The political feasibility of postponing retirement

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Abstract

Conventional economic wisdom suggests that to face the aging process, social security systems will have to be retrenched. In particular, retirement age will have to be largely increased. Yet, is this policy measure feasible in OECD countries? Since the answer belongs mainly to the realm of politics, I evaluate the political feasibility of postponing retirement under aging. After calibrating the model to France, Germany, Italy, Spain, the UK, and the US, I simulate the effects for the 2050 demographic, economic and political scenario. Galasso and Profeta (2004) suggested that a higher effective retirement age always decreases the size of the system chosen by the voters, often increases its generosity, and may be the only viable solution to pension system problems in the face of population aging. This paper shows that this policy measure is also politically feasible, as a majority of the voters will be willing to support a rise in the retirement age, due to the negative income effect induced by aging – via the large social security system.

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1. Introduction

The aim of this paper is to assess the political feasibility of the most commonly suggested retrenchment measure of the social security system: postponing retirement. Conventional economic wisdom suggests that – due to population aging – social security systems will have to be largely modified in order to maintain their financial sustainability. Due to the increasing share of retirees to workers, in fact, these systems will be unable to finance the pension benefits – as calculated under the current rules. Hence, either contribution rates will have to be raised or per-capita pension benefits reduced. Among the latter retrenching measures, postponing retirement has typically been proposed by experts and policy-makers, since it allows keeping a sufficient level of old age consumption with a combination of a longer working carrier – and thus more labor income – and a still generous pension benefit; at the cost of enjoying less old age leisure. Yet, will future voters be willing to support such a policy? Recent empirical evidence from survey data by Profeta (2005) portray a rather grim picture: individuals do not seem willing to trade-off less leisure for more consumption – and thus to postpone retirement. Whether individuals fully understand the full set of policy options in answering or not (as suggested by Pestieau, 2002), it remains to be seen.

This analysis complements the quantitative assessment of the political sustainability of social security in six graying societies – France, Germany, Italy, Spain, the UK and the US – provided in Galasso and Profeta (2004). In this paper, their theoretical framework for the analysis of the economic and political decisions is enriched to allow for the political determination of the retirement age. A comprehensive economic environment features several economic factors that may lead social security to enhance some individuals’ well-being – and hence to be supported by these individuals.
These multidimensional individual preferences – over the social security contribution rate and the effective retirement age – are then aggregated through a political system of simple majority voting. This political institution emphasizes the democratic role of the electorate in shaping economic policy\(^1\): incumbent politicians and political candidates seeking election will only adopt social security policies supported by the electorate. Voters thus determine the social security contribution rate and the retirement age. Yet, due to the multi-dimensionality of the policy space, Nash equilibria of this voting game may fail to exit, as Condorcet cycles may arise. To address this well-known result, I use the concept of structured induced equilibrium or issue-by-issue voting introduced by Shepsle (1979). A political arrangement is considered that allows a complete separation of the issue to be voted (see section 3 for the details). Due to this political structure, issues are voted contemporaneously, yet separately. This issue-by-issue voting is effectively equivalent to obtain two reaction functions, which correspond to the median vote of the electors over one issue for a given vote on other. The intersection of these two reaction functions gives raise to an issue-by-issue voting equilibrium of the game.

Aging is the main driving force behind the current call for retrenching the welfare state. In every country, the population pyramid will eventually invert its shape, as the base (young) will shrink, while the top (elderly) will continue to expand. This aging process will have a substantial influence on the financial sustainability of the existing unfunded social security systems\(^2\): as fewer resource obtained from a decreasing working population will be divided among a growing number of retirees. But most importantly, aging affects the political representation of the different generations and hence the

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\(^1\) An advantage of this electoral approach is to provide a political environment that allows for a clear assessment of the effect of the demographic dynamics – through the aging of the electorate – on the political determination of social security policies.

\(^2\) Also the economic scenario will be influenced by the demographic process: due to a higher expected longevity, individuals will save more for old age consumption and long term care in old age, and they may enjoy longer working carriers.
relative importance of the economic well-being of persons in the different age groups to the policy-makers. Clearly, the expected demographic dynamics will lead towards a higher political representation of elderly individuals, as the median age among the voters will largely increase.

Table 1: Dependency ratios and retirement ages

<table>
<thead>
<tr>
<th>Country</th>
<th>Old Age Dependency Ratio</th>
<th>Effective Retirement Age</th>
<th>Pension Dependency Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2050</td>
<td>2000</td>
</tr>
<tr>
<td>France</td>
<td>25.9</td>
<td>48.8</td>
<td>58</td>
</tr>
<tr>
<td>Germany</td>
<td>25.0</td>
<td>51.5</td>
<td>61</td>
</tr>
<tr>
<td>Italy</td>
<td>27.9</td>
<td>64.5</td>
<td>59</td>
</tr>
<tr>
<td>Spain</td>
<td>26.0</td>
<td>63.4</td>
<td>61</td>
</tr>
<tr>
<td>UK</td>
<td>25.3</td>
<td>44.3</td>
<td>63</td>
</tr>
<tr>
<td>US</td>
<td>20.5</td>
<td>36.3</td>
<td>63</td>
</tr>
</tbody>
</table>

Although almost all OECD countries are expected to experience a demographic process of further population aging, the magnitude of this phenomenon will widely vary even among these six countries analyzed here – being particularly large in Italy and Spain, but much less dramatic in the US, as shown at table 1. In some of these countries, the
aging process is furthermore accompanied by a deep reduction in the labor force participation rate among the elderly workers, and hence in the retirement age (see table 1). These differences in the forecasted demographic dynamics carry over to the political representation, as measured by the changes in the median age among the voters.

The methodology used in this book to provide a quantitative evaluation of how political constraints may shape social security systems under population aging operates in two stages. First, the theoretical political economy model presented at sections 1 and 2 is calibrated to match the main economic, demographic and political characteristics and the crucial features of the social security system, for each country in our sample around the year 2000. This characterization allows the model to replicate each economy in its initial steady state, which is assumed to be at the turn of the century. In particular, in every country, individuals take economic and political decisions, and the social security contribution rate through the political process is calibrated to correspond to the actual average equilibrium contribution rate during the nineties, while the resulting economic aggregates have to be consistent with the long term features of each economy.

The simulations of the impact of the electoral constraints on the political determination of social security under aging are obtained by feeding this calibrated model with the forecasted values of demographic, economic and political variables for the year 2050. This methodology thus assumes that in fifty years each economy will have reached a new steady state in which the demographic process has stabilized and the social security systems have been modified to copy with these new demographic and economic elements. The social security contribution rate and the effective retirement age estimated by the model in this new steady state represents the political equilibrium outcomes of the voting game in 2050; in other words, the most preferred social security
contribution rate and the most preferred retirement age for the year 2050 median voter. They are presented at section 5.

2. The economic environment

The economic environment consists of an overlapping generation general equilibrium model, which is singularly calibrated to the main demographic and economic features of each country in exam. The economy is populated by several overlapping generations of workers and retirees. At any time \( t \), individuals face a probability of surviving until the next period, \( \left( \pi^i_t \right)_{i=1}^G \), which depend on their age \( i \), where \( G \) is the last possible period of any agent’s life; subscripts indicate calendar date, and superscripts refer to the agent’s period of birth. Agents who reach the \( G \)-th period of their life face certain death, \( \pi^G_t = 0 \). The demographic structure of the model can be synthesized by a population profile, which combines these survival probabilities with the population growth rate, \( n_1 \). The profile summarizes the fraction of population in each cohort and group type, \( \mu^i_t \), with \( \sum_{i=1}^G \mu^i_t = 1 \) for all \( t \).

Agents work during the first \( J \) periods of their life and then retire. Labor supply is exogenous: labor is supplied inelastically, and retirement age is mandatory.

2.1 Preferences

Agents value consumption and leisure – depending on the specification of the model – according to the following expected utility function:

\[
\sum_{j=0}^G \beta^j \left[ \prod_{i=0}^j \pi^i_t \right] U\left(c^i_{t+j}, \nu^i_{t+j}\right) \quad \forall j = 0, \ldots, G
\]
where $c'_{t+j}$ and $\nu'_{t+j}$ denote respectively consumption and leisure at time $t+j$ of an individual born at time $t$, $\pi'_{t}$ is the age specific individual probability of surviving until the next period, and $\beta$ is the subjective time discount rate. Agents hence enjoy utility from leisure: if individuals decide to work one additional year, they have to give up this annual utility level, $\nu$. The utility function is further specified by assuming that agents have a constant degree of risk aversion over consumption, while the utility from leisure is constant:

$$U(c'_{t+j}, \nu'_{t+j}) = \frac{(c'_{t+j})^{-\rho} - 1}{1 - \rho} + \nu*\Gamma'_{t+j}$$

(2.2)

where $\rho$ indicates the coefficient of relative risk aversion, $\nu$ is the annual value of leisure and $\Gamma'_{t+j}$ is a binary variable taking value zero if the individual works at $t+j$, and a positive value if she does not (e.g., if she retires).

This economic environment shares a common feature with all lifecycle economic models: every agent – depending on her expected lifetime horizon and income – decides how much to consume and save in every period in an attempt to smooth consumption over time, in spite of the possible fluctuations in the annual income. In taking these decisions, agents face the following sequence of budget constraints:

$$c'_{t+j} + a'_{t+j+1} = a'_{t+j} R_{t+j} + y'_{t+j} + H'_{t+j} \quad \forall j = 0,\ldots,G$$

(2.3)
where $a'_{t+j}$ and $y'_{t+j}$ represent respectively the end-of-period asset holding and disposable income at time $t+j$, and $R_{t+j}$ is the interest factor on private financial assets. Since some individuals fail to survive until the next period, their involuntary bequest, which amounts to $H'_{t+j} = (1 - \pi_{t+j-1}) a'_{t+j} R_{t+j} / \pi_{t+j-1}$, has to be redistributed. A common assumption in the literature is to assume that the assets of those who do not survive are shared among all living individuals with the same characteristics. Effectively, this amounts to assuming that individuals enter a one-year annuity contract to distribute the assets of the deceased. Alternatively, asset holdings may be redistributed in a lump sum fashion among survivors of all ages and types or only to young individuals.

Individuals vary also in their working ability, with middle aged workers being typically more productive than young and elderly workers. The disposable labour income respectively for workers and retirees is thus summarized as follows:

\begin{align*}
y'_{t+j} &= \varepsilon'_{t+j} \cdot h'_{t+j} \cdot w_{t+j} (1 - \tau_{t+j}) \quad \forall j = s, \ldots, J - 1, \\
y'_{t+j} &= P'_{t+j} \quad \forall j = J, \ldots, G.
\end{align*}

(2.4)

where $w_{t+j}$ indicates wage per efficiency unit, $\varepsilon'_{t+j}$ is a measure of labour efficiency unit, which may depend on the worker’s age, $s$ is the initial age at which agents begin their working career and $\tau_{t+j}$ and $P'_{t+j}$ represent respectively the contribution rate to social security and the (annuity) pension benefit received by retiree aged $j$. The number of worked hours at time $t+j$ by an agent born at time $t$, $h'_{t+j}$, is constant, as the labour supply is assumed to be exogenous.
Clearly, the age diversity across individuals will induce different savings and consumption choices by the agents, as well as different individual preferences over social security policies.

### 2.2 Technology

The production side of the economy is characterized by a constant returns to scale aggregate production function, which transforms the productive inputs – labor and capital – into the production of a final good. The economy enjoys an exogenous technical progress that enhances labor productivity. The aggregate production function can be represented as follows:

\[
Q_t = f\left[\eta_t \cdot (1 + \lambda)^t, k_t\right] = b \cdot k_t^\theta \cdot \left[\eta_t \cdot (1 + \lambda)^t\right]^{-\theta}
\]  
(2.5)

where \(\lambda\) is the growth rate of labour productivity – a crucial variable for the profitability of the unfunded social security systems – \(\eta\) is a measure of the per capita unit of labour measured in efficiency units, \(k\) denotes the per capita stock of capital, \(b\) is a total factor productivity index and \(\theta\) is the factor share of capital.

Since social security imposes no economic distortion on the labor market, the labour supply in efficiency units is simply determined by the product of the (exogenous) average number of hours worked and the average labor efficiency units in the economy:

\[
\eta_i = \bar{h} \sum_{i=1}^{J} e_i^j \mu_i^j
\]  
(2.6)
The aggregate capital stock is obtained by aggregating the individual net savings over generations:

\[ k_i = \sum_{t=1}^{G} \frac{\mu_t a_{t-i}}{1+n} \]  

(2.7)

Agents maximize their expected utility – subject to their individual budget constraints – with respect to the consumption flow and to the retirement decision; while firms maximize profits with respect to their choice of the factors of production – capital and labor – given the technological constraint. The optimizing conditions for agents and firms and equilibrium conditions in the factor markets determine the usual expression for hourly wage, \( w_t \), and rate of return on capital, \( r_t \):

\[
w_t = f_1 \left[ \eta_t \cdot (1 + \lambda)' , k_t \right] \\
R_t = 1 + r_t = f_2 \left[ \eta_t \cdot (1 + \lambda)' , k_t \right] + 1 - \delta
\]  

(2.8)

where \( \delta \) is the parameter of the physical depreciation rate in the economy and subscripts denote the partial derivatives with respect to the relevant variable – thus respectively the marginal product of labor and the marginal product of capital.

### 2.3 Social Security Systems

In pure unfunded social security systems, in every period total contributions equal total benefits. Since every agent at any time \( t \) contributes a fraction \( \tau_t \) of her labour income, total contributions depend on the tax rate \( \tau_t \) and on the retirement age \( J \) according to the following equation:
\[ T_{i}(\tau_{i}, J) = \tau_{i} \sum_{j=1}^{J-1} \mu^{i}_{j} e^{i}_{j} h^{i}_{j} w^{i}_{j} \]  

(2.9)

Everywhere, pension benefits represent an annuity paid to the retirees. Under budget balance, the total amount of pensions paid out to retirees is equal to the aggregate contributions of the current workers:

\[ T_{i}(\tau_{i}, J) = \sum_{j=1}^{G} P^{i}_{j} \mu^{i}_{j} \]  

(2.10)

Social security systems may also differ across countries due to other institutional features, such as: (i) statutory and effective retirement age; (ii) pension benefit calculation; and (iii) pension indexation criterion. For instance, in Italy, prior to the reforms, and in Germany, pension benefits are indexed to aggregate productivity (real wage) growth, \( \lambda \), and hence evolve according to \( P_{t+1}^{i} = P_{t}^{i} (1 + \lambda_{t}) \); whereas if pension benefits are only indexed to inflation, then they remain constant in real terms: \( P_{t+1}^{i} = P_{t}^{i} \).

2.4 Economic Equilibrium

In this model economy, an equilibrium requires all agents to take their economic decisions between savings and consumption in order to maximize their well-being given their budget (and time) constraints. Analogously, firms have to determine their demand of the factors of production (labor and capital) so as to maximize profits, given the technological constraints. Finally, factor prices are endogenously determined to clear all markets. Notice that, since the determination of the social security contribution rates
occurs in the political arena, the economic equilibrium is obtained for a given sequence of these contribution rates.

Formally, for a given sequence of social security contribution rates, labor productivity and population growth rates, and retirement ages, \((\tau, n, \lambda, J, \sigma, \sigma_0)\) a competitive economic equilibrium is characterized by a sequence of allocations and prices, \((c_{t+j}, l_{t+j}, w_t, R_t)\) \(\forall t = 0, \ldots, \infty; \forall j = 0, \ldots, G\); that in every period satisfies the following conditions:

- the consumer problem is solved for each generation \(\forall j = 0, \ldots, G\). Hence, every agent aged \(j\) maximizes the expected utility at eq. 2.1 and 2.2 with respect to \(c_{t+j}\) and given the sequence of budget constraints at eq. 2.3;

- firms maximize their profits, and the conditions at eq. 2.8 are satisfied;

- labor, capital and goods markets clear, and thus respectively eq. 2.6, eq. 2.7, and the following expression are satisfied:

\[
\sum_{j=0}^{G} \sum_{t=1}^{\infty} \left( a_t^{t-i+1} + c_t^{t-i+1} \right) \mu_t = f(\eta_t, k_t) + (1-\delta) \sum_{j=0}^{G} \mu_t a_t^{t-j} . \tag{2.11}
\]

3. The Political System

Unlike in Galasso and Profeta (2004), where voters only determined the size of the social security system under aging, to assess the political feasibility of postponing retirement, in this political environment, every individual expresses her preferences over these aspects of the social security system: the contribution rate and the retirement age – given the different institutional settings prevailing in each system, such as eligibility criteria, indexation and benefit rule. The relevance of the electoral concerns for the policy-makers in a phase of welfare state retrenching under aging was largely been
emphasized by Pierson (1996), and was adopted in their quantitative analysis by Galasso and Profeta (2004). Although I acknowledge that pension policies involve more complex decision processes than simple majority voting model\(^3\), electoral concerns are still crucial among policy-makers dealing with social security issues, since welfare states – once established – build their own political constituencies. Simple majority voting represents the minimal political environment where to analyze these electoral concerns; and has the advantage of providing a coherent and transparent analysis of the impact of the demographic dynamics on the political process.

To retain this electoral approach, the political decisions on these two issues will be taken under majority voting. A well-known result in the voting literature is that, when the policy space over which individuals vote upon is multi-dimensional, a Nash equilibrium of the voting game may fail to exist, since Condorcet cycles typically arise, unless restrictive assumptions on the preferences of the electors are imposed (see Ordershock, 1986, for an extensive discussion of these issues). To overcome this problem, I follow Shepsle (1979) in analyzing voting equilibria induced by institutional restrictions, i.e., structure-induced equilibria. Moreover, I consider a one-and-for-all voting game, although the results may easily be generalized to a repeated voting environment, in which an implicit social contract among successive generations of voters may emerge to induce a majority of voters – and hence some workers – to support a social security system featuring a certain retirement age\(^4\).

\(^3\) For instance, a corporatist view emphasizes the role played by unions, left parties and lobbies in the social security policy-making, while an institutional approach highlights the importance of veto power and political accountability as shaped by the political and electoral institutions.

\(^4\) Compliance by successive generations of voters to this social norm – and hence their support to social security – is entirely based on self interest. Today’s voters agree to transfer resources to current retirees because they expect to be rewarded for their actions with a sufficiently large transfer at the retirement. Yet, if current voters fail to comply with the contract – thus choosing not to pay any social security to current old – they will receive no transfers in their old age.
The political system that aggregates the individual preferences over the alternatives \((r, J)\) into a political outcome is characterized by an institutional arrangement that allows issue-by-issue voting. An arrangement consists of (i) a committee system, which separates the electorate – i.e., the set of all voters – into committees; (ii) a jurisdictional arrangement, which divides the issues \((r, J)\) into jurisdictions; (iii) an assignment rule, which associates the jurisdictions to committees. Through these arrangements, the political system assigns the decision over a subset of the issue space, e.g. a single issue, to a particular committee. Every committee is entitled to make a proposal to change the current value of the issue (the status quo) which falls into its jurisdiction. Finally, an amendment control rule determines how proposals can be further modified (amended) by the electorate before the final stage is reached, and the (possibly amended) proposal is then voted in a majority rule, pairwise comparison against the status quo by the entire electorate.

The political system considered in this paper allows contemporaneous yet separate voting on the two issues; and is characterized by the following arrangements:

- Committee of the Whole: there exists only one committee, which coincides with the electorate;
- Simple Jurisdictions: each jurisdiction is a single dimension of the issue space, \(\{\{r\}, \{J\}\}\). In other words, one jurisdiction has the power to deliberate on the social security contribution rate, \(r\), and another on the retirement age, \(J\).
- Every simple jurisdiction is assigned to the committee of whole.
- Germaneness Amendment Control Rule: amendments to the proposal are permitted only along the dimensions that fall in the jurisdiction of the
committee. That is, if the proposal regards $\tau$, only amendments on $\tau$ are permitted, and vice versa.

In this political system, the entire electorate has jurisdiction on the two issues, but only issue-by-issue. The restriction that each issue is on the floor separately is achieved through simple jurisdictions and germaneness amendment rule, and it is needed to overcome the possible lack of a Nash equilibrium. No further restrictive jurisdictional arrangements are imposed. The choice of a committee of the whole, for example, guarantees that no subset of the electorate which constitutes a committee is effectively awarded veto power over an issue. In fact, any such committee could block any alternative to the status quo which would be preferred by a majority of the electorate, but not by a majority of the members of this committee.

This notion of structure induced equilibrium (see Shepsle, 1979, for a detailed description and Conde-Ruiz and Galasso, 2003 and 2005, for a generalization to a repeated voting environment) hence retains the flavour of the median voter theorem.

The next proposition characterizes the structure induced equilibrium used in the simulations discussed at section 4.

**Proposition** Let $X_i^*$ be the set of $i$-th components from the induced ideal points of all voters in the direction $i$ from the status quo $x^o$. For one-dimensional (simple) jurisdictions, a germaneness rule for amendments, a committee of the whole, and single peaked preferences, $x^o$ is a structure-induced equilibrium outcome if and only if, for all $i$, $x_i^o = \text{median } X_i^*$.

3.1 Individual Preferences over contribution rates

There exists a large theoretical literature addressing the determinants of the individual preferences over social security (see Galasso and Profeta, 2002, and Persson and Tabellini, 2000 for a survey), while some effort has also been put in testing these induced preferences using survey data (see Boeri, Börsch-Supan and Tabellini, 2002). Within the framework of the economic environment described at section 2.1, preferences over social security contribution rates – for a given retirement age – will depend on the individuals’ age, and on the main features of the system. Since a PAYG social security system imposes a contribution on the workers and provides a pension transfer to the retirees, the elderly will generally support the system. Workers are instead willing to incur in current and future costs only if they expect to be sufficiently compensated by future pension benefits. The individual remaining time horizon represents a crucial factor to determine the individual support to the system. In fact, since past contributions to the system could not be returned to the workers, were the system to be abandoned, they represent a sunk cost, which does not affect the agents’ decisions. Hence, middle aged and elderly individuals are more supportive of social security systems, as they will mostly enjoy pension benefits in their remaining time horizon. Within this approach, agents will determine their most preferred social security contribution rate by evaluating two factors: (i) the implicit return provided by the social security in comparison to the returns available on the capital market from assets of comparable risk; and (ii) the effects on wage and rate of returns induced by a social security system through changes in the stock of capital.

How do these individual preferences depend upon the (fixed) retirement age? Postponing retirement induces two direct effects on the individual preferences. For every worker, the contribution period – that is, the remaining years of contributions –
will increase; thereby reducing the profitability of the system. Individuals, who already retired, are instead not affected by this change. Yet, postponing retirement decreases the share of retirees per workers, thereby reducing the dependency ratio and counterbalancing the aging process. This latter effect increases the profitability of the system and will induce the workers to increase the contribution rate to exploit the increased returns of the social security system.

3.2 Individual Preferences over retirement age

To characterize a structure induced equilibrium, it is important to analyze how individuals form their preferences over the effective retirement age – all individuals are forced to retire at the same age – for a given level of the social security contribution rate. In particular, how do these preferences differ according to the voters’ age? And how do they depend on the social security contribution rate?

In voting over the effective retirement age – for a given contribution rate – an agent considers several determinants: (i) the individual labor-leisure trade-off associated with her retirement decision; (ii) the impact that the overall retirement age will have on her own pension benefits, by modifying the dependency ratio, and (iii) any general equilibrium effect on rate of return and on wages. Elderly workers or retirees will typically choose the retirement age that maximizes their own benefits; for instance, every retiree would potentially like to be the youngest of the group, so as to minimize the number of people with whom to share resources. Younger individuals may be induced to set lower retirement ages in order to anticipate their retirement period, but they would then incur in the cost of receiving a smaller pension benefits at retirement. Which factor prevails will depend on the individual discount factor, and cannot be determined a priori.
How are individual preferences on the retirement age affected by a change in the social security contribution rate? A variation in the size of the system produces a substitution and an income effect, which may induce the voters to modify their decision over the retirement age. An increase in the contribution rate, in fact, reduces the net income associated with working, while increasing the pension benefits; the opportunity cost of retiring thus decreases, thereby inducing voters to anticipate the effective retirement age. Yet, since social security is a dominated saving device, an increase in the contribution rate decreases the overall income of the young, and should hence induce them to postpone retirement. Again, which effect prevails can not be established a priori.

4 Methodology and Calibration

To evaluate quantitatively the future size of the social security system as induced by the policy-makers’ electoral concerns and the political feasibility of postponing retirement in a greying societies, I use a two stages methodology, which consists of an initial calibration of the model to the initial steady state and of its simulation for future steady state. In its initial steady state, the model is calibrated to capture the main economic, demographic and political aspects, and the institutional elements of the different social security systems in France, Germany, Italy, Spain, the UK and the US, around the year 2000. In this calibration exercise (see Cooley and Prescott, 1995), each country is viewed as a closed economy and the values of the key parameters of the theoretical model are pinned down. To simulate how political constraints will shape social security under aging, the model is then fed with the forecasted values of demographic, economic
and political variables for the year 2050, and the social security contribution rates and the effective retirement age which arise as a political equilibrium, are calculated.

In the calibrated model, every period corresponds to one year. Agents are born at age 18 and may live up to age 95 ($G=77$), according to age specific probability of survival. For each country, these probabilities are averages by gender of 1999 official estimates. Given these surviving probabilities, the population growth rate used in the calibration for the year 2000 is calculated to match the elderly dependency ratios reported at table 1. All the estimated parameters are displayed at table 2.

In the labor market, the crucial variables are the average employment rate, which in the model corresponds to the average amount of time dedicated to productive activities, and the labor efficiency by age, which corresponds to the labour income lifetime profile, and are obtained by using country-specific microeconomic data on labour income by age. Another crucial labor market variable needed for the initial calibration of the model is the retirement age, which is set at the median effective retirement age for each country (see table 1).

The calibration of the production side is rather standard. For the constant return to scale production function at eq. 2.5, the value of the average capital share is taken from national accounts, while the exogenous productivity growth is given by the average per-capita GDP growth rate during the nineties. Depreciation rate is set equal to an average value of 5% for all countries. The long term characteristics of each economy are described by its capital-output ratio (see Cooley and Prescott, 1995), which can be obtained from several publications (see also Galasso and Profeta, 2004).

The crucial feature of each social security system is taken to be the equilibrium – rather than the legal – social security contribution rate, which – in each period – equates total
contributions to total pension benefits. In the calibration, this equilibrium social security contribution is computed for the nineties; for countries running a budget deficit (or surplus), the transfer from the general taxation is thus imputed to the contribution rate.

<table>
<thead>
<tr>
<th>Table 2: Estimated Parameters of the Model</th>
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<tbody>
<tr>
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<tr>
<td></td>
</tr>
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<td>France</td>
</tr>
<tr>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Population growth</td>
</tr>
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<td>1.04%</td>
</tr>
<tr>
<td>Avg. employment</td>
</tr>
<tr>
<td>65.4%</td>
</tr>
<tr>
<td>Median Voter’s Age</td>
</tr>
<tr>
<td>43</td>
</tr>
<tr>
<td>Capital share</td>
</tr>
<tr>
<td>31%</td>
</tr>
<tr>
<td>Capital-output ratio</td>
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<td>2.21</td>
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<tr>
<td>Productivity growth</td>
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<td>1.6%</td>
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<td>Social Security</td>
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<tr>
<td>Contribution rate</td>
</tr>
<tr>
<td>22.4%</td>
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<td>Effective Retirement</td>
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<td>Age</td>
</tr>
</tbody>
</table>

For each country, the model is calibrated to match the capital-output ratio, the equilibrium social security contribution rate and the equilibrium effective retirement age in the initial scenario – that is, in 2000. The contribution rate and the effective retirement age is chosen by the median voter on the respective issue (see Shepsle,
On the social security contribution rate, the political system can easily be parameterized to the median age among the voters (see Galasso and Profeta, 2004); whereas on the retirement age the median voter’s age needs not to coincide with the median age among the voters. In computing the median voter, electoral participation rate by age are also considered. These restrictions on the capital-output ratio, on the equilibrium contribution rate and on the equilibrium retirement age (as chosen by the respective median voter) jointly pin down three parameters of utility function: the subjective time discount rate, \( \beta \), the coefficient of relative risk aversion, \( \rho \), and the leisure parameter, \( \upsilon \), which are reported at table 3 for all countries.

### Table 3: Calibrated Parameters of the Model

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Spain</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \rho )</td>
<td>2.24</td>
<td>2.41</td>
<td>2.67</td>
<td>1.86</td>
<td>3.65</td>
<td>4.17</td>
</tr>
<tr>
<td>( \beta )</td>
<td>1.01</td>
<td>1.01</td>
<td>1.07</td>
<td>1.00</td>
<td>1.04</td>
<td>1.08</td>
</tr>
<tr>
<td>( \upsilon )</td>
<td>1.95</td>
<td>0.87</td>
<td>1.75</td>
<td>1.3</td>
<td>2.75</td>
<td>1.4</td>
</tr>
</tbody>
</table>

In the second step, corresponding to the simulation exercise, these calibrated parameters are used to characterize the political economy model, which is then fed with forecasted values of economic, demographic and political variables for the year 2050. In particular, to simulate the aging process, official 2050 surviving probabilities are used for France and the US, while for Germany, Italy, Spain, and the UK, they are computed by
reducing the 1999 official mortality rate by 10%. The population growth rate used in the simulation for 2050 is also calculated to match – given the corresponding surviving probability – the expected elderly dependency ratios (see table 1); while the forecasts for the exogenous productivity growth are taken from EC projections. The forecasted demographic dynamics modifies also the age of the median age among the voters. All these forecasted parameters are reported at table 4.

Table 4: Forecasted Parameters of the Model

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Spain</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population growth</td>
<td>1.04%</td>
<td>0.62%</td>
<td>0.7%</td>
<td>0.8%</td>
<td>0.5%</td>
<td>1.35%</td>
</tr>
<tr>
<td>Median Voter’s Age</td>
<td>53</td>
<td>55</td>
<td>57</td>
<td>57</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Productivity growth</td>
<td>1.6%</td>
<td>1.8%</td>
<td>1.92%</td>
<td>2.2%</td>
<td>2.6%</td>
<td>1.94%</td>
</tr>
</tbody>
</table>

With this new set of parameters, the model simulates – in a new steady state – the political sustainability of the social security system – that is, the social security contribution rate chosen by the median voter on this issue in 2050 – and the political feasibility of postponing retirement – that is, the retirement ages chosen by the median voter on this issue in 2050. The simulations results described in the next section will compare the initial steady state equilibrium – as calibrated for the year 2000 – with the political equilibrium emerging in the 2050 steady state.
5. The political feasibility of postponing retirement

Despite portraying a grim picture, the results in Galasso and Profeta (2004) validated the conventional economic view that some reform measures may be effective in keeping social security expenditure under control. Even in a political economy scenario, in fact, a rise in the retirement age tends in fact to mitigate the hike of the contribution rates, while increasing the disposable income for old age consumption; and the magnitude of these effects is rather large, since in Italy and France, postponing retirement from 58 to 65 years would limit the rise of the contribution rate by respectively 12% and 11.6%.

The intuition behind this result is straightforward: postponing retirement counterbalances the economic and political impacts of aging: the economic effect is reduced, since a higher retirement age, by increasing the ratio of workers to retirees, improves the average return from social security. An increase in the retirement age also moderates the political pressure for a larger system by an older electorate. In fact, postponing retirement reduces the continuation return from the system for all individuals – and hence also for the median voter – by expanding the contribution period, while reducing the length of retirement.

Yet, is this policy measure political feasibility? Will future voters be willing to support an increase in the retirement age? To provide an answer to this question, the political economy model described in the previous sections introduces a political environment in which agents determine – at majority voting – the social security contribution rate, but also the effective retirement age. In this bi-dimensional voting game, voters determine simultaneously, yet separately – that is, issue by issue – the two policies. The social security contribution rate and the effective retirement age that are each supported by a majority of the voters represent the equilibrium outcomes of the voting game.
Table 5: Simulations’ results, postponing retirement

<table>
<thead>
<tr>
<th></th>
<th>Age of the median voter over contribution rate</th>
<th>Effective retirement age</th>
<th>Social security contribution rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>47</td>
<td>58</td>
<td>22.4%</td>
</tr>
<tr>
<td>2050</td>
<td>56</td>
<td>61</td>
<td>25.9%</td>
</tr>
<tr>
<td>2050</td>
<td>56</td>
<td>62</td>
<td>24.3%</td>
</tr>
<tr>
<td>2050</td>
<td>56</td>
<td>63</td>
<td>22.7%</td>
</tr>
<tr>
<td>France</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>46</td>
<td>61</td>
<td>23.8%</td>
</tr>
<tr>
<td>2050</td>
<td>55</td>
<td>69</td>
<td>29.1%</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>44</td>
<td>58</td>
<td>38.0%</td>
</tr>
<tr>
<td>2050</td>
<td>56</td>
<td>67</td>
<td>34.9%</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>44</td>
<td>62</td>
<td>21.3%</td>
</tr>
<tr>
<td>2050</td>
<td>57</td>
<td>66</td>
<td>39.3%</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>45</td>
<td>63</td>
<td>14.5%</td>
</tr>
<tr>
<td>2050</td>
<td>53</td>
<td>64</td>
<td>32.1%</td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>47</td>
<td>63</td>
<td>9.7%</td>
</tr>
<tr>
<td>2050</td>
<td>53</td>
<td>68</td>
<td>13.5%</td>
</tr>
<tr>
<td>2050</td>
<td>53</td>
<td>69</td>
<td>11.9%</td>
</tr>
<tr>
<td>US</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How does aging modify the individual preferences over retirement – given the social security contribution rate? Two main effects occur. First, aging reduces the average profitability from social security. Given the large size of the system, which an older median voter may decide to expand even further, the drop in the social security returns generates a reduction in the lifetime income of future generations. This negative income effect will encourage individuals to postpone retirement. Second, for a given social security contribution rate, aging will reduce the pension benefits’ replacement rate, as fewer resources will have to be shared among more retirees. This amounts to a negative substitution effect, which reduces the pecuniary incentives to retire early and leads to an increase in the retirement age. Therefore, while aging will create a political demand for more pension spending – by increasing the age of the pivotal voter – it will also generate political support for postponing retirement – through these negative income and substitution effects.

Table 5 presents the simulations’ results. For each country, the first line describes the main features for the year 2000, while the following lines characterize the equilibrium outcomes of this bi-dimensional voting game for the year 2050. A crucial result immediately emerges: in all countries, the estimated effective retirement age increases with respect to the initial equilibrium in 2000. Future voters will be willing to support a rise in the retirement age because of the negative impacts of the aging process.

Among these six countries, the largest increase in the effective retirement age – from 58 to 67 years – is forecasted to occur in Italy, where the dramatic aging process will create a sizeable, negative income effect. For a retirement age of 67 years, the social security contribution rate will correspond to 34.9%, hence leading to a reduction in pension spending, in line with the EC-OECD estimates. In Spain, the other fastest aging country, the retirement age will reach 66 years (from 62 years in 2000). Unlike in Italy, where
the initial size of the system in 1992 was notably large, the strong increase in the age of the pivotal Spaniard voter (over the contribution rate) will induce more pension spending, and thus higher contributions and more pension benefits. The reduction in the net labor income and the contemporaneous increase in the pension benefits create a pecuniary incentive to retire (a positive substitution effect), which partially compensates the negative effect of aging. Figure 1 displays the political economic equilibrium in the case of Spain. The reaction function of the retirement age to the contribution rate is increasing. In the 2050 demographic, economic and political scenario, for a range of high contribution rates (between 30% and 50%), further increases in the contribution rate lead to large negative income effect that induces the pivotal voter to postpone retirement.

Figura 1
Sizeable reductions in the social security profitability are also forecasted for Germany and the UK. As in Spain, the aging of the pivotal British voter will lead to a substantial increase in the social security contribution rate, which will jump to 32.1%, and generate a positive substitution effect, so that retirement age will only be postponed by one year. In Germany, instead, the negative effect of aging on the lifetime income of the individuals will dominate: future voters will postpone retirement age to 69 years, while increasing the contribution rate to 29.1%. The negative income effect of aging is expected to be more moderate in France and the US; where also the increase in the pivotal voter’s age is estimated not to have a massive impact on the contribution rate. Interestingly, both France and the US feature multiple equilibria, with the retirement age ranging between 61 and 63 years for France and 68 to 69 years for the US; while the corresponding contribution rates remain between 22.7% and 25.9% in France and 11.9% and 13.5% in the US. Figure 2 displays this equilibrium feature for the US. In this case, the reaction function of the retirement age to the contribution rate is decreasing, since in the US 2050 demographic, economic and political scenario, for a range of low contribution rates (from only 4.5% to 30%), any increase in the contribution rate lead to a positive substitution effect – as pension benefits increase, while the labor income is reduced – that induce the pivotal voter to anticipate retirement.
6. Concluding Remarks

These new simulations on the simultaneous political determination of social security contribution rate and retirement age shed a new light on the political viability of the most commonly endorsed reform measure: postponing retirement. When all political constraints are considered, the retirement age is expected to increase in all countries – thereby mitigating the hike in the social security contribution rates. According to these simulations, Italy will benefit the most from this policy, whereas Spain and the UK are still estimated to experience a large increase in pension spending.
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