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Abstract

Analyzing 30 OECD-countries between 1980-2010, this paper estimates the effect of an aging electorate on public expenditure on old age. The main outcome is that an increase in the age of the median voter is not significantly associated with more generous pensions. The second result is that an older median voter is not significantly associated with an increase in pension expenditure relative to GDP. The results do not support the main prediction of median voter models that an older median voter will successfully push for higher individual benefits. There is however a positive and significant effect of the dependency ratio on both public expenditure on old age and on generosity of pensions.

JEL classification: C23; H55; J18

Key words: aging; retirement; political economy

I. Introduction

Aging has called the financial sustainability of publicly financed pension arrangements into question (OECD, 2011). This has become more pressing with the credit crisis, in which the health of public finance deteriorated. There are two ways in which aging may positively influence public expenditure on old age.

The first effect is that there are more retirees on the receiving end of Social Security. As a result, aging virtually automatically leads to higher overall old-age expenditure. This upward pressure on old-age expenditure could only be avoided by a substantial decrease of benefits per retiree. A second effect of aging is that the electorate consists of older voters; arguably retirees thus have more political influence. Median voter models in particular postulate that an older median voter will push successfully for more generous pension benefits (Galasso (2006), Persson and Tabellini (2000)). Aging will then not only lead to higher total old age spending but also to more generous pension benefits.

Using OECD data from 30 countries between 1980 and 2010, this paper tests the median voter hypothesis that an older median voter leads to more generous pension benefits. The effect of an older median voter on pension spending relative to GDP is considered as well.

Only public spending is taken into account here, disregarding individual savings via pension funds, insurance companies and banks. We focus on the political pressure to increase pensions theorized to arise from an older electorate. As governments can influence public spending directly,

public pension spending should be first and foremost affected if such political pressure is indeed present. The fixed effect model controls for several economic and political covariates, including GDP per capita, union density, the interest rate and ideology of government. We do not find empirical support for the median voter hypothesis. An older median voter is also not significantly associated with higher public spending on Social Security.

Several earlier papers have investigated the relationship between aging and retirement spending. Breyer and Craig (1997) use OECD-data for 20 countries in 1960-1990 with 10-year intervals and find that benefits as a fraction of GDP are positively and significantly related to the median voter age. Depending on the specification, an increase of one year of the latter increases spending relative to GDP by 0.4-0.6 percentage points. The median age is positively but not significantly related to total benefits by the number of retirees. Tepe and Vanhuysse (2010) reach the same conclusions based on 18 countries between 1980 and 2000 using eight-year intervals. They operationalize aging with the dependency ratio instead of the age of the median voter. Here both are considered. A controversial claim is made by Razin, Sadka and Swagel (2002) stating that a higher dependency ratio is associated with lower pension contributions. This has been challenged by Disney (2007) and Sanz and Velazquez (2007) who criticize both the (static) model specification and the operationalization of aging and Social Security (which also includes unemployment benefits), see also Shelton (2008a, 2008b).

The most important difference between Disney and our paper is that he focuses on the demographic effect of aging on the size of Social Security, while we focus on the political effect controlling for the demographic effect. A second and related difference is that he focuses on the size of the welfare state and contributions, whereas we focus on both the size and the generosity of pension arrangements. If demography has a political effect above and beyond increasing the number of people eligible for pension arrangements this should first and foremost show-up in the generosity of pensions. Mulligan, Gil and Sala-i-Martin (2002) have a somewhat different approach. They show that democracies do not spend more on social security than undemocratic countries. They conclude that for social security "much more important are economic and demographic variables, such as the aging of the population and economic growth."

Our contribution to this literature is that we disentangle the political and demographic effect, simultaneously exploiting more recent data, resulting in more observations.[1] The rest of this paper is organized as follows. The next section discusses the theoretical literature on Social Security and in particular the predicted effect of a greying median voter on benefits. The third section discusses the data and the model. The fourth section shows the results. The fifth section concludes.

[1] This paper has a minimum of 105 observations whereas Breyer and Craig and Tepe and Vanhuysse have a maximum of 76 and 54 observations respectively. This elaborated, respecified and updated approach generally confirms earlier findings, thereby strengthening these previous conclusions. This is all the more relevant because aging is a relatively recent phenomenon that by its nature increases gradually over time. Our data thus include observations with a median age higher than found in earlier studies.

II. Theoretical background and related literature

There is a well-developed and substantial theoretical literature on the political economy of social security, see overviews of Galasso (2002) and Breyer (1994). An important and dominant approach is the median voter model (Browning (1975), Persson and Tabellini (2000), Galasso (2006), Galasso and Profeta (2007), Conesa and Krueger (1999) and Cooley and Soares (1999)).

In median voter models aging typically has two opposing effects on the preferences of the decisive median voter. A first, economic effect is that the rate of return of a Pay-as-you-go system decreases, as the ratio between workers and retirees decreases. This will make a PAYG-system less attractive for all voters, including the median voter. A second, political effect is that the median voter is older. He or she will thus be ever more inclined to support more generous pension benefits.

The outcome of median voter models depends crucially on timing and structure of elections. The early literature assumes that elections take place once, and that the outcome thereof thus remains in effect forever after (Browning (1975) and Persson and Tabellini (2000)). This could alternatively be interpreted as a situation where elections take place regularly but pensions is politicized once. If there is a one-off election, the political effect outweighs the economic effect and an older median voter will successfully push for higher benefits.

The crucial implication of median voter models is thus that benefits will become more generous as the median voter ages. Persson and Tabellini

state: “A social planner, for example, would also spend more on pensions with a larger number of elderly people. The model really predicts that pensions per retiree will be higher, the higher the weight on old voters (..), as this shifts the median-voter equilibrium toward a more generous pension system.”

The crucial assumption is that elections take place once and is binding. This assumption is difficult to maintain in the presence of highlt contested and ever-changing pension-policies. Alternatively, Sjoblom (1985), Conesa and Krueger (1999) and Cooley and Soares (1999) understand PAYG arrangements as an intergenerational game where elections take place each period. In this case multiple equilibria arise. If voters do not expect that their contributions will influence future contributions made to them, they will not contribute. A self-rationalizing equilibrium with zero contributions may then result; if no future generation contributes, it is best to do likewise. Positive transfers can still be supported by the threat that future generations will withhold future contributions if current working generations do not contribute to current retirees. Each generation then contributes to retirees, because this results in future generations doing likewise. In the resulting equilibrium, each generation takes into account the behavior of previous generations in a reaction function. This reaction function gives the current contribution as a function of contributions of previous generations and it can be interpreted as a social contract between generations, Sjoblom (1985), Boldrin and Rustichini (2000). Any transfer scheme that outperforms the default option of zero contributions and zero benefits can subsequently result as a subgame perfect

equilibrium. When elections take place each period, the effect of aging on pension expenditure is not clear a priori as multiple equilibria are possible. Galasso (2006) however predicts a dramatic increase in pension spending: Spain will increase its spending on social security from 21.3% of wages to 45.5% in 2050 and the UK from 14.5% to 33.2%.

Several assumptions underlie median voter models (Milanovic, 2010). Voters are supposed to care only about themselves and to have no altruistic preferences with regard to (grand)parents or (grand)children. Voters are furthermore assumed to take into account one single issue (that is, pension arrangements) and not care about other issues or characteristics of parties as charisma or ideology. Median voter models also do not take into account differences in economic and lobbying power between voters nor the fact that some voters do not vote (in particular younger and poorer voters). These are assumptions that may or may not be useful in a particular application. Here however, we do not take position a priori but merely test the main prediction of median voter models.

A different approach in the political economy literature on Social Security is chosen by Breyer and Stolte (2001). In their OLG-model, the retired generation forms a majority, holding all political power. This does not lead to contributions of 100% however because young generations respond to higher taxation by decreasing their labor supply. The older generations effectively maximize a Laffer curve. Breyer and Stolte predict that aging leads to both higher contributions *and* lower individual benefits. That is, the 'burden of aging' is shared between working and retired generations.

The combined outcome of higher contributions (for each worker) and lower benefits (for each retiree) is also the outcome of probability voting models, see for example Gonzales-Eiras and Niepelt (2007). Probability voting models allow for the possibility that pension policy is not the only factor that voters consider in their voting decision.

Yet another view is given by Boldrin and Rustichini (2000), who propose that aging may lead to the collapse of Social Security. Aging makes PAYG less and less attractive and at one point working generations will stop contributing to social security. Key in their two-period OLG-model is that this moment of break-down is uncertain because future demographic developments are uncertain. Each generation has the choice to continue social security, facing ex-ante a positive probability but not the certainty that the next generation will do the same. The last contributing generation will lose ex post, because older generations are not compensated. In this approach aging leads to a certain breakdown of Social Security at an ex ante undeterminable moment.

III. Data and econometric model

All data are retrieved from publicly available sources of the OECD, the World Bank and the Comparative Political Data Set.[2] Table 1 provides descriptive statistics.

Table 1.

	Mean	Standard deviation	Minimum	Maximum
Retirement spending / GDP	6.37%	2.39%	2.1%	12.9%
Benefit / retiree	1035.5	374.1	363.9	2536
Median age	36.5	3.6	27.3	44.7
Dependency	2.44	0.41	1.62	3.80
GDP per capita	28814	8017	13867	68211
Union density	39.0%	20.1%	7.9%	88.0%
Interest rate	7.18%	3.52%	1.15%	17.66%
Government ideology	2.1	1.2	0	5
GDP growth	2.59	1.50	-0.61	10.28

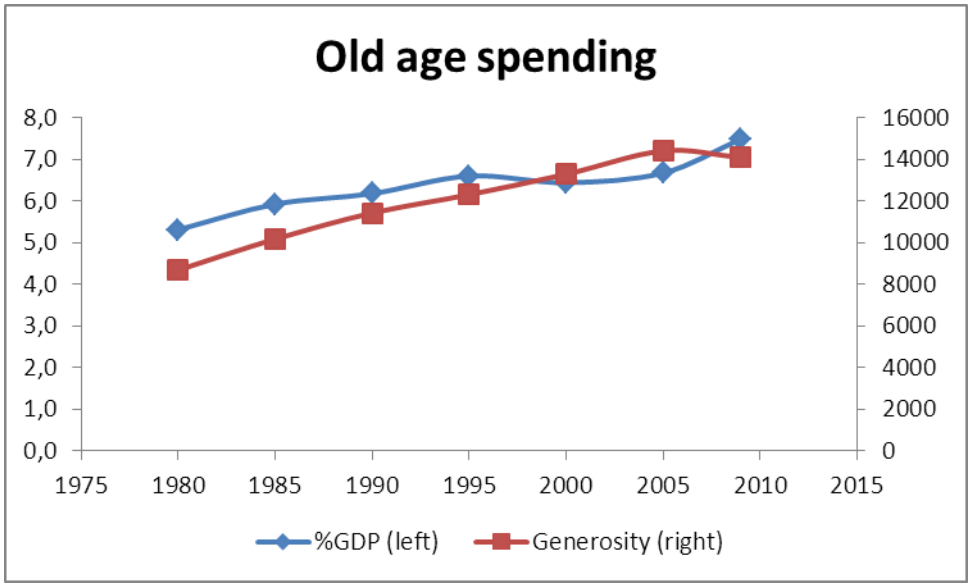
The median age of the electorate is proxied by the median age of the whole population, as reported by the World Bank.

Two dependent variables are considered. The first measure of pension expenditure is total expenditure relative to GDP. This ranges between 2.1% and 12.9%. The following graph gives the average expenditure relative to GDP for the 21 countries for which this figure is available in each year.[3] For

[2] www.oecd.org, www.worldbank.nl and Armingeon, Engler, Potolidis, Gerber and P. Leimgruber (2010)

[3] The entire sample of 30 countries consists of Australia*, Austria*, Belgium*, Canada*, Czech Republic, Denmark*, Finland*, France*, Germany*, Greece*, Hungary, Ireland, Iceland*, Italy*, Japan*, Korea, Luxembourg*, Mexico, Netherlands*, New Zealand*, Norway*, Poland, Portugal, Slovak Republic, Spain*,

2010 no information is available; figures of 2009 are used instead as a proxy.



A second measure is the generosity of benefits, that is, pension benefits per retiree. This figure is derived by dividing total expenditure (US dollars, constant prices, constant PPPS, reference year 2000) by the number of people older than 64. This is an approximation as it does not take account of differences in the retirement-age. The exact number of retirees in countries is however unavailable. The number of people over 64 is the best approximation available but it is a limitation. Use of this indicator is consistent with other studies on the effects of aging. Again, for 2010 no information is available; figures of 2009 are used instead as a proxy. The

Sweden*, Switzerland*, Turkey, United Kingdom*, United States*. For the 21 countries denoted * data are available for the entire period.

graph provides the development of individual benefits for the same 21 countries for which these numbers are available each year.

The covariates can be grouped in economic and political control variables. Economic growth, GDP per capita (US dollars, constant prices, constant PPPS, reference year 2005) and the interest rate indicate the economic circumstances of a country. A high interest rate hinders debt-financing of retirement expenditure. The effect of GDP growth is not straightforward. If pensions are not fully indexed to GDP, GDP growth leads to lower Social Security spending relative to GDP.

Political factors other than the age of the median voter are potentially important. The first factor considered is union density, ranging from 8% to 86%. A strong union may successfully press for higher benefits for their (former) members. A government of left-wing signature may likewise lead to higher benefits. The ideological signature of the government is indicated by the fraction of the government parties that is made up of left-wing parties.

The period 1980-2010 is chosen solely for practical considerations of data availability. Five-year intervals are considered instead of one year intervals, the reason being that pension reforms need time to be developed, discussed and implemented. Reforms can thus not be implemented yearly. A five-year period is chosen because that covers a political cycle in which one (or more) election(s) take place. There is also a practical reason to dismiss one year intervals. The median age hardly changes one year to the next and estimation results would therefore not be robust.

The econometric model is a panel data model with fixed effects; the estimator is the within-estimator. The country-specific fixed effect may be

interpreted as habit formation, geography, culture or path-dependency of policies. The base-line regression model is given by the following equation:

$$y_{i,t}=\alpha_i+\beta_1 Medianage_{i,t}+\beta_2 DependencyRatio_{i,t}+\beta_3 Interest\ rate_{i,t}+\beta_4 GDPgrowth_{i,t}+\beta_5 governmentideology_{i,t}+\varepsilon_{i,t} i=1,2,..,30,\ t=1980,1985,..,2010$$

Here $y_{i,t}$ is either one of the two dependent variables that were discussed. In principle the data cover 30 countries over seven periods, leading to potentially 210 observations. A substantial amount of observations are however not available. The base-line model is estimated using 105 observations. This leads to an (unavoidable) loss in efficiency of the estimators. There is no reason to assume that the missing observations are correlated with the effect we are interested in, so we do not consider it likely that the estimators is biased.

IV. Results

The median age has a positive effect on the generosity of pensions but this effect is not significant. The regression thus does not support the claim of median voter models that an older median voter successfully presses for higher pension spending. Neither does the median age significantly affect spending as a share of GDP. The estimated effect itself is positive, but again insignificant.

Table 2.

VARIABLES	Benefits/retiree	Public expenditure /GDP
Median age	34.8	0.12
	(20.7)	(0.11)
Dep. Ratio	-253.4*	1.56*
	(126.9)	(0.53)
GDP growth	-16.7	-0.18*
	(11.5)	(0.06)
GDP per capita	8.7	-0.05
	(6.4)	(0.035)
Union density	9.5*	0.043*
	(3.1)	(0.018)
Government ideology	9.7	0.03
	(12.2)	(0.07)
Interest rate	-20.3*	-0.059
	(-2.3)	(0.05)
Constant	-68.4	-1.15
	(593.0)	(3.38)
Observations	105	110
R-squared	0.08	0.23

Number of countries	22	23

Standard errors in parentheses
*p<0.05

The effect of other covariates varies. The dependency ratio is positively and significantly associated with both generosity of pensions and pension expenditure relative to GDP. Union density is also positively and significantly associated with both generosity of pensions and pension expenditure relative to GDP. This suggests that strong unions bargain for more generous pensions. The effect is quite substantial; the difference between no unions (that is, a membership of 0%) and full unionization (100%) is four percentage points of GDP worth of pension expenditure. GDP growth has a significant, negative effect on public expenditure, whereas the interest rate significantly and negatively affects generosity of pensions.

Robustness checks

The baseline-models rests on several model-assumptions and choice of regressors. These assumptions and choices, though reasonably in our view, are not set in stone. Therefore we consider here several alternative model-specifications, in order to assess whether the main conclusions are robust.

First, the regression is re-estimated omitting the covariate with the lowest t-value. Second, a regression is considered with time-dummies for each year except for 1980 (the reference year). Third, a regression with

lagged values of the interest rate is considered to address possible endogeneity of this variable. The interest rate may be endogenous, as the interest rate may increase as a result of high Old age expenditure. This would be the case if sovereign debt holders expect that high Old age expenditure (as a percentage of GDP) jeopardizes solvability of the government. A fourth variant estimates the baseline with a random effect instead of a fixed effect. The table summarizes which significant variables become insignificant and vice versa.[4]

Table 3: robustness checks

	Model	**Model with dep. Var. benefits per retiree**	**Model with dep. Var. Public expenditure (%GDP)**
1.	*Omitting variable with lowest t-value*	Dependency ratio and interest rate insignificant	No changes
2/	*Time dummies*	Dependency ratio, union and interest-rate insignificant; GDP per capita significant and positive; economic growth significant and negative	Economic growth insignificant
3.	*Lagged value interest-rate*	Dependency ratio insignificant; GDP per capita significant and positive	Interest rate significantly negative
4.	*Random effect*	Dependency ratio, union and interest-rate insignificant; GDP	Union insignificant

[4] Estimation-results are available upon request.

		per capita significant and positive; economic growth significant and negative	

As can be seen in table 3, the estimation results are not robust in terms of changes in significant variables. In particular, in every alternatives from the baseline-model with generosity as the dependent variable at least two changes result. This warrants caution in interpreting the variables, significance of which crucially depends on the model-specification. The crucial observation is that the variable median age remains insignificant in all alternative models. This strengthens the conclusion that the hypothesis that the age of median voter does not affect generosity of public pensions cannot be rejected. It also strengthens the conclusion that the hypothesis that age of median voter does not even affect the size of public old age expenditure cannot be rejected. Another important outcome is that the dependency ratio has a significant positive effect on Old Age expenditure in all specifications considered here.

V. Conclusion

This paper has tested the hypothesis that an older median voter leads to more generous pensions. The overall conclusion is that an increase in the age of the median voter does not necessarily lead to more generous pensions. The main prediction of median voter models, that a greying median voter will successfully push for higher benefits, is therefore not supported. An older median voter also does not lead to more public expenditure relative to GDP. The dependency ratio however does have a significant and positive effect on both total size and individual generosity. This is in line with preferences of a majority of West-European voters, Boeri et al. (2002).

The results nuance the prominent theoretical role of the median voter. The empirical results in particular indicate that unions have a significant political effect on old age expenditure. Integrating these empirical outcomes in theoretical models, is warranted for a better understanding of the economic and political effect of demography on the financial sustainability of social security.

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