemployment benefit exp.	(6) Unemployment benefit exp.	(7) Unemployment benefit exp.	(8) Unemployment benefit exp.
1st lag of public debt	0.004*				0.003			
	(0.002)				(0.004)			
3 year avg. of public debt		0.003				0.000		
		(0.002)				(0.004)		
1st lag Replacement rate			0.006				0.011	
			(0.009)				(0.015)	
3 year average of rep. rate				0.008				0.011
				(0.010)				(0.017)
Population over 65	0.010	0.011	0.029	0.026	−0.015	0.007	−0.044	−0.046
	(0.032)	(0.031)	(0.025)	(0.025)	(0.074)	(0.075)	(0.038)	(0.039)
Life expectancy at age 65	−0.131	−0.125	−0.128	−0.129	0.394*	0.423*	0.460**	0.433*
	(0.122)	(0.120)	(0.129)	(0.130)	(0.228)	(0.231)	(0.217)	(0.209)
GDP per capita	−0.199	−0.270	−0.573	−0.565	−2.845***	−3.089***	−3.707***	−3.687***
	(0.365)	(0.386)	(0.402)	(0.398)	(0.690)	(0.711)	(0.640)	(0.683)
GDP growth	−0.004	−0.004	0.002	0.002	−0.032*	−0.026	−0.031*	−0.026
	(0.008)	(0.008)	(0.008)	(0.008)	(0.018)	(0.020)	(0.017)	(0.019)
Government support	0.000	0.000	0.002	0.002	0.003	0.004	0.008	0.007
	(0.003)	(0.003)	(0.002)	(0.002)	(0.006)	(0.006)	(0.005)	(0.005)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	527	516	516	502	589	574	564	541
Countries	20	20	20	20	20	20	20	20
Adj. R^2	0.209	0.196	0.180	0.184	0.384	0.402	0.446	0.460

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: IV regressions - women

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age	(6) Legal ret. age	(7) Legal ret. age	(8) Legal ret. age
Replacement rate	−0.103***	−0.077**	−0.127***	−0.104***	−0.152	−0.371	−0.169	−0.260
	(0.032)	(0.030)	(0.038)	(0.030)	(0.117)	(0.266)	(0.135)	(0.191)
Population over 65	0.518***	0.434***	0.515***	0.510***	0.617***	0.430	0.628***	0.641***
	(0.089)	(0.085)	(0.088)	(0.111)	(0.201)	(0.342)	(0.196)	(0.179)
Life expectancy at age 65		0.710		0.714		1.639**		0.484
		(0.472)		(0.496)		(0.642)		(0.778)
GDP per capita		−3.356**		−3.171		−1.448		−2.277
		(1.404)		(2.018)		(2.963)		(1.901)
Health exp. % GDP		0.158						
		(0.287)						
Act. lab. market exp. % GDP						0.451		
						(1.011)		
GDP growth		0.009		−0.013		−0.104		−0.069
		(0.041)		(0.039)		(0.116)		(0.074)
Government support		−0.002		−0.002		−0.004		−0.005
		(0.011)		(0.011)		(0.018)		(0.013)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	YES	NO	YES	NO	YES	NO	YES
First stage	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate
1st lag rep. rate	0.893***	0.880***						
	(0.030)	(0.028)						
Avg. rep. rate			0.879***	0.896***				
			(0.045)	(0.045)				
1st lag public debt					0.102***	0.062		
					(0.021)	(0.047)		
Avg. public debt							0.094***	0.065**
							(0.022)	(0.027)
Observations	676	571	621	611	702	509	662	650
Countries	20	20	20	20	20	20	20	20
SW-F	901.061	1021.759	378.749	398.553	23.206	1.769	18.223	5.868

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A11: IV regressions - men

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age	(6) Legal ret. age	(7) Legal ret. age	(8) Legal ret. age
Replacement rate	-0.080^{**}	-0.039	-0.095^{**}	-0.063^{**}	-0.208^{**}	-0.391	-0.223^{**}	-0.362^{**}
	(0.031)	(0.029)	(0.039)	(0.030)	(0.096)	(0.312)	(0.103)	(0.184)
Population over 65	0.202^{*}	0.104	0.199^{*}	0.167	0.415^{**}	0.257	0.411^{**}	0.367
	(0.109)	(0.138)	(0.110)	(0.145)	(0.196)	(0.402)	(0.187)	(0.283)
Life expectancy at age 65		0.671		0.347		1.279^{*}		0.850
		(0.424)		(0.488)		(0.727)		(0.587)
GDP per capita		-3.937^{**}		-3.942^{**}		-0.477		-2.222
		(1.596)		(1.906)		(3.407)		(2.099)
Health exp. % GDP		0.086						
		(0.235)						
Act. lab. market exp. % GDP						0.466		
						(1.119)		
GDP growth		0.041		0.027		-0.121		-0.072
		(0.032)		(0.035)		(0.133)		(0.069)
Government support		-0.011		-0.011		-0.014		-0.015
		(0.011)		(0.011)		(0.020)		(0.015)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	YES	NO	YES	NO	YES	NO	YES
1st lag rep. rate	0.893^{***}	0.880^{***}						
	(0.030)	(0.028)						
Avg. rep. rate			0.879^{***}	0.896^{***}				
			(0.045)	(0.045)				
1st lag public debt					0.102^{***}	0.062		
					(0.021)	(0.047)		
Avg. public debt							0.094^{***}	0.065^{**}
							(0.022)	(0.027)
Observations	676	571	621	611	702	509	662	650
Countries	20	20	20	20	20	20	20	20
SW-F	901.061	1021.759	378.749	398.553	23.206	1.769	18.223	5.868

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: IV regression: Stepwise inclusion of control variables

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age	(6) Legal ret. age	(7) Legal ret. age	(8) Legal ret. age	(9) Legal ret. age	(10) Legal ret. age	(11) Legal ret. age	(12) Legal ret. age
Replacement rate	-0.091^{***}	-0.076^{***}	-0.076^{***}	-0.113^{***}	-0.094^{***}	-0.094^{***}	-0.191^{**}	-0.172^{**}	-0.166^{**}	-0.204^{**}	-0.180^{*}	-0.175^{*}
	(0.030)	(0.026)	(0.026)	(0.037)	(0.032)	(0.032)	(0.093)	(0.087)	(0.083)	(0.101)	(0.096)	(0.091)
Population over 65	0.444^{***}	0.368^{***}	0.373^{***}	0.430^{***}	0.347^{***}	0.352^{***}	0.531^{***}	0.479^{***}	0.475^{***}	0.511^{***}	0.454^{***}	0.451^{***}
	(0.137)	(0.122)	(0.119)	(0.132)	(0.116)	(0.112)	(0.160)	(0.146)	(0.145)	(0.163)	(0.143)	(0.141)
Life expectancy at age 65	−0.133	0.355	0.349	−0.115	0.407	0.400	0.003	0.251	0.254	0.029	0.320	0.320
	(0.196)	(0.367)	(0.360)	(0.193)	(0.349)	(0.340)	(0.212)	(0.311)	(0.308)	(0.202)	(0.301)	(0.298)
GDP per capita		-3.095^{*}	-3.073^{*}		-3.322^{**}	-3.303^{**}		−1.761	−1.816		−2.036	−2.070
		(1.656)	(1.637)		(1.535)	(1.507)		(1.570)	(1.537)		(1.501)	(1.468)
GDP growth		0.005	0.005		0.006	0.006		−0.018	−0.017		−0.007	−0.006
		(0.030)	(0.029)		(0.031)	(0.031)		(0.036)	(0.036)		(0.033)	(0.033)
Government support			−0.009			−0.009			−0.007			−0.005
			(0.011)			(0.010)			(0.010)			(0.009)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
First stage	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate
1st lag rep. rate	0.884^{***}	0.884^{***}	0.884^{***}									
	(0.031)	(0.032)	(0.032)									
Avg. rep. rate				0.864^{***}	0.884^{***}	0.884^{***}						
				(0.045)	(0.043)	(0.043)						
1st lag public debt							0.110^{***}	0.112^{***}	0.115^{***}			
							(0.016)	(0.016)	(0.018)			
Avg. public debt										0.103^{***}	0.103^{***}	0.107^{***}
										(0.015)	(0.014)	(0.015)
Observations	666	666	666	611	611	611	692	689	689	652	650	650
Countries	20	20	20	20	20	20	20	20	20	20	20	20
SW-F	810.810	759.754	760.578	375.141	414.410	415.187	46.135	46.613	39.547	45.210	52.335	50.087

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A13: IV regression: Stepwise inclusion of control variables – women

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age	(6) Legal ret. age	(7) Legal ret. age	(8) Legal ret. age	(9) Legal ret. age	(10) Legal ret. age	(11) Legal ret. age	(12) Legal ret. age
Replacement rate	−0.104***	−0.090***	−0.090***	−0.130***	−0.110***	−0.110***	−0.167	−0.149	−0.146	−0.183	−0.159	−0.158
	(0.032)	(0.027)	(0.027)	(0.038)	(0.033)	(0.033)	(0.113)	(0.108)	(0.103)	(0.128)	(0.123)	(0.117)
Population over 65	0.610***	0.538***	0.541***	0.601***	0.513***	0.517***	0.670***	0.617***	0.616***	0.656***	0.600***	0.599***
	(0.116)	(0.107)	(0.106)	(0.112)	(0.099)	(0.099)	(0.146)	(0.134)	(0.133)	(0.140)	(0.122)	(0.121)
Life expectancy at age 65	−0.139	0.314	0.311	−0.129	0.411	0.407	−0.041	0.210	0.212	−0.010	0.267	0.267
	(0.202)	(0.393)	(0.389)	(0.200)	(0.350)	(0.347)	(0.219)	(0.352)	(0.352)	(0.217)	(0.344)	(0.343)
GDP per capita		−2.889	−2.877		−3.448**	−3.437**		−1.764	−1.791		−1.956	−1.964
		(1.791)	(1.782)		(1.478)	(1.464)		(1.679)	(1.654)		(1.617)	(1.595)
GDP growth		−0.005	−0.006		−0.004	−0.004		−0.024	−0.023		−0.015	−0.015
		(0.031)	(0.030)		(0.032)	(0.032)		(0.036)	(0.036)		(0.032)	(0.032)
Government support			−0.005			−0.005			−0.004			−0.001
			(0.012)			(0.011)			(0.011)			(0.010)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
First stage	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate
1st lag rep. rate	0.884***	0.884***	0.884***									
	(0.031)	(0.032)	(0.032)									
Avg. rep. rate				0.864***	0.884***	0.884***						
				(0.045)	(0.043)	(0.043)						
1st lag public debt							0.110***	0.112***	0.115***			
							(0.016)	(0.016)	(0.018)			
Avg. public debt										0.103***	0.103***	0.107***
										(0.015)	(0.014)	(0.015)
Observations	666	666	666	611	611	611	692	689	689	652	650	650
Countries	20	20	20	20	20	20	20	20	20	20	20	20
SW-F	810.810	759.754	760.578	375.141	414.410	415.187	46.135	46.613	39.547	45.210	52.335	50.087

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A14: IV regression: Stepwise inclusion of control variables – men

	(1) Legal ret. age	(2) Legal ret. age	(3) Legal ret. age	(4) Legal ret. age	(5) Legal ret. age	(6) Legal ret. age	(7) Legal ret. age	(8) Legal ret. age	(9) Legal ret. age	(10) Legal ret. age	(11) Legal ret. age	(12) Legal ret. age
Replacement rate	−0.078**	−0.062**	−0.062**	−0.096**	−0.077**	−0.078**	−0.215**	−0.195**	−0.187**	−0.225**	−0.201**	−0.193**
	(0.030)	(0.027)	(0.026)	(0.039)	(0.033)	(0.033)	(0.084)	(0.077)	(0.073)	(0.088)	(0.083)	(0.078)
Population over 65	0.277	0.198	0.204	0.259	0.180	0.188	0.393**	0.340*	0.335*	0.365*	0.308*	0.303*
	(0.172)	(0.155)	(0.149)	(0.167)	(0.152)	(0.146)	(0.195)	(0.180)	(0.178)	(0.205)	(0.186)	(0.182)
Life expectancy at age 65	−0.126	0.396	0.388	−0.102	0.404	0.394	0.046	0.292	0.297	0.069	0.373	0.373
	(0.203)	(0.369)	(0.357)	(0.199)	(0.367)	(0.354)	(0.231)	(0.303)	(0.298)	(0.217)	(0.298)	(0.292)
GDP per capita		−3.301**	−3.270**		−3.196*	−3.169**		−1.757	−1.840		−2.115	−2.177
		(1.643)	(1.610)		(1.645)	(1.605)		(1.591)	(1.541)		(1.529)	(1.475)
GDP growth		0.016	0.016		0.015	0.015		−0.012	−0.011		0.001	0.002
		(0.031)	(0.030)		(0.032)	(0.032)		(0.038)	(0.037)		(0.036)	(0.035)
Government support			−0.013			−0.013			−0.011			−0.009
			(0.011)			(0.010)			(0.011)			(0.009)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
First stage	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate	Rep. rate
1st lag rep. rate	0.884***	0.884***	0.884***									
	(0.031)	(0.032)	(0.032)									
Avg. rep. rate				0.864***	0.884***	0.884***						
				(0.045)	(0.043)	(0.043)						
1st lag public debt							0.110***	0.112***	0.115***			
							(0.016)	(0.016)	(0.018)			
Avg. public debt										0.103***	0.103***	0.107***
										(0.015)	(0.014)	(0.015)
Observations	666	666	666	611	611	611	692	689	689	652	650	650
Countries	20	20	20	20	20	20	20	20	20	20	20	20
SW-F	810.810	759.754	760.578	375.141	414.410	415.187	46.135	46.613	39.547	45.210	52.335	50.087

Standard errors (clustered at country level) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$