Journal of Public Economics 88 (2004) 1849–1869
JOURNAL OF PUBLIC ECONOMICS
www.elsevier.com/locate/econbase

The macroeconomics of early retirement

J. Ignacio Conde-Ruiz[a,*], Vincenzo Galasso[b,c]

[a] FEDEA, Calle Jorge Juan 46, 28001 Madrid, Spain
[b] IGIER, Università Bocconi, Milan, Italy
[c] CEPR, London, UK

Received 29 May 2001; received in revised form 4 December 2003; accepted 10 December 2003

Abstract

Early retirement was introduced after the appearance of redundant middle-aged workers, not entitled to pensions. This distortionary policy reduces human capital accumulation and economic growth, but shifts part of the tax burden on future generations. Why was it adopted? Alternative policies, which do not introduce long-term distortions, but impose a larger cost on the current generation of workers, were blocked by a coalition of high income workers, who did not plan to retire early, but sought to reduce the current tax burden, and low income workers, who expected to retire early and to benefit from the early retirement pension.

JEL classification: H53; H55; D72
Keywords: Human capital accumulation; Political sustainability; Redistributive policies

1. Introduction

Since their adoption between the late 1960s and the 1970s, early retirement provisions[1] have been so widely used to become a distinctive feature of the social security system in all industrialized countries. Early retirement is not innocuous, tough. Gruber and Wise (1999, 2004); Blöndal and Scarpetta (1998) have shown that this provision is, in fact, responsible for the dramatic decrease of the labor force participation of the last few

* Corresponding author. Tel.: +34-91-435-9020; fax: +34-91-577-9575.
E-mail address: conde-ruiz@fedea.es (J.I. Conde-Ruiz).

[1] As Gruber and Wise (1999), we label as early retirement provision different pathways out of the labor market, such as disability pensions (e.g. in Denmark, Germany, the Netherlands and Norway) and unemployment benefits for the elderly (e.g. in Austria, Finland and Germany).

doi:10.1016/j.jpubeco.2003.12.005

decades among middle-aged workers[2]. In virtually all OECD countries, but Iceland and Japan, the average labor force participation of males aged between 60 and 64 has dropped by at least 25%. Two striking cases are the Netherlands, from 84.7% in 1960 to only 19.1% in 2000, and France, from 68.7% in 1960 to only 17.8% in 2000. Ahituv and Zeira (2000) have complemented this view by suggesting that, in the presence of technologic progress, workers with lower human capital, or with more technology-specific human capital, are induced to take advantage of this provision, and to retire early. In a demographic context of aging population, this retirement behavior contributes to increase the dependency ratio, and therefore, exacerbates the financial unbalance of the pay as you go (PAYG) social security systems. Furthermore, Herbertsson and Orszag (2001) have calculated that early retirement can be held responsible for a reduction in the order of 5–7% of potential annual GDP in OECD countries, with even higher figures for EU countries.

Early retirement provisions were initially introduced[3] in the late 1960s and the 1970s, after large shocks to the labor market, which led to the appearance of a mass of redundant middle-aged workers, who were not entitled to a pension transfer in their old-age. Early retirement awarded them a pension. In this paper, we provide a political economy explanation for the adoption of these distortionary early retirement provisions, rather than alternative non-distortionary policy measures. Early retirement introduces long-term distortions in the economy. In fact, the generous incentives to retire early induce workers to accumulate less human capital, hence reducing the growth rate of the economy. Alternative, non-distortionary policies could instead have been introduced to accommodate the labor market shocks.

We concentrate on one-time "bundled" policies, which award an old-age transfer to the elderly with incomplete working history, do not touch the entitlement of the elderly with complete working history, and may generate some income redistribution among the young. In our political environment, any feasible policy response to the negative labor market shock has to defeat the status quo—consisting of a simple unfounded social security system that provides an old-age pension only to those agents who contributed to the system in their youth—in a pairwise majoritarian voting game. All feasible policies are then evaluated in a pairwise voting game.

When we compare a feasible bundled policy to the early retirement provision, a clear trade-off emerges. Bundled policies do not create long-term distortions, but impose a large cost on the current young generation of workers—since they need to generate enough income redistribution among the young to be preferred to the status quo. Early retirement—on the other hand—has negative, long-lasting effects on the growth of the economy, but induces a lower tax burden on the current young, although the tax bill of all future workers increases. In a pairwise comparison, early retirement enjoys the support of a coalition of the extreme: high income workers, who do not plan to retire early, but sought

[2] Actuarially fair early retirement provisions were available in some countries already in the late 1950s. Their introduction has a simple economic explanation, since they were designed to provide an early pathway from the labor market to unhealthy people or workers in hazardous sectors. Notice, however, that they did not give an incentive to leave the labor force to every worker. Our analysis applies to generous—or non actuarially fair—early retirement provisions.

[3] See Conde-Ruiz and Galasso (2003a) for a descriptive analysis of the introduction of these provisions.

to reduce the current tax burden, and low income workers, who expect to retire early and to retain their early retirement pensions in their old-age. To capture the relevance of the young agents' expectations, as it is common in the voting models of social security (see Galasso and Profeta, 2002, for a survey), we concentrate on subgame perfect equilibrium outcomes of our voting game.

To capture the distortionary effect of early retirement, we introduce an overlapping generations economy with human capital accumulation and growth. Young individuals are heterogeneous in their innate ability, which depends on their parents' ability and on the average human capital in the economy. They choose how much human capital to accumulate through an education technology, and when to retire. These decisions determine their labor income. The social security system consists of a PAYG scheme: young workers pay a proportional labor income tax and the proceedings are divided among the retirees. Under early retirement, workers who retire early are awarded an early retirement pension, while those who retire at mandatory age receive the full pension. In this setting, early retirement persistently distorts the human capital accumulation decision of the low-ability types, and thus reduces economic growth.

In its initial political equilibrium, the economy features a social security system with no early retirement—our status quo. Then an unexpected shock takes place, which forces a large mass of workers, who have not reached normal retirement age, out of the labor market. These workers have an incomplete working history and thus—under the status quo system—they are not entitled to a pension in their old-age. Early retirement and bundled policies provide them, respectively, an early retirement pension and a (one-time) old-age transfer.

There has recently been a growing interest in the political economy of early retirement provisions. Lacomba and Lagos (2000) study a model where individuals vote on the mandatory retirement age for a given level of redistribution of the social security system. Casamatta et al. (2002) complement this effort by studying the political determination of the size of the pension system in a model with endogenous retirement for a given early retirement provision. Conde-Ruiz and Galasso (2003a) focus on policy persistence[4] to account for the existence of early retirement provisions in social security systems. In their paper, the political support of a relevant fraction of the current young and middle-aged workers hinges on their expectation that the early retirement provision will be in place when they will be able to take advantage of it. These papers represent positive contributions aimed at explaining the different features of the early retirement scheme. Cremer et al. (2002), on the other hand, have a normative approach along the lines of the traditional optimal taxation literature. They show that when first-best redistributive instruments are not available, because some variables, such as individual productivity or health status, are not observable, early retirement provisions are part of the optimal-tax transfer policy.

The paper[5] proceeds as follows: Section 2 introduces the economic model and the social security system, while Section 3 describes the status quo, the early retirement

[4] See also Coate and Morris (1999); Hassler et al. (2003) on the importance of persistence for the political sustainability of a policy.

[5] All proofs are available in the working paper version, see Conde-Ruiz and Galasso (2003b), or upon request by the authors.

provision and characterizes alternative policy responses. Section 4 defines the political game and compares the policies. Section 5 concludes.

2. The economic model

We introduce an overlapping generations model with growth. In every period, the economy is populated by young and old individuals. Population grows at a constant rate, $n>0$. Young agents decide how much human capital to accumulate and when to retire. Old agents do not work, retirement being mandatory. All consumption takes place in old-age.

Each generation consists of a continuum of agents, who are heterogenous in their innate ability. At any time t, a young agent is characterized by an innate ability level, x_{t-1}, which can be converted into her own level of human capital, h_t, through an education technology. This acquired level of human capital entirely determines her working ability. Agents' innate ability level depends on a relative ability level, z, and on the average human capital in the economy in the previous period, $\tilde{h}_{t-1}$, specifically, $x_{t-1} = z\tilde{h}_{t-1}$. The relative abilities, z, are assumed to be distributed according to a time invariant cumulative distribution function $F(\cdot)$, which has mean $\tilde{z}$, and is skewed, $F(\tilde{z}) > 1/2$. Thus, the evolution of the innate abilities over time entirely depends on the average accumulation of human capital in the economy, while their distribution across agents is regulated by $F(\cdot)$.

Young individuals decide how much human capital to accumulate. All agents have access to the same Cobb Douglas education technology, which transforms investment in education into human capital[6], according to the agent's innate ability. Thus, as in Glomm and Ravikumar (1992), the law of human capital accumulation is:

$$h_t(e_t, x_{t-1}) = \theta(e_t)^{\gamma}(x_{t-1})^{1-\gamma} \tag{1}$$

where $h_t(e_t, x_{t-1})$ is the level of human capital that an innate ability type x_{t-1} young individual obtains at time t by investing e_t units of consumption in education, $\theta>0$ is the productivity of the human capital sector, and $\gamma\in(0,1)$ represents the relative importance of the education in the accumulation of human capital.

Young agents also decide when to retire. They may retire at mandatory retirement age[7], in which case they work during the entire working period, or they may retire early. We characterize the retirement age at time t, that is, the fraction of the working period during which an individual is employed, by ϕ_t. To be entitled to a pension transfer for the remaining period of her life, an agent needs to work at least until the minimum retirement age, $\phi_t \geq \Theta$. Agents retiring at mandatory retirement age at time t, $\phi_t = 1$, receive the full pension in their old-age, at time $t+1$, which we denote by P_{t+1}. An individual retiring

[6] We interpret the investment in human capital as a learning process, which takes place on and off the work place, rather then just as primary or secondary education. According to Becker (1975), the cost of this general training process has to be beard by the workers.

[7] Notice that, although in a large majority of countries agents are still forced or induced to retire in order to obtain a pension transfer, in a growing number of countries—such as the US—agents can work and—at the same time—receive a pension transfer. In our analysis, we abstract from this possibility. For an analysis of the empirical regularities between social security and retirement see Profeta (2002).

early at time t, i.e. between the minimum and the mandatory retirement age, $\phi_t \in [\Theta,1]$, obtains a share $\alpha_t \in [0,1]$ of the full pension, P_t, during the remaining of her youth and a share α_{t+1} of P_{t+1} in her old-age. Hence, the parameter $\alpha > 0$ defines the generosity of the early retirement provision: a large α indicates a small reduction in the pension transfer associated with retiring early, and viceversa.

A linear production function coverts the worker's human capital, weighted by the duration of the working period, ϕ, into the only consumption good:

$$y_t(e_t, \phi, x_{t-1}) = \phi h_t(e_t, x_{t-1}) \tag{2}$$

There exists a storage technology that transforms a unit of today's consumption into $1+r$ units of tomorrow's consumption. All private intertemporal transfers of resources into the future are assumed to take place through this technology.

Young agents have to decide when to retire, ϕ, and the amount of resources to invest in human capital, e. Additionally, they pay a proportional tax on their labor income, τ, which finances the pension spending, and save all their resources for old-age consumption through the storage technology. Old agents take no relevant economic decisions; they simply consume all their wealth. Depending on her retirement behavior, the old-age consumption at time $t+1$ of an agent born at time t is:

$$c_{t+1}^{t} = \begin{cases} (h_t(1-\tau_t) - e_t)(1+r) + P_{t+1} & \text{for } \phi_t = 1 \\ (\phi_t h_t(1-\tau_t) - e_t + (1-\phi_t)\alpha_t P_t)(1+r) + \alpha_{t+1} P_{t+1} & \text{for } \phi_t \in [\Theta, 1) \end{cases} \tag{3}$$

where the upper expression applies to an agent, who retires at mandatory retirement age, $\phi_t = 1$, while the lower one to an early retiree, $\phi_t \in [\Theta,1)$.

Agents are assumed to value leisure, d_t, in their working period and old-age consumption, c_{t+1}^{t} according to a linear utility function[8]:

$$U(\phi_t, c_{t+1}^{t}) = (1-\phi_t)d_t + \beta c_{t+1}^{t}$$

where β, the individual time discount factor, is assumed to be equal to the inverse of the real interest factor, $\beta = 1/(1+r)$, and the value of leisure, d_t, is normalized to the average stock of human capital in the economy in order to be consistent with a growing environment: $d_t = \delta \tilde{h}_{t-1}$, with δ being a constant. The utility that an agent attaches to leisure can be interpreted as the utility associated to the free time which becomes available after an early exit from the labor market or, alternatively, as the utility from the income that an agent may obtain from working on a different occupation—typically in the informal market—after early retirement.

[8] By disregarding current consumption, we abstract from the saving decisions and from the effect of social security on these decisions (see Feldstein, 1974).

To summarize, agents decide their retirement age and their human capital accumulation in order to maximize $U(\phi_t, c^t_{t+1})$, subject to the budget constraint 3. The following lemma characterizes these economic decisions.

Lemma 2.1. *For a given tax rate* τ_t, *and given proportion* α_t, α_{t+1}, *of the unitary pensions* P_t *and* P_{t+1}, *the economic decisions of the agents can be summarized as follows:*

$$\phi^*_t(x_{t-1}) = \begin{cases} \Theta & \text{if } x_{t-1} \leq x^R_{t-1} \\ 1 & \text{if } x_{t-1} > x^R_{t-1} \end{cases} \tag{4}$$

$$e^*_t(x_{t-1}) = (\theta\gamma(1-\tau_t)\phi^*_t)^{\frac{1}{1-\gamma}} x_{t-1} \tag{5}$$

where

$$x^R_{t-1} = \frac{(1-\Theta)(\alpha_t P_t + d_t) - \dfrac{1-\alpha_{t+1}}{1+r} P_{t+1}}{(1-\gamma)(\theta\gamma^\gamma(1-\tau_t))^{\frac{1}{1-\gamma}}(1-\Theta^{\frac{1}{1-\gamma}})} \tag{6}$$

Individuals either stop working at the earliest retirement age, Θ, or at the mandatory retirement age. This binary retirement decision, which is in line with the empirical observations (see Gruber and Wise, 1999), depends on our assumption regarding the early retirement pension: postponing retirement above Θ, but below the mandatory retirement age, does not lead to an increase in the share of the full pension, which remains equal to α.

At any time t, an agent with innate ability level x^R_{t-1} is indifferent between retiring early at Θ or at the mandatory retirement age. Due to the redistributive nature of the social security system (see the discussion in Section 2.1), individuals with innate ability levels below the threshold retire early, since their foregone income is low, while pension benefits and leisure are equal across types. The other agents retire at mandatory age (see Eq. (4)). This innate ability level, x^R_{t-1}, characterizes the human capital accumulation decisions as well. Agents with innate ability x_{t-1} below the threshold x^R_{t-1} will accumulate less human capital—even in proportion to their innate ability—than agents with more innate ability, $x_{t-1} > x^R_{t-1}$ (see Eq. (5)). The intuition is straightforward. Early retirement shortens the period of time devoted to production, and thus decreases the return from investing in human capital; as the low-ability types retire early, they will also accumulate less human capital. Notice that the threshold innate ability, x^R_{t-1}, and therefore, the mass of early retirees, is endogenous. It depends positively on the generosity of the early retirement provision, α_t and α_{t+1}, and of today's pension P_t, and on the current tax burden, τ_t. Larger future pension transfers, P_{t+1}, on the other hand, increase the cost of retiring early, provided that early retirement pensions are penalized, $\alpha_{t+1} < 1$, and thereby reduce the threshold innate ability, x^R_{t-1}.

The previous lemma also suggests that agents accumulate human capital at different pace, depending on their innate ability. In fact, it is easy to show that the level of human capital at time t of an innate ability type, x_{t-1}, is $h_t = (\theta\phi^\gamma\gamma^\gamma(1-\tau_t)^\gamma)^{\frac{1}{1-\gamma}} x_{t-1}$. The average human capital in the economy at the end of the period t can then be obtained by aggregating the accumulation decisions of all agents: $\tilde{h}_t = \int_0^{\infty} h_t \mathrm{d}F(z) = (\theta\gamma^{\gamma}(1-\tau_t)^{\gamma})^{\frac{1}{1-\gamma}}$ $\tilde{h}_{t-1}[1-\mu^{\mathrm{R}}_{t-1}(1-\Theta^{\frac{\gamma}{1-\gamma}})]$, where $\mu^{\mathrm{R}}_{t-1} = \int_0^{x^{\mathrm{R}}_{t-1}} z\mathrm{d}F(x)$ is the proportion of the relative innate ability that can be attributed to the early retirees at time t. Finally, notice that since the innate ability level depends on the relative ability, z (recall that $x_{t-1} = z\tilde{h}_{t-1}$) which is assumed to be time invariant, the distribution of human capital around its average value does not change over time, although the average human capital in the economy may increase.

2.1. The social security system

We consider a balanced budget PAYG social security system with early retirement, which redistributes from the rich to the poor. This element of within cohort redistribution is crucial, because it induces low-ability young to support the social security system[9] (see Casamatta et al., 2000; Conde-Ruiz and Galasso, 1999; Tabellini, 2000). Every worker pays a proportional tax on her labor income, and the proceedings are divided among old-age and early retirees. The pension transfer may depend on the length of the working period of the recipient, but not on her labor income. Since the system is balanced every period, the sum of all pension transfers is equal the sum of all contributions. Thus, the full pension transfer which balances the budget constraint is equal to:

$$P_t = \frac{\overbrace{(1+n)\int \phi_t h_t \mathrm{d}F(x_{t-1})D(\tau_t)\tau_t}^{\text{Tax Base}}}{\underbrace{\int_0^{x^{\mathrm{R}}_{t-2}} \alpha_t \mathrm{d}F(x_{t-2}) + \int_{x^{\mathrm{R}}_{t-2}}^{+\infty} \mathrm{d}F(x_{t-2})}_{\text{Old Age Retirees}} + \underbrace{(1+n)\int_0^{x^{\mathrm{R}}_{t-1}} (1-\phi_t)\alpha_t \mathrm{d}F(x_{t-1})}_{\text{Early Retirees}}}. \tag{7}$$

where x^{R} is defined at Lemma 2.1, $F(x^{\mathrm{R}}_{t-1})$ represents the fraction of young who decides to retire early at time t, and $D(\tau_t)$ is (the complement to one of) a deadweight loss induced by the distorsive taxation that reduces the tax base. We assume that a rise in the tax rate increases the deadweight loss at an increasing rate. Hence, $D'(\tau_t) < 0$ and $D''(\tau_t) < 0$. The above expression can also be written as follows:

$$P_t = \frac{(1+n)\left[1-\mu^{\mathrm{R}}_{t-1}\left(1-\Theta^{\frac{1}{1-\gamma}}\right)\right](\theta\gamma^{\gamma}(1-\tau_t)^{\gamma})^{\frac{1}{1-\gamma}}\tilde{h}_{t-1}D(\tau_t)\tau_t}{1-(1-\alpha_t)F(x^{\mathrm{R}}_{t-2})+(1+n)(1-\Theta)\alpha_t F(x^{\mathrm{R}}_{t-1})}. \tag{8}$$

Thus, the social security system is characterized by the sequence of exogenous minimum retirement age, payroll tax rate, full pension, and percentage of the full pension awarded to the early retirees (Θ, τ, P, α).

[9] Evidence in favor of the existence of this within cohort redistribution can be found in Boskin et al. (1987); Galasso (2002) among others.

2.2. The growth rates of the economy

We can now characterize the per capita growth rate of the economy, for a constant sequence of social security tax rates, τ, in an economy with the early retirement provision, $g_t^{\mathrm{ER}}(\tau)$, and without it, $g^{\mathrm{WR}}(\tau)$. They are, respectively

$$g_t^{\mathrm{ER}}(\tau) = \left[1 - \mu_{t-1}^{\mathrm{R}}\left(1 - \Theta^{\frac{\gamma}{1-\gamma}}\right)\right]((1-\tau)^{\gamma}\theta\gamma^{\gamma})^{\frac{1}{1-\gamma}} \tag{9}$$

$$g^{\mathrm{WR}}(\tau) = (\theta\gamma^{\gamma}(1-\tau)^{\gamma})^{\frac{1}{1-\gamma}} \tag{10}$$

Clearly, $g_t^{\mathrm{ER}}(\tau) = \Psi_t g^{\mathrm{WR}}(\tau)$ where $\Psi_t = \left[1 - \mu_{t-1}^{\mathrm{R}}\left(1 - \Theta^{\frac{\gamma}{1-\gamma}}\right)\right] \leq 1$, since early retirement reduces the accumulation of human capital by the early retirees. Thus a positive per capita growth rate takes place in the two scenarios, if the investment in human capital is sufficiently productive and the social security tax rate is not too high: $\theta > \Psi_t^{-(1-\gamma)}(\gamma^{\gamma}(1-\tau))^{-1}\forall t$.

3. Early retirement and alternative policy responses

In this section, we first model a simple social security system that resembles the system in place in many OECD countries before the introduction of early retirement. We then introduce a temporary shock to the labor market taking place at time $T-1$, and leading to the appearance of individuals with incomplete working history, hence not entitled to an old-age pension. Several policy responses could have provided some income to these individuals. We use the "status quo" model as a benchmark to compare to a social security system with early retirement and to an alternative policy. Early retirement awards these individuals with a pension income, at the cost of long-term distortions in the economy, since it distorts the human capital investment decisions. However, alternative, non-distortionary policies could have also been implemented.

3.1. The status quo

We consider an economy in which there initially exists a social security system that levies a tax on labor income and provides a lump-sum old-age pension. No early retirement provision is available at this stage. We call this initial social security system the status quo (SQ). Since the budget is balanced every period, the status quo pension at time t can be written as follows:

$$P_t^{\mathrm{SQ}} = (1+n)(\theta\gamma^{\gamma}(1-\tau_t^{\mathrm{SQ}})^{\gamma})^{\frac{1}{1-\gamma}}\tilde{h}_{t-1}D(\tau_t^{\mathrm{SQ}})\tau_t^{\mathrm{SQ}} \tag{11}$$

where τ_t^{SQ} indicates the status quo tax rate[10] at time t. Furthermore, we consider the status quo social security as a defined benefit system, in which pensions are linked to the per capita growth of the economy, through the average human capital. In particular, we assume that

$$P_{t+1}^{SQ} = P_t^{SQ} \frac{\tilde{h}_t}{\tilde{h}_{t-1}} = P_t^{SQ} g^{WR}(\tau_t^{SQ}) \forall t \tag{12}$$

where $g^{WR}(\tau_t^{SQ})$ is defined at Eq. (9). Thus, for a given average human capital at $t-1$, $\tilde{h}_{t-1}$, the pension transfer P_t^{SQ} fully characterizes the status quo system—since τ_t^{SQ} has to adjust in order to finance the pension transfers—and its evolution over time. It is now useful to define the indirect utility function at time t for a young individual with innate ability x_{t-1} under the status quo system:

$$v_{t,x}^{SQ} = \underbrace{(1-\gamma)(\theta\gamma^{\gamma}(1-\tau_t^{SQ}))^{\frac{1}{1-\gamma}}}_{I^{SQ}} x_{t-1} + \underbrace{\frac{P_{t+1}^{SQ}}{1+r}}_{K^{SQ}}. \tag{13}$$

where I^{SQ} is the part of the (indirect) utility that is proportional to the agents' ability type and K^{SQ} is the constant term.

3.2. Timing of the events

We now discuss the timing of the events, which is summarized in Fig. 1. At time $T-2$, the economy is at a steady state with a status quo social security system characterized by a tax rate $\tau_{T-2}^{SQ} = \bar{\tau}^{SQ}$ and a corresponding old-age pension P_{T-2}^{SQ} which grows at the per capita growth rate of the economy as defined at Eq. (12). At $T-1$, an unexpected temporary shock takes place: a worsening of the economic conditions forces a large mass of workers to exit the labor market before having reached normal retirement age. These redundant workers are low-ability, and we indicate their mass by $\varepsilon = F(x_{T-2}^{R})$. Since the shock was unexpected, it is reasonable to assume that these workers did not modify their human capital accumulation decision to adjust for the reduction in their working period. Nevertheless, the income—and thus the tax base—decreases at $T-1$, because of their early exit from the labor market. The tax rate τ_{T-1}^{SQ} will therefore adjust[11] in order for the pension transfer P_{T-1}^{SQ} to increase at the per capita growth rate of the economy (see Eq. (12)). At time T, these redundant workers would not receive an old-age pension, since they have an incomplete working history, and will have to consume only out of their savings;

[10] We are implicitly assuming that, in absence of an early retirement provision, all agents retire at normal retirement age. This amounts to impose the following restriction on the value of the leisure: $d_t < P_{t+1}^{SQ}/(1+r)(1-\Theta)\forall t$.

[11] In particular, the tax rate will increase, $\tau_{T-1}^{SQ} > \bar{\tau}^{SQ}$, if $\bar{\tau}^{SQ}$ is on the increasing portion of the Laffer curve induced by the deadweight loss function, $D(\tau_t)$, and decrease otherwise.

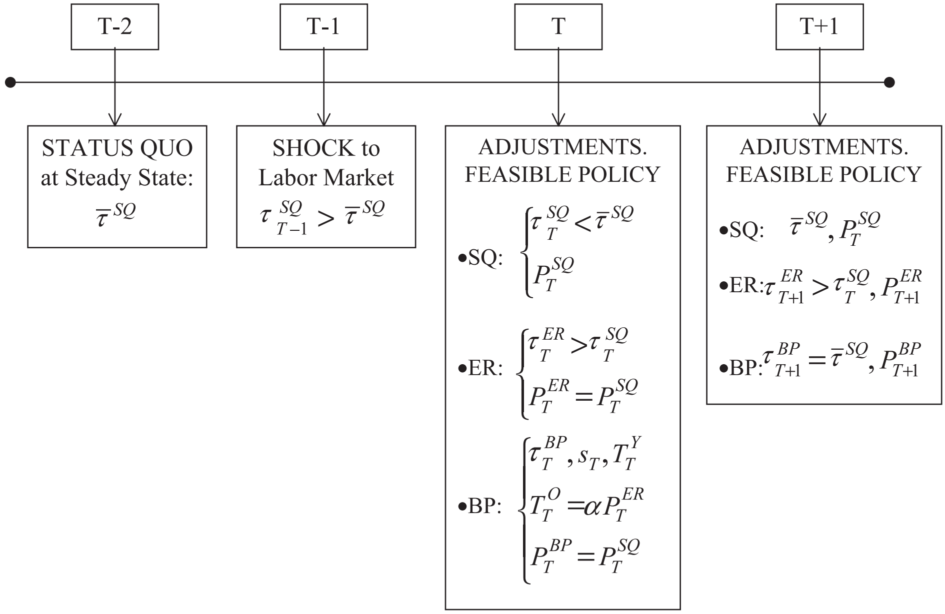

Fig. 1. The time of events.

whereas the elderly with complete working history would obtain their normal pension transfer, P_T^{SQ}. The tax rate would temporarily be reduced below its steady state level, $\tau_T^{\mathrm{SQ}} < \bar{\tau}^{\mathrm{SQ}}$, since the number of pensions paid out at time T would drop.

Finally, at $T+1$, the pension transfer would be awarded to all retirees—there are no more elderly with incomplete working history—and all workers would retire at normal retirement age. Notice that at this point the status quo system would revert to its steady state (as at $T-2$). In fact, the proportion of retirees and workers has returned to its steady state level, the pension transfer continues to increase at the per capita growth of the economy $P_{T+1}^{\mathrm{SQ}}/\tilde{h}_T = P_{T-2}^{\mathrm{SQ}}/\tilde{h}_{T-3}$ and thus the tax rate is equal to the steady state value $\tau_{T+1}^{\mathrm{SQ}} = \bar{\tau}^{\mathrm{SQ}}$.

3.3. The early retirement provision

The existence of a mass of elderly people with no entitlement to receive an old-age pension transfer may induce the policy-makers at time T to institute an early retirement provision, which awards an old-age transfer to the elderly with incomplete working history. At time T, these elderly would receive a share α_T of the full pension. The early retirement scheme is described in details in Section 2: agents who have worked until a minimum retirement age, Θ, receive a proportion $\alpha_t \leq 1$ of the full pension, P_t^{ER}, during the remaining of their youth and a share α_{t+1} of P_{t+1}^{ER} in their old-age. The system is financed through a sequence of taxes on labor income, τ^{ER}. Three further elements characterize our early retirement provision. First, the introduction of early retirement does not modify the entitlement of the elderly with complete working history at time T, and thus $P_T^{\mathrm{ER}} = P_T^{\mathrm{SQ}}$. Second, as in the status quo, under early retirement pensions are indexed to the growth of the economy: $P_{t+1}^{\mathrm{ER}} = P_t^{\mathrm{ER}}\tilde{h}_t/\tilde{h}_{t-1} = P_t^{\mathrm{ER}} g^{\mathrm{ER}}(\tau_t^{\mathrm{ER}})\forall t$ (see Eq. (9)). Third, we assume the share of the full pension going to the early retirees to be constant over time, $\alpha_t = \alpha\ \forall t$.

These restrictions guarantee that for given values of α and Θ the early retirement provision is fully characterized. In particular, at time T, the tax rate τ_T^{ER} is set to provide[12] the full pension, $P_T^{\mathrm{ER}} = P_T^{\mathrm{SQ}}$, to the elderly with complete working history and a reduced pension, $\alpha_T P_T^{\mathrm{ER}}$, to the early retirees. In the following periods, $t > T$, the full pension (and thereby the early retirement pension via the parameter α) evolves according to $P_{t+1}^{\mathrm{ER}} = P_t^{\mathrm{ER}}\tilde{h}_t/\tilde{h}_{t-1}$, and the tax rate, τ_{t+1}^{ER}, adjusts accordingly (see Fig. 1).

The introduction of a generous early retirement provision increases the financial requirements of the system, which now has to provide for more pensions, both initially and in the long-run, $\tau_{T+i}^{\mathrm{ER}} > \tau_{T+i}^{\mathrm{SQ}}\ \forall i \geq 0$. The growth of the economy is instead reduced, $g_{T+i}^{\mathrm{ER}} < g_{T+i}^{\mathrm{SQ}}\ \forall i \geq 0$, where g_{T+i}^{ER} and $g_{T+i}^{\mathrm{SQ}} = g_{T+i}^{\mathrm{WR}}$ follow from Eq. (9) and (10). The extent to which the size of the system increases depends on the generosity of the early retirement provision, measured by α, and on the proportion of workers who retire early. Notice that, after the initial shock at time $T-1$ that gives raise to an exogenous initial group of agents with incomplete working history, ε, in the following periods the mass of early retirees, $F(x_t^{\mathrm{R}})$ with $t \geq T-1$, is endogenous and depends on the features of the early retirement provision (see Eq. (6)). To simplify the analysis, in what follows we assume that the exogenous initial mass of workers who is forced to exit the labor market at $T-1$ equals the mass of early retirees that arises endogenously in the following periods: $\varepsilon = F(x_{t-1}^{\mathrm{R}}) = F(x_t^{\mathrm{R}})\ \forall t \geq T-1$.

Finally, the indirect utility obtained under early retirement by the early retires and by those who work till mandatory retirement age are, respectively:

$$v_{t,x}^{\mathrm{ER}} = \underbrace{(1-\gamma)(\Theta\theta\gamma^{\gamma}(1-\tau_t^{\mathrm{ER}}))^{\frac{1}{1-\gamma}}}_{I^{\mathrm{ER}}} x_{t-1} + \underbrace{(1-\Theta)(\alpha P_t^{\mathrm{ER}} + d_t) + \alpha\frac{P_{t+1}^{\mathrm{ER}}}{1+r}}_{K^{\mathrm{ER}}}$$

$$v_{t,x}^{\mathrm{NR}} = \underbrace{(1-\gamma)(\theta\gamma^{\gamma}(1-\tau_t^{\mathrm{ER}}))^{\frac{1}{1-\gamma}}}_{I^{\mathrm{NR}}} x_{t-1} + \underbrace{\frac{P_{t+1}^{\mathrm{ER}}}{1+r}}_{K^{\mathrm{NR}}} \tag{14}$$

where I^{ER} and I^{NR} represent the part of the (indirect) utility that is proportional to the agents' ability type and K^{ER} and K^{NR} represent the constant terms, respectively, for the early retirees and for the agents who retire at normal retirement age.

[12] We assume that there always exists a tax rate, τ_t^{ER}, generating enough tax proceeds to finance the pension benefits.

3.4. An alternative policy response

In this section, we examine alternative political responses to the labor market shock. The simplest policy would have been to provide a transfer at time T to the workers with incomplete working history, financed by a labor income tax. However, this relatively inexpensive policy, introducing no long-term distortions, would have not defeated the status quo. To be preferred to the status quo by at least some young agents, besides providing a transfer to the workers with incomplete working history, a policy has to entail some redistribution among the young. This is not surprising, as also the early retirement provision bases its political support among the young on an element of intragenerational redistribution.

Hence, we concentrate on a policy, which at time T provides every young with a lump-sum transfer and every elderly person with incomplete working history with an old-age transfer, financed by a proportional tax on labor income. This policy, which we call "bundled" policy, has two important features: (i) it does not introduce long-term distortions, by reverting to the status quo in period $T+1$; and (ii) it does not allow to target redistribution in favor of specific income groups. Clearly, if policy-makers are allowed to use every fiscal instrument, such as for instance targeted transfers, it is always possible to construct a policy preferred to both the status quo and early retirement by a majority of agents. To prevent this, the latter feature of our "bundled" policy restricts the policy space, on the basis of informational requirements. Policy-makers are assumed not to possess all the information to identify every individual's income, and hence income targeted policies cannot be implemented.

More precisely, our bundled policy (BP) consists of:

- a sequence of pension transfers to the elderly with complete working history, $P_t^{\mathrm{BP}}\ \forall t \geq T$, financed by a sequence of tax rates on labor income, $\tau_t^{\mathrm{BP}}\ \forall t \geq T$, such that (i) at time T, the transfer is equal to the status quo pension, $P_T^{\mathrm{BP}} = P_T^{\mathrm{SQ}}$, and (ii) future pensions are linked to the growth of the economy, as under the status quo and early retirement, $P_{t+1}^{\mathrm{BP}}/\tilde{h}_t = P_t^{\mathrm{BP}}/\tilde{h}_{t-1} \forall t \geq T$;
- a transfer at time T to the elderly with incomplete working history that is equal to the pension awarded to the same agents at time T under early retirement, $T_T^{\mathrm{O}} = \alpha P_T^{\mathrm{ER}}$;
- a transfer at time T to all young agents, T_T^{Y}; and
- a tax rate s_T—at time T—levied on the labor income net of social security taxes, which rises enough revenues to finance the transfer to the young and to the old with incomplete working history, i.e. $(1+n)T_T^{\mathrm{Y}} + F(x_{T-1}^{\mathrm{R}})T_T^{\mathrm{O}}$.

Under this bundled policy, the elderly at time T—regardless of their working history—receive the same treatment as under early retirement. The degree of redistribution among the young—namely on T_T^{Y}—represents the instrument for the bundled policy to increase its political support. Our bundled policy can in fact be indexed by T_T^{Y}, or, equivalently, by the tax rate, s_T, that finances this transfer, T_T^{Y}, and the old-age transfer, T_T^{O}. This policy has only a one-time negative impact—at time T—on the growth rate of the economy, whose relevance depends on the degree of redistribution,

s_T. In particular, the growth rate of the economy at time T is $g_T^{\mathrm{BP}}(s_T) = (\theta\gamma^{\gamma}(1-s_T)^{\gamma}(1-\tau^{\mathrm{BP}})^{\gamma})^{\frac{1}{1-\gamma}} < g^{\mathrm{SQ}} \forall s_T > 0$.

In all future periods, all retirees would receive an old-age pension and all workers would retire at normal retirement age. Thus, since $P_T^{\mathrm{BP}} = P_T^{\mathrm{SQ}}$ and future pensions[13] evolve according to the growth of the economy, $P_{t+1}^{\mathrm{BP}}/\tilde{h}_t = P_t^{\mathrm{BP}}/\tilde{h}_{t-1} \forall t \geq T$, it is easy to show that the social security tax rate under the bundled policy would coincide with the tax rate under status quo, $\tau_t^{\mathrm{BP}} = \tau_t^{\mathrm{SQ}}$ $\forall t > T$, and thus the growth rates would coincide as well, $g_t^{\mathrm{BP}} = g_t^{\mathrm{SQ}}$ $\forall t > T$.

It is useful to characterize the indirect utility function at time T of a young agent with innate ability type x_{T-1}. As previously mentioned, this utility will depend on the tax rate s_T which determines the young-age transfer:

$$v_{T,x}^{\mathrm{BP}}(s_T) = \underbrace{(1-\gamma)(\theta\gamma^{\gamma}(1-\tau_T^{\mathrm{BP}})(1-s_T))^{\frac{1}{1-\gamma}}}_{I^{\mathrm{BP}}} x_{T-1} + \underbrace{T_T^{\mathrm{Y}} + \frac{P_{T+1}^{\mathrm{BP}}}{1+r}}_{K^{\mathrm{BP}}}. \tag{15}$$

where as usual, I^{BP} represents the part of the (indirect) utility that is proportional to the agents' ability type and K^{BP} is the constant term.

4. The political game

In this section, we examine the politics behind the policy response to the labor market shock. At time T, our economy is populated by two types of elderly, those who have a complete working history and those who do not, since at $T-1$ they were forced out of the labor market. According to the policy in place at $T-1$—the status quo—the latter group of elderly would not be entitled to any pension benefit. However, policy changes may take place at T that award them a pension transfer.

To describe our political process, we need to introduce the concept of feasible policy. In our terminology, a feasible policy is any policy—early retirement or a bundled policy—that at time T defeats the status quo in a pairwise majoritarian voting game. These feasible policies constitute the win-set of the status quo[14]. The political game than takes place among these feasible policies. To replace the status quo at time T, a policy has thus to be feasible and to defeat all other feasible policies in a pairwise voting game. In other words, our political game can be thought of as a two stage game. In the first stage, we identify all the policies that are preferred to the status quo by a majority of voters. In the second stage, the equilibrium policy response is selected among all feasible policies by pairwise comparisons.

This voting game displays some nice properties. First, it eliminates the possibility of Condorcet cycles among the status quo and two alternative policies—early retirement and

[13] Notice that although the absolute pension transfer would be lower under the bundled policy, $P_t^{\mathrm{BP}} < P_t^{\mathrm{SQ}}$ $\forall t > T$, since at time T there would be a lower human capital accumulation under the bundled policy (lower $\tilde{h}_T$), the relative pension transfer, i.e. as a proportion of the stock of human capital, would coincide.

[14] See Tsebelis (2002) for a formal definition and a political characterization of the win-set of the status quo.

a bundled policy—which would typically arise in a voting game based on pairwise comparisons among all policies[15]. Second, it prevents the selection of other sequential agenda settings[16] that lead as an equilibrium outcome to a policy, which would have been defeated by the status quo in a pairwise comparison.

To summarize, we deal with the possibility of Condorcet cycles by refining our political game in two directions: (i) we restrict the policy space, on the ground of low informational requirements; and (ii) we consider a sequential voting game, in which any policy outcome has to belong to the winset of the status quo.

We now turn to the selection of the feasible policy responses by analyzing the pairwise comparisons among the status quo and, respectively, early retirement and the bundled policy.

4.1. Status quo and early retirement

We consider a pairwise majority voting at time T between the status quo and the system with the early retirement provision. The voting behavior of the elderly is straightforward: those with incomplete working history vote for early retirement, while the others abstain, since they receive the same treatment under the two policies. Young voters, on the other hand, may not be willing to sustain early retirement—or any social security system—unless they expect this transfer policy to be in place in their old-age. This is a common feature of virtually all voting models of intergenerational transfers (for a review see Galasso and Profeta, 2002). As often in this literature, we concentrate on subgame perfect equilibrium outcomes of this voting game[17]. If young agents believe their current voting decision to influence future voters, they may be willing to sustain an early retirement provision—and to retire early—since they expect to be rewarded in their old-age with an early retirement pension. Young voters who do not expect to retire early vote for the status quo, in order to avoid the larger tax burden.

It is useful to define the innate ability level of an agent who is indifferent between voting for the status quo and voting for the early retirement provision, in which case she would retire early: $x^{ES}=(K^{ER}-K^{SQ})/(I^{SQ}-I^{ER})$. The next proposition hinges on the previous discussion to find a condition for the early retirement provision to be a subgame perfect equilibrium of our pairwise voting game.

Proposition 4.1. *If* $F(x^{ES})>\frac{1}{2}\left(1-\frac{F(x^{R})}{1+n}\right)$, *then the early retirement provision represents a (subgame perfect) political equilibrium outcome of our pairwise voting game against the status quo, at every election since period T, and hence is feasible.*

---

[15] Notice, however, that Condorcet cycles may still potentially arise among feasible policies in the second stage.

[16] See Bernheim et al. (2002)—and references therein—for a recent discussion of the power of control in agenda setting.

[17] These social security games give typically rise to multiple equilibria. Different selection criteria have been adopted to single out an equilibrium outcome: Esteban and Sakovics (1993) introduce a transaction cost, Azariadis and Galasso (2002) consider a constitutional veto power, Boldrin and Rustichini (2000) assign all the gain from social security to the first generation to set up the system, while Cooley and Soares (1999) and Galasso (1999) assume that the initial voters share this gains with all future generations.

The crucial insight of this proposition is that the political success of early retirement—vis a vis the status quo—depends on two features: the size of the group of agents who have already retired early, $F(x^{R})$, and the degree of income inequality in the economy. The former element quantifies the support for early retirement among the elderly, while the latter determines its popularity among the young. In fact, because of its redistributive feature, early retirement is supported by low-income individuals; hence, the degree of income inequality characterizes the mass of young voters in favor of the provision.

This proposition also suggests that, for large degrees of income inequality, early retirement provisions could be introduced as a political equilibrium of a voting game—vis a vis the status quo—even without labor market shocks. In particular, in absence of individuals with incomplete working history, $F(x^{R})=0$, an equilibrium with early retirement exists if more than half of the young population is willing to retire early, $F(x^{ES})>1/2$. In this case, early retirement is exclusively supported by low-ability young, due to its redistributive feature.

In this paper, we stressed the pivotal role of negative labor market shocks in paving the way to the introduction of early retirement provisions. In fact, the existence of a large mass of individuals with incomplete working history was crucial to establish early retirement, as it provided additional support for this provision and increased its probability of adoption, even in countries with low degrees of income inequality, in which most workers were not willing to retire early[18]. A shock to the labor market may thus be pivotal for the early retirement system to get started. Finally, notice that once early retirement is introduced, this policy becomes endogenously persistent, as it creates incentives for young individuals to retire early, and hence creates its own future constituency.

4.2. Status quo and bundled policy

We now examine the pairwise comparison between our bundled policy and the status quo. Elderly with incomplete working history clearly prefer the bundled policy, which awards them a transfer, T_T^{O}; whereas all other elderly are indifferent and thus abstain. Among the young, for any $s_T>0$—i.e. as long as some transfers, T_T^{O}, are paid to the elderly with incomplete working history—rich individuals prefer the status quo, which imposes a lower tax burden. Low income young, on the other hand, may benefit from the bundled policy, if this provides enough income redistribution. We can thus define the innate ability level of a young agent who is indifferent between voting for the status quo or for the bundled policy: $x^{BS}(s_T)=(K^{BP}-K^{SQ})/(I^{SQ}-I^{BP})$. This threshold depends on s_T to indicate that some degree of income redistribution is required for low-ability young to support the bundled policy. We can now state the following proposition.

Proposition 4.2. *If* $F(x^{BS}(s_T)) > \frac{1}{2}\left(1-\frac{F(x^{R})}{1+n}\right)$*, then the bundled policy characterized by the tax rate* $s_T(>0)$ *represents a political equilibrium outcome of our pairwise voting game against the status quo, at time T, and hence is feasible.*

[18] See also Conde-Ruiz and Galasso (2003a) for a discussion of the conditions for the initial introduction of the early retirement provision.

In a nutshell, to defeat the status quo in a pairwise majoritarian voting game, the bundled policy has to generate enough redistribution among the young that the voting coalition between the elderly with incomplete working history and the low-ability young who benefit from the policy constitutes a majority of the voters.

4.3. Bundled policy and early retirement

We can now turn to the pairwise voting game between a feasible bundled policy and the early retirement provision. Since the political support for early retirement hinges on expectation of future policies, we focus on subgame perfect equilibrium outcomes, thereby allowing young agents to believe that their current voting behavior may have an influence on future voters.

As discussed in Section 3, the elderly receive equal treatment under early retirement and under bundled policy, and thus abstain from voting. To analyze the voting behavior of the young, we have to distinguish those agents who under early retirement would retire early—the early retirees—from those who would not. Let $x^{\mathrm{EB}}(s_T)$ be the ability level of a former type of agent—i.e. an early retiree—who is indifferent between voting for the bundled policy or for the early retirement provision: $x^{\mathrm{EB}}(s_T)=(K^{\mathrm{ER}}-K^{\mathrm{BP}})/(I^{\mathrm{BP}}-I^{\mathrm{ER}})$. And let $x^{\mathrm{NB}}(s_T)$ be the ability level of a latter type of agent, who is indifferent between the two policies: $x^{\mathrm{NB}}(s_T)=(K^{\mathrm{NR}}-K^{\mathrm{BP}})/(I^{\mathrm{BP}}-I^{\mathrm{NR}})$. Clearly, both thresholds depend on the tax rate s_T, which characterizes the degree of redistribution in the bundled policy. Moreover, notice that the feasible bundled policies are indexed by the tax rate s_T as shown in Proposition 4.2. Finally, let $\tilde{x}^{\mathrm{EB}}(s_T)=\max\{0,x^{\mathrm{EB}}(s_T)\}$ and $\tilde{x}^{\mathrm{NB}}(s_T)=\max\{0, x^{\mathrm{NB}}(s_T)\}$. We can now state the following proposition, which provides a comparison between these two policies in a pairwise voting game. Notice that the winner in this pairwise voting game between feasible early retirement and bundled policy is a Condorcet winner of our political game, since both policies belong to the win-set of the status quo.

Proposition 4.3. *A bundled policy characterized by the tax rate s_T represents a (subgame perfect) political equilibrium outcome of our pairwise voting game against early retirement, at every election since time T, if the tax rate s_T is such that one of the following conditions holds*:

- *For $I^{\mathrm{BP}}>I^{\mathrm{NR}}>I^{\mathrm{ER}}$ (small s_T)*: $F(\tilde{x}^{\mathrm{EB}}(s_T))<1/2$;
- *For $I^{\mathrm{NR}}>I^{\mathrm{BP}}>I^{\mathrm{ER}}$ (medium s_T)*: $F(\tilde{x}^{\mathrm{NB}}(s_T))-F(\tilde{x}^{\mathrm{EB}}(s_T))>1/2$;
- *For $I^{\mathrm{NR}}>I^{\mathrm{ER}}>I^{\mathrm{BP}}$ (large s_T)*: $F(\min\{\tilde{x}^{\mathrm{EB}}(s_T),\tilde{x}^{\mathrm{NB}}(s_T)\})>1/2$.

This proposition suggests that the composition of the voting coalition in favor of the bundled policy—and against early retirement—depends on the degree of redistribution at time T, and thus on s_T. Figs. 2–4 display the utility by ability types under the two policies (dotted lines for ER and continuous lines for BP) for different values of s_T, and provide a graphic interpretation of this proposition. For small s_T, the bundled policy is less costly than early retirement, and thus all young voters who do not expect to retire early will support the bundled policy. Even the early retirees with medium ability—above the

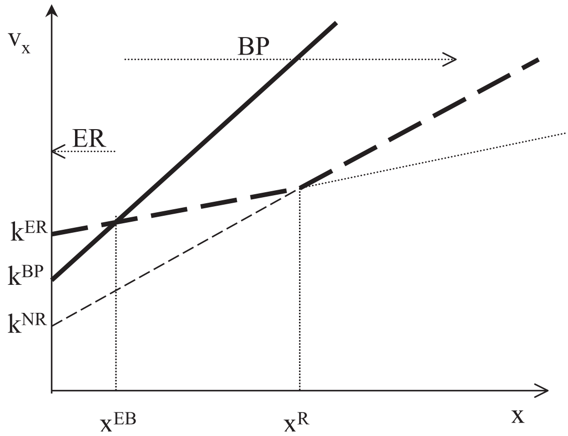

Fig. 2. Early retirement and bundled policy. Small s_T.

threshold $x^{EB}(s_T)$—will vote for the bundled policy, since the benefit from the reduction in the tax burden prevails over the utility from the pension transfer and from leisure (see Fig. 2). For medium s_T, there is more redistribution, and the tax burden under the bundled policy becomes larger than under early retirement. In this case (see Fig. 3), the voting coalition in favor of the bundled policy is composed of the medium ability types, $x^{EB}(s_T) < x < x^{NB}(s_T)$. Among these agents, the early retirees benefit only marginally from retiring early, and thus prefer the redistribution provided by the bundled policy; while for the agents who retire at normal retirement age, the two systems have similar costs, but the bundled policy provides a larger benefit, since it awards them a transfer, T_T^Y. Notice that in this case early retirement is supported by a coalition of the extreme: the poorest and the richest young. Finally, for large values of the tax rate s_T, the tax burden is large and finances a massive redistribution. In this case (see Fig. 4), the support for the bundled

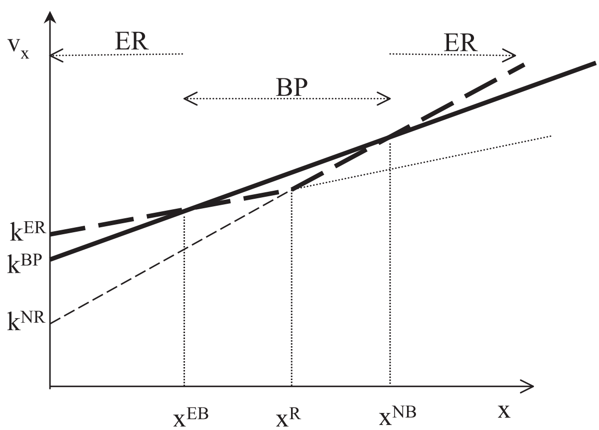

Fig. 3. Early retirement and bundled policy. Medium s_T.

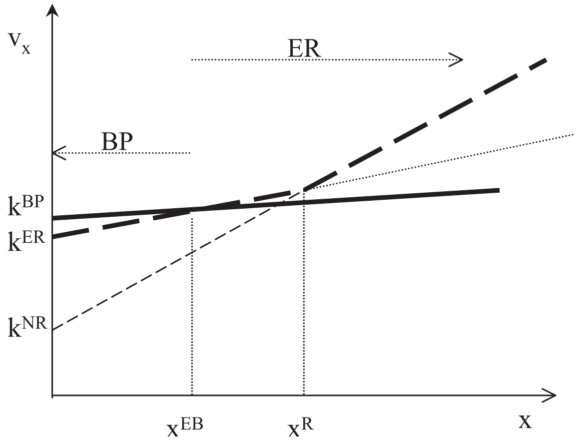

Fig. 4. Early retirement and bundled policy. Large s_T.

policy comes from the low-ability agents, who are less penalized by the high taxes and benefit from the redistribution. To summarize, a reduction in s_T decreases the support for the bundled policy against early retirement among the low-income young, while increasing the support among the high-income young. The numerical example of the next section will help to quantify these effects.

Taken together, Propositions 4.2 and 4.3 suggest that there exist a trade-off in choosing the degree of redistribution for the bundled policy. In fact, while a high degree of redistribution—a large s_T—is needed for the bundled policy to be voted by low-ability young against the status quo, and thus to be feasible, a low degree of redistribution—a small s_T—typically increases the support for the bundled policy against the early retirement provision. Whether there exists an intermediate level of redistribution, which allows the bundled policy to defeat both the status quo and early retirement, it depends on several elements, such as the size of the initial mass of workers who were forced to exit the labor market, the degree of income inequality and the impact that these policies have on the growth of the economy.

4.4. A numerical example

To provides a quantitative assessment of the relative importance of the effects discussed above, we parametrize our simple model to the Italian social security system. Every period corresponds to 40 years. Since the elderly only survive half of their old-age, the working period includes agents who are 25–64 years-old, while the old-age those who are 65–84. Population grows at 1% per year. The relative abilities, z, are distributed according to a piecewise uniform density function, whose parameters are calibrated to give a median to mean ratio of 0.75; while the deadweight loss due to the distortionary taxation is characterized by the following function: $D(\tau)=(1-\tau)^{\lambda}$.

Under the status quo, the economy is calibrated at steady state to a tax rate, $\bar{\tau}^{SQ}$, of 20%, in line with the average contribution rate in the sixties, and to an annual growth rate of the

Table 1
The Italian social security system

Parameters	Early retirement	Tax rates
$\gamma=0.25$	$\Theta=4/5$	$\tau_t^{SQ}=19.8\%\ \forall t\neq T$
$\theta=2.4$	$\alpha=0.8$	$\tau_T^{SQ}=11.7\%$
$\lambda=2/3$	$\varepsilon=F(x^R)=50\%$	$\tau_t^{ER}=25\%\ \forall t$
$n=1.5$		$\tau_t^{BP}=19.8\%\ \forall t>T$
$\delta=0.46$		$s_T\in[20\%, 27\%]$

economy of 1.5%. Moreover, in order to capture the existence of non-contributory "social" pension in the Italian social security system, at time T, the status quo social security system is assumed to provide the elderly with incomplete working history with a minimum non-contributory pension, equal to 30% of the full pension. The early retirement provision is parametrized to the Italian legislation—prior to the 1995 reform: the minimum retirement age is 57 years, early retirees obtain 80% of the full pension, the tax rate is around 25%, and, according to Bank of Italy survey data, 50% of the working population retired at 57 years. All parameters and tax rates are shown in Table 1.

At time T, the early retirement provision would defeat the status quo by a tiny margin, with 51% of the votes, while the bundled policy would require intermediate degrees of redistribution to be preferred to the status quo. However, in this case, corresponding to Fig. 2, the bundled policy would not defeat early retirement. To see why, consider $s_T=20\%$. The overall tax rate of the bundled policy at time T exceeds the cost of early retirement, but early retirement increases the tax burden on all future generations. Poor—whom ability is below 39% of the average—and rich agents—whom ability is above 172% of the average—prefer early retirement, which obtains a voting majority of 60%. As s_T increases, the bundled policy gains support among the poor—because of the increase in the redistribution—and loses votes among the middle income agents—due to the increase in the tax burden. The overall effect favor early retirement, whose voting majority raises steadily from 60% for $s_T=20\%$ to 87.7% for $s_T=27\%$.

5. Conclusions

In this paper, we argue that early retirement provisions introduce long run distortions in the economy. In fact, the prospect of retiring early—by shortening the working life—reduces the incentives to accumulate human capital, thereby decreasing economic growth. Additionally, this provision shifts part of the increase in the tax burden on future generations.

The adoption of generous early retirement provisions in the late 1960s and the 1970s followed a period of large shocks to the labor market, which had created a large mass of redundant middle-aged workers, not entitled to a pension transfer in their old-age; and was aimed at providing these elderly individuals with a pension transfer. Indeed, early retirement was not the only possible response to the appearance of redundant workers with no entitlement to a pension. A wide variety of temporary policies was available to transfer resources to the workers initially hit by the negative shock in their old-age.

However, these one-time policies did not typically enjoy the support of a large share of voters, and hence did not constitute a political equilibrium. To see this, we have analyzed an alternative policy, with a low informational requirement, that (i) provides the elderly with incomplete working history with the same transfer as the early retirement pension, (ii) has no impact on the elderly entitled to an old-age pension, and (iii) provides a lump-sum (redistributive) transfer to the young. This bundled policy is then compared to the status quo and to early retirement.

A clear trade-off emerges from comparing this bundled policy to the early retirement provision. To win the support of the low-ability young—and thereby to defeat the status quo—a bundled policy has to generate enough income redistribution among the young. Thus, unlike early retirement, this one-time policy does not reduce the long-term economic growth, but imposes a larger tax burden on the current young generation of workers. In a pairwise comparison, early retirement wins the support of a coalition of the extreme: high income workers, who do not plan to retire early, but prefer this provision because of its lower current tax burden, and the low income workers, who expect to retire early.

Acknowledgements

We thank Samuel Bentolila, Michele Boldrin, Marco Celentani, Pierre Pestieau, Paola Profeta, Guido Tabellini and two anonymous referees for useful comments. The authors kindly acknowledge financial support from Fundación BBVA, from Fundación Ramón Areces, from MCYT (Spain) under the project SEC2002-03421 and (Galasso) from MIUR. All remaining errors are ours.

References

Ahituv, A., Zeira, J., 2000. Technical Progress and Early Retirement. CEPR Discussion Paper 2614.

Azariadis, C., Galasso, V., 2002. Fiscal constitutions. Journal of Economic Theory 103, 255–281.

Becker, G., 1975. Human Capital. A Theoretical and Empirical Analysis, with Special Reference to Education. The University of Chicago Press, Ltd., London.

Bernheim, B.D., Rangel, A., Rayo, L., 2002. Democratic Policy Making with Real-Time Agenda Setting. Stanford University. Part 1, mimeo.

Blöndal, S., Scarpetta, S., 1998. The Retirement Decision in OECD Countries. OECD Working Paper AWP 1.4.

Boldrin, M., Rustichini, A., 2000. Political equilibria with social security. Review of Economic Dynamics 3, 41–78.

Boskin, M.J., Kotlikoff, L.J., Puffertt, D.J., Shoven, J.B., 1987. Social security: a financial appraisal across and within generations. National Tax Journal 40, 19–34.

Casamatta, G., Cremer, H., Pestieau, P., 2000. The political economy of social security. Scandinavian Journal of Economics 102, 503–522.

Casamatta, G., Cremer, H., Pestieau, P., 2002. Voting on Pensions with Endogenous Retirement Age. Mimeo.

Coate, S., Morris, S., 1999. Policy persistence. American Economic Review 89, 1327–1336.

Conde-Ruiz, J.I., Galasso, V., 1999. Positive Arithmetic of the Welfare State. CEPR Discussion Paper # 2202.

Conde-Ruiz, J.I., Galasso, V., 2003a. Early retirement. Review of Economic Dynamics 6, 12–36.

Conde-Ruiz, J.I., Galasso, V., 2003b. Macroeconomics of Early Retirement. CEPR Discussion Paper # 3896.

Cooley, T.F., Soares, J., 1999. A positive theory of social security based on reputation. Journal of Political Economy 107, 135–160.

Cremer, H., Lozachemeur, J., Pestieau, P., 2002. Social security, retirement age and optimal income taxation. Journal of Public Economics (in press).
Esteban, J.M., Sakovics, J., 1993. Intertemporal transfers institutions. Journal of Economic Theory 61 (2), 189–205.
Feldstein, M., 1974. Social security, induced retirement, and aggregate capital accumulation. Journal of Political Economy 82 (5), 905–926.
Galasso, V., 1999. The US social security system: what does political sustainability imply? Review of Economic Dynamics 2, 698–730.
Galasso, V., 2002. The US social security: a financial appraisal for the median voter. Social Security Bulletin 64, 57–65.
Galasso, V., Profeta, P., 2002. The political economy of social security: a survey. European Journal of Political Economy 18, 1–29.
Glomm, G., Ravikumar, B., 1992. Public versus private investment in human capital: endogenous growth and income inequality. Journal of Political Economy 100 (4), 818–834.
Gruber, J., Wise, D. (Eds.), 1999. Social Security and Retirement Around the World. University of Chicago Press, Chicago.
Gruber, J., Wise, D. (Eds.), 2004. Social Security Programs and Retirement Around the World: Micro Estimation. University of Chicago Press, Chicago.
Hassler, J., Rodriguez Mora, J.V., Storesletten, K., Zilibotti, F., 2003. The survival of the welfare state. American Economic Review 93 (1), 87–112.
Herbertsson, T.T., Orszag, J.M., 2001. The Cost of Early Retirement in the OECD Countries. IoES Working Paper Series No. W01:02, available at: http://www.ioes.hi.is.
Lacomba, J.A., Lagos, F.M., 2000. Election on Retirement Age. Mimeo.
Profeta, P., 2002. Aging and retirement: evidence across countries. International Tax and Public Finance 9, 651–672.
Tabellini, G., 2000. A positive theory of social security. Scandinavian Journal of Economics 102, 523–545.
Tsebelis, G., 2002. Veto Players: How Political Institutions Work. Princeton University Press, Princeton.