Economics Letters 227 (2023) 111122

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Who wants (them) to work longer?

Benjamin Bittschi [a,*], Berthold U. Wigger [b]

[a] Austrian Institute of Economic Research, Vienna, Austria
[b] Karlsruhe Institute of Technology, Department of Economics, Germany

ARTICLE INFO

Article history:
Received 30 November 2022
Received in revised form 11 April 2023
Accepted 14 April 2023
Available online 20 April 2023

JEL classification:
D72
H55
J26

Keywords:
Legal retirement age
Age-specific preferences
Pension reform

ABSTRACT

This paper examines age-specific individual preferences for the legal retirement age. Within a theoretical model, we develop the hypothesis that retirees prefer a higher legal retirement age than workers, and that newly retired individuals prefer the highest retirement age. Retirees benefit from a positive fiscal externality. A higher legal retirement age leads to higher pension benefits, without retirees having to bear the costs in the form of a longer working life. We corroborate the hypothesis empirically with a fuzzy regression discontinuity design and show that newly retired individuals are indeed most in favor of an increasing retirement age. We conclude that in aging societies the political feasibility of raising the legal retirement age increases.

1. Introduction

This paper studies age-specific individual preferences for the legal retirement age. First, we characterize these preferences in a simple, overlapping generations life-cycle model. We show that retirees prefer a higher legal retirement age than workers, and that recently retired individuals prefer the highest legal retirement age. Retirees benefit from a positive fiscal externality. Via the budget constraint of pay-as-you-go public pensions, a higher legal retirement age leads to higher pension benefits, without retirees having to bear the costs in the form of a longer working life.

Subsequently, we test this hypothesis empirically. We conduct descriptive regression analyses with German data to demonstrate that retirement significantly raises the likelihood of supporting an increase in the retirement age. Moreover, using a fuzzy regression discontinuity (FRD) design, we show that this result can be given a causal interpretation, especially for those individuals which have just retired. The descriptive regression results show that the probability of supporting an increase in the legal retirement age increases by 12.3 percentage points for individuals after retirement. The FRD results even suggest a 39 percentage point increase in our most preferred specification.

* Corresponding author.
E-mail addresses: benjamin.bittschi@wifo.ac.at (B. Bittschi), berthold.wigger@kit.edu (B.U. Wigger).

2. Legal retirement age preferences

We characterize age-specific legal retirement age preferences within a time-continuous overlapping generations life-cycle framework.[1] 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, 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

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

where u denotes instantaneous utility from consumption, with $u' > 0$ and $u'' < 0$, and c_A denotes the periodical consumption of an individual of age A. The function $z = z(A) > 0$ measures

[1] The model is based on Sheshinski (1978). A number of theoretical studies build on Sheshinski's work to study the determinants of individual retirement behavior and the legal retirement age. Examples are Profeta (2002), Conde-Ruiz et al. (2013), Cremer and Pestieau (2003), Conde-Ruiz and Galasso (2004), Casamatta et al. (2005), Lacomba and Lagos (2006), Lacomba and Lagos (2007) and Casamatta and Gondim (2011).

https://doi.org/10.1016/j.econlet.2023.111122

instantaneous disutility, which an individual of age A derives from labor. We assume that $z' \geq 0$, so that labor disutility is non-decreasing with 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 the strict concavity of the instantaneous utility function u, this leads to a constant remaining consumption flow of an 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 historical legal retirement age, i.e., the legal retirement age that has prevailed until the current period. So, let the historical legal retirement age be given by $\bar{R}$. Then, with c_A determined by (3), the amount of cumulated savings of an individual of age $A < \bar{R}$ can be written as

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

Note that a current change in R does not affect S_A, as S_A has been based on the historical level $\bar{R}$.

To determine age-specific retirement age preferences, we assume that there is a grandfathering clause in place, which stipulates that $\bar{R}$ continues to apply to the current retirees. Thus, no retired individual has to go back to work in order to qualify for pension benefits, if the legal retirement age increases. We ask what legal retirement age an individual of age A prefers, on the assumption that a change in the legal retirement age is permanent in the sense that it will not change again during the individual's lifetime.

We start by looking at the retirement age preferences of retired individuals. These preferences can be readily determined because a rising legal retirement age unequivocally increases the 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 such an increase. In fact, an individual of age $A = \bar{R}$, that is, an individual that has just retired, prefers the legal retirement age to be as high as possible, namely $R = T$. 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 R as long as $R < T - A + \bar{R}$, and is indifferent to further increases.

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. In principle, this trade-off is the same for all workers regardless of their age. However, workers of different ages may be affected differently by a change in the legal retirement age. Workers aged $A = 0$ can adjust their total life savings fully to the change, but older workers can only do so imperfectly because some of their savings are historically predetermined. Since cumulated savings depend on the historical legal retirement age $\bar{R}$, as can be inferred from (4), the legal retirement age preferred by a worker of age A, R_A, also depends on $\bar{R}$. In the appendix, we show that R_A can be written as a function $R_A = R_A(\bar{R})$. This function has a single fixed point R^*, so that all workers prefer $R_A = R^*$ if $\bar{R} = R^*$. Furthermore, we show that R^* is a stable fixed point. We thus assume that the historical legal retirement age is given by $\bar{R} = R^*$. This would be the case, for instance, if in the past workers had a majority and if there was repeated majority voting on the legal retirement age. Then, $R = R^*$ would eventually come out as a self-repeating result.

Fig. 1 illustrates the results for age-specific retirement age preferences when the historical legal retirement age is $\bar{R} = R^*$. All workers then prefer $R = R^*$, 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. Retirees benefit from a positive fiscal externality of an increasing legal retirement age, as they enjoy higher future pension benefits without having to work longer. This has a straightforward welfare implication. Starting from R^*, workers only experience a second-order effect from an increase in the legal retirement age, as R^* maximizes workers' utility (see appendix). Retirees, on the other hand, benefit from a positive first-order effect. Therefore, the total of all individual utility levels increases with an increase in the legal retirement age. This implies that a legal retirement age resulting from majority voting would be too low from a welfare perspective, if workers had a majority.

We conclude the theoretical discussion with the following hypothesis, which is tested in the next section.

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

3. Empirical analysis

Descriptive analysis. We start with descriptive regressions and employ the representative German ALLBUS survey,[2] which has been conducted biannually since 1980. The wave we use is from 2006 and contains a question on different pension reform options, including the attitude towards an increase in the legal retirement age. More precisely, we consider a reform dummy as the dependent variable to measure preferences for an increasing legal retirement age. The survey question used to construct the dummy is: "To solve the problems in the public pension insurance

[2] In contrast to our micro data approach, there are a few papers using calibrated macro models to study the political feasibility of increasing the retirement age, see for instance, Bütler (2000) for Switzerland or Galasso (2008) for France, Italy, the UK, and the US.

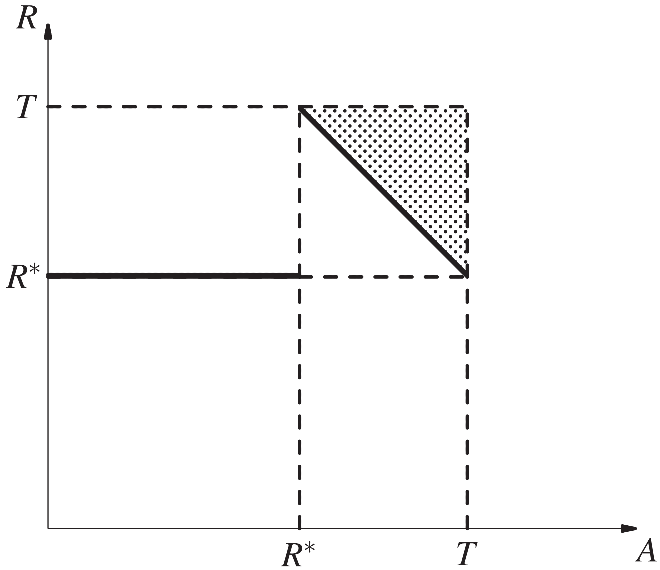

Fig. 1. Legal retirement age preferences across age.

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 variable of interest, Pension, is a dummy indicating whether the respondent is a retiree. Additionally, we control for education, gender, and political preferences with a 10-point left–right scale.[3] We estimate the following equation:

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

Table 1 depicts the regression results. It becomes evident that individual preferences to increase the retirement age are consistent with Hypothesis 1. Retirees have a significantly higher probability to opt for an increasing legal retirement age. More precisely, the increase in the probability is 9.2 percentage points (PP). When we add control variables, the probability increase amounts to 12.3 PP. To rule out functional form misspecification we estimate a logit model (column 3), which leads to a similar result. The odds of opting for an increase in the retirement age is 1.9 for retirees compared to employees. Fig. 1 from Section 2 suggests that employees, irrespective of age, do not differ in their preferences for an increasing 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 theory.

FRD-Design. The regressions above support our hypothesis. However, they may suffer from endogeneity and not reveal causal effects. 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, its logic suggests 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 an FRD-design.

Table 1
Pension reform preferences — descriptive regressions.

	(1) LPM	(2) LPM	(3) LOGIT	(4) LPM
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; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
The full table with all control variables is given in Table A2 in the appendix.

The treatment, D, that we observe is Pension, which, according to our theory, sharply increases political support for a higher legal retirement age.[4] Pension take-up, however, does not take place solely at the legal retirement age and thus makes the RD design fuzzy. In reality, the jump in the probability of receiving the treatment 'Pension' becomes maximal around the effective retirement age, which therefore forms the cutoff, c. According to OECD figures for 2006 in Germany, this is at age 60.8/61.8 for women/men.[5] The assignment variable, X, then is the difference between the age of an individual and the cutoff age.

While the individual retirement age is manipulable, this is not the case for the effective retirement age, which results from all retirement decisions of a society. As no individual can influence the effective retirement age,[6] 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 is

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

The treatment effect in an FRD can be estimated with an IV-regression and the estimates can be interpreted as a local average treatment effect (Lee and Lemieux, 2010).[7] In the estimation we use heteroskedasticity robust standard errors and estimate $f(X - c)$ in both stages with a first degree polynomial. Fig. 2 illustrates the discontinuity effect of pension entry.[8] The x-axis

3 Summary statistics are in Table A1 in the appendix.

4 See Battistin et al. (2009) and Müller and Shaikh (2018) for similar FRD strategies.

5 Figure A1 in the appendix plots the development of the probability of receiving the treatment Pension between age 45 and 70, showing that the Pension probability increases discontinuously in only seven years (between age 58 and 65) from approximately 0.2 to roughly 1.

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

7 More precisely, the treatment effect is the LATE for compliers with a score close to the threshold. While this effect is hard to generalize, for our purpose it is precisely the discontinuity in Fig. 1 that we want to identify.

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

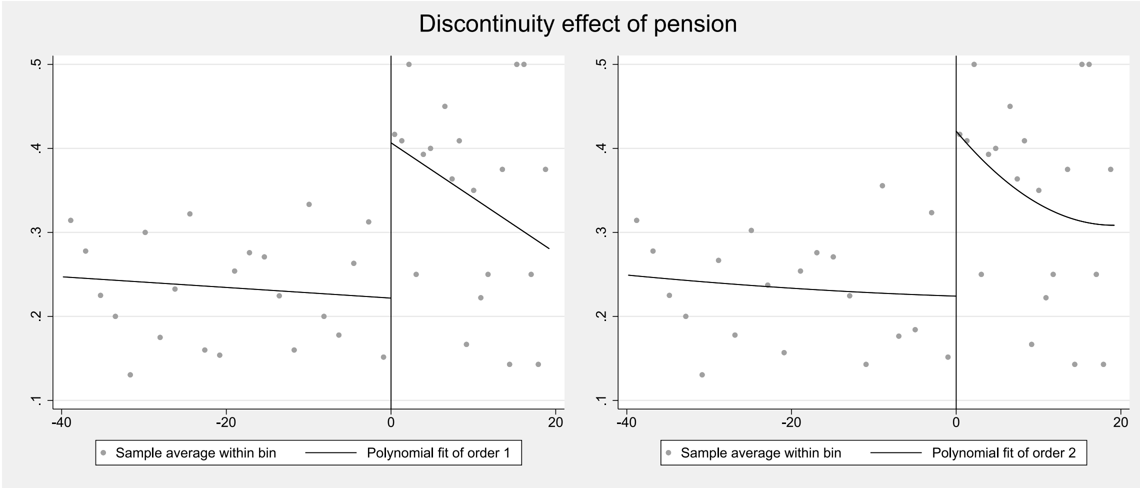

Fig. 2. Time before/after effective retirement age and pension reform preferences.
Note: Own calculations based on ALLBUS data.
Left graph: RD plot with first degree polynomial with evenly spaced bins that mimic the underlying variance of the data implemented by spacings estimators. 858 observations 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.

Table 2
Pension reform preferences — FRD.

	(1) FRD–all	(2) FRD–all	(3) BW ± 20y	(4) BW ± 20y	(5) BW ± 15y	(6) BW ± 15y	(7) BW ± 10y	(8) BW ± 10y
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.

depicts the distance to the effective legal retirement age in years and the *y*-axis the probability of a reform preference for an increase in the legal retirement age. The left graph of Fig. 2 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. The raw data plot strongly resembles Fig. 1 of the theoretical model and supports Hypothesis 1, i.e., a strong discontinuity in reform support for an increasing 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 increasing legal retirement age becomes 19.7 PP. The first-stage F-statistic is strong and the instrument coefficient is highly significant. Adding control variables does not affect the significance and magnitude of this effect. We check the sensitivity of this result to a range of bandwidths and scrutinize individuals close to the cutoff. Therefore, we first decrease the bandwidth to ±20 years around the cutoff. This increases the effect size of the Pension treatment to 37.2 PP (32.8 PP with controls). 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. Consequently, the first-stage F-statistic shrinks and the standard errors of the instrument become larger. Still, the effect is statistically significant and becomes larger. Columns 5 and 7 of Table 2 say that the probability of supporting an increasing legal retirement age increases by 47 and 123 PP after retirement, respectively. As columns 6 and 8 show, adding control variables reduces the effect to 39 and 92 PP.[9]

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 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, supporting the assumption of no sorting around the cutoff. Moreover, we

9 Based on survey data and contrary to our results, Boeri et al. (2002) find that in Germany lower pensions are more popular than an increased legal retirement age. However, the paper does not contain a causal analysis.

can also show that Pension has no influence on general policy preferences. This could happen if retirees devoted more time to political participation, which would shape political preferences in a way that would not occur without retirement. Again, this would invalidate causal interpretations of our results. However, columns 3 to 5 in Table A4 show that Pension does not change individual preferences on a self-assessed left–right policy scale and does not affect general political interest or party affiliation.

4. Conclusion

The present paper has provided theoretical and empirical evidence that population aging may promote the political feasibility of increasing the legal retirement age. Our results say that retired individuals and especially those who have just retired support an increase in the legal retirement age. This may have implications for the timing of pension reforms. In many countries, the baby boomers are currently or will soon be retiring. Our results suggest that this is a good moment for policymakers to increase the legal retirement age. Future cohorts of workers should therefore expect to have to work for a longer part of their lives.

In sum, this paper offers a balanced perspective 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 path to a gerontocracy (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; Lancia and Russo, 2016).

Data availability

Data will be made available on request.

Acknowledgments

We thank the editor Audra Bowlus, an anonymous referee as well as Luna Bellani, Axel Börsch-Supan, Christina Felfe, Vincenzo Galasso, Laszlo Goerke, Helmut Hofer, Kai Konrad, Clemens Puppe, Michael Reiter, Richard Sellner, Mujaheed Shaikh and Nora Szech for helpful comments and suggestions.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econlet.2023.111122.

References

Battistin, E., Brugiavini, A., Rettore, E., Weber, G., 2009. The retirement consumption puzzle: Evidence from a regression discontinuity approach. Amer. Econ. Rev. 99 (5), 2209–2226.
Boeri, T., Boersch-Supan, A., Tabellini, G., 2002. Pension reforms and the opinions of European citizens. Am. Econ. Rev. Pap. Proc. 92 (2), 396–401.
Bütler, M., 2000. The political feasibility of pension reform options: the case of Switzerland. J. Public Econ. 75 (3), 389–416.
Calonico, S., Cattaneo, M., Titiunik, R., 2014. Robust data-driven inference in the regression-discontinuity design. Stata J. 14 (4), 909–946.
Casamatta, G., Cremer, H., Pestieau, P., 2005. Voting on pensions with endogenous retirement age. Int. Tax Public Finance 12 (1), 7–28.
Casamatta, G., Gondim, J.L.B., 2011. Reforming the pay-as-you-go pension system: Who votes for it? When? FinanzArchiv Public Finance Anal. 67 (3), 225–260.
Conde-Ruiz, J., Galasso, V., 2004. The macroeconomics of early retirement. J. Public Econ. 88 (9–10), 1849–1869.
Conde-Ruiz, J.I., Galasso, V., Profeta, P., 2013. The role of income effects in early retirement. J. Public Econ. Theory 15 (3), 477–505.
Cremer, H., Pestieau, P., 2003. The Double Dividend of Postponing Retirement. Int. Tax Public Finance 10 (4), 419–434.
Galasso, V., 2008. Postponing retirement: the political effect of aging. J. Public Econ. 92 (10–11), 2157–2169.
Irmen, A., 2017. Capital- and labor-saving technical change in an aging economy. Internat. Econom. Rev. 58 (1), 261–285.
Lacomba, J.A., Lagos, F., 2006. Population aging and legal retirement age. J. Popul. Econ. 19 (3), 507–519.
Lacomba, J.A., Lagos, F.M., 2007. Political election on legal retirement age. Soc. Choice Welf. 29 (1), 1–17.
Lancia, F., Russo, A., 2016. Public education and pensions in democracy: A political economy theory. J. Eur. Econom. Assoc. 14 (5), 1038–1073.
Lee, D.S., Lemieux, T., 2010. Regression discontinuity designs in economics. J. Econ. Lit. 48 (2), 281–355.
Müller, T., Shaikh, M., 2018. Your retirement and my health behavior: Evidence on retirement externalities from a fuzzy regression discontinuity design. J. Health Econ. 57, 45–59.
Profeta, P., 2002. Retirement and social security in a probabilistic voting model. Int. Tax Public Finance 9 (4), 331–348.
Sheshinski, E., 1978. A model of social security and retirement decisions. J. Public Econ. 10 (3), 337–360.
Sinn, H.-W., Uebelmesser, S., 2003. Pensions and the path to gerontocracy in Germany. Eur. J. Political Econ. 19 (1), 153–158.