IMF Working Paper

WP/99/180 INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

The Political Economy of Redistributive Social Security

Prepared by Pierre Pestieau[1]

Authorized for distribution by Vito Tanzi

December 1999

Abstract

Population aging puts significant pressure on social security systems that are based mainly on a pay-as-you-go (PAYG) formula and determined by the political process in which both retirees and future retirees participate. This paper demonstrates that in an economic and demographic steady state, majoritarian democracy overspends on social security. It then shows that in case of demographic shock, the regular majority process can be paralyzed by the development of entrenched interest groups that could lose from majority decisions. Depending on the way these entrenched interests operate, they can be judged more or less desirable from the viewpoint of social justice.

Contents   Pages

Table

Figures

I. INTRODUCTION

Long before economists, political scientists have studied the evolution of the welfare state, its elusive retrenchment and its long due reforms. With their own concepts and tools, they thus contribute to the debate in a number of interesting respects.[2] First, they characterize a social program by at least two dimensions: its size and its benefit rule. The size is measured by the percentage of spending in the GDP; one sometimes speaks of the generosity of a program instead of its relative size. The benefit rule pertains to the link between contributions and benefits that can be more or less tight. It ranges from means-tested to earnings-related benefits through flat rate benefits. Political scientists observe that universal schemes often enjoy the greatest political support. The more comprehensive and thus costly the welfare state, the more peoples' lives will be organized around its programs (health care, retirement) and the more difficult it will be to curtail them. This is particularly true of social security: since everybody eventually ages, there is a ready-made coalition in favor of generous pensions.

Second, they note an important precondition for reform. The average voter's veto is more easily overcome where government can negotiate a broad consensus, such as occurred in Germany in 1989 and Sweden in 1997–98 in contrast to a policy of imposition as in Berlusconi's Italy or Juppé's France. In any case, reforms are heavily constrained by entitlements and entrenched interests. Finally, they observe that entrenched interests may have two consequences. As often pointed, they often paralyze needed reforms and force governments to adopt socially costly grandfathering reforms. But they can also serve as a useful buffer, an insurance device, for some minority groups in case of unexpected shocks.

In this paper, we want to use these three lessons to formalize the political economy of social security, both in the steady state and in a transition state triggered by either aging or productivity decline. In particular, we will see that depending on the situation, entrenched interests sometimes paralyze needed reforms and sometimes protect the retirees against the tyranny of voting majority.

As already mentioned, a social security system can be characterized by its generosity and its redistributiveness. The generosity or the size of a social security program is measured by its relative cost in GDP; its redistributiveness is measured by the relation between the replacement rate, namely the ratio of retirement benefit to earned income and earned income. If the replacement rate is rather constant, there is no redistribution; when it decreases with income, there is redistribution. Table 1 provides such information for nine countries. Three groups of countries are distinguished.

---

[2] Esping-Andersen (1996).

Table 1. Size and Redistributiveness of Social Security Systems

|	Replacement Ratio			Regime 1/	Spending as percent of GDP
	Half	Average	Twice		
Canada	76	44	25	BE	5.4
France	84	84	73	BI	12.5
Germany	76	72	75	BI	12.8
Italy	103 (¼x)	90	84 (3x)	BI	15.6
Japan	77	56	43	MI	6.6
Netherlands	73	43	25	BE	5.2
New Zealand	75	38	19	BE	5.4
United Kingdom	72	50	35	MI	4.4
United States	65	55	32	MI	4.6

Source: Johnson (1998)

1/ BI-Bismarckian; BE-Beveridgean; MI-Mixed.

First, the Bismarckian countries,[3] France, Germany, and Italy, which spend more than 12 percent of GDP on public pensions and hardly redistribute, their replacement ratio being quite stable across income levels. Second, the Beveridgean countries: Canada, the Netherlands, and New Zealand, which redistribute a rather small amount (5.2–5.4 percent of GDP). Finally, the mixed-regime countries which spend little and redistribute less than the Beveridgean countries and more than the Bismarckian countries.

These countries can be organized on a two dimensional plane (see Figure 1) which shows that there is indeed a positive link between size and comprehensiveness of social security. Two remarks are in order: first, that countries with restricted programs and highly redistributive scheme, including in some instances means tests, rely on private schemes. Consequently, it is not clear that overall they devote less resources to retirement, and more importantly, that they are globally more redistributive than the other countries; and second, in Figure 2, Scandinavian countries are omitted, they would be somewhere below France and Germany: namely, with about the same size but with universal "rights" programs that are more redistributive than pure Bismarckian earnings-related-benefits schemes. In other words, the relation between size and comprehensiveness of social protection is not as clear-cut as it

---

[3] The terms Bismarckian and Beveridgean are used in reference to the relation between contributions and benefits. A Bismarckian scheme is one when the link between the two is tight; a Beveridgean scheme is one with float benefits and contributions proportional to earnings. Scholars of both William Henry Beveridge (1879–1963) and Otto von Bismarck (1815–1898) often find this view oversimplistic.

Figure 1. Taxonomy of Social Security Systems
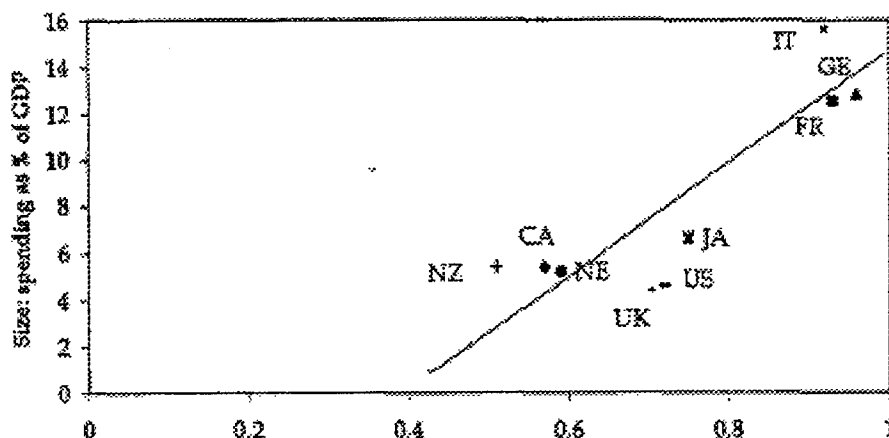
appeared at first sight.

The purpose of this paper is to formalize the above-mentioned considerations toward a better grasp of the working of actual social security systems. We want first to show that behind the apparent diversity of regimes there is some coherence, as it appears in Figure 1. In concrete terms, a too redistributive system, one that would restrict benefits to individuals with low income, could be politically unsustainable.

We also want to show that entitlement positions and entrenched interests often paralyze reasonable reforms but they can also act as a buffer against the political consequences of demographic shock.

For a long time public finance economists have been somewhat obsessed by the famous equity-efficiency quandary and frustrated by the nonimplementation of their recommendations based on second-best analysis. Only recently have they become aware of pervasive political constraints, realizing that the couple equity-efficiency had to be replaced by the *ménage à trois* equity-efficiency-political support. This is the viewpoint of this paper.

Indeed, if the only concerns of the authorities were equity, expressed by some welfare criterion and efficiency, aimed at minimizing tax and transfer distortions, their most likely choice would be to offer a flat-rate benefit or even a targeted one. The reason is clear: the more effective the transfer is in reaching the poor, the less the waste and the less the cost to achieve desired objectives of efficiency and equity. It is a matter of cost-effectiveness in securing retirement benefit. However, one observes that the primary beneficiaries of such a targeted program are often those who are quite weak politically and who may lack the clout

to sustain it. This consideration has been the basis of the arguments in favor of "universal" programs with some positive link between earnings and benefits, rather than targeted ones.[4]

In this paper we restrict the range of redistributiveness to flat-rate benefit, on the one hand, and full-earnings-related benefits on the other. In other words, we exclude the case of social security benefits aimed exclusively at the poor, as it exists in some countries and is proposed in some privatization plans.[5] We do this in the interest of clarity and because in the majority of OECD countries, our main reference, there is no targeting in social security.

Section II develops our model in a steady-state setting. The only choice made by the majority concerns the size of the program or the level of pensions. The degree of redistributiveness is taken as given, just as one assumes that some people drive on the left or eat with chopsticks while others drive on the right and use forks. We also show that at the constitutional stage it may be desirable, even from a Rawlsian viewpoint focusing on the poorest in society, to determine a benefit rule that is in part Bismarckian. Section III introduces an unexpected demographic shock. We show that its consequences can be detrimental to the transitional generations in the not unlikely situation that the new majority equilibrium tax rate is radically reduced. We assume that the retirees can block, or at least slow down, this process in the name of entitlements linked to the contributory (Bismarckian) part of their social security benefits. Depending on the case, such a blocking can be desirable or not from a Rawlsian viewpoint. Section IV concludes.

II. Majority Voting in the Steady state

A. Previous Work

Most of the literature focuses on simple majority voting and median voter outcome. The earliest result is that of Browning (1975) who considers an economy with three overlapping generations of which the oldest is retired, in which there is no capital market, and the only way of saving is through social security. The median voter falls among the older members of the working population and majority voting implies a level of social security in excess of that which maximizes lifetime welfare. Later work surveyed by Myles (1995) has considered variations on the Browning model. It has produced different results but in general with the same conclusion: majority voting overspends on social security. Among the most representative variations, let us mention Hu (1979) who focuses on uncertainty of benefits receipts, Boadway and Wildasin (1989) who introduce an explicit capital market, and Veal (1986) who assumes intergenerational altruism.

---

[4] On this, see Gelbach and Pritchett (1996).

[5] See, for example, World Bank (1996).

All these works assume that individuals differ only in age and that there is some sort of commitment to preserve past decisions in the future. Tabellini (1990) introduces heterogeneity in a model where there is no such commitment and individuals are altruistic toward their parents. In such a setting the working generation, which outnumbers the retired one, does not vote for a zero tax because of altruism. In our paper, there is no altruism and heterogeneity arises from variable productivity. As in most work, we assume some commitment.

B. The Model

We consider a small-open, one-sector, overlapping-generations economy with a given interest rate, r, and wage, $\overline{w}$. At each period of time t, two generations coexist, L_t workers and L_{t-1} retirees, with $L_t = L_t (1 + n)$, $(1 + n)$. Individuals differ in two ways: the generation they belong to and their wage earning w a continuous variable with support (w_-, w_+), mean $\overline{w}$, and median w_m. As usual $w_m < \overline{w}$.

A working individual with earning w is subject to a payroll tax τ. He can then allocate his disposable income between consumption c and saving s. When he retires his consumption d is equal to the gross return of his saving, $(1 + r) s$, and a pension p. Formally he maximizes a utility function:

$$U = u\,(c) + \beta u\,(d)$$

subject to:

$$w\,(1 - r)\,s = c + s$$

and

$$d = (1 + r)\,s + p(w).$$

The function u (.) is strictly concave and β (≤ 1) is a factor of time preference. We define σ as the elasticity of substitution between c and d. We assume that there is not much substitution in consumption, namely, that $\sigma < 1$. This assumption seems to be in line with observation. It means that even if the rate of interest changes drastically, individuals don't significantly change the way they distribute lifetime resources between first and second period.

p (w) is the pension benefit an individual earning w expects. We assume that p (w) consists of two parts: a (contributory) part that is directly related to individual earning, w, and a (noncontributory) part that is related to average earnings, $\overline{w}$. With a PAYG scheme, the rate of return is the population growth. All these features yield the following expression for p (w):

$$p\,(w) = (1 + n)\,\tau\,(\alpha w + (1 - \alpha)\overline{w}\,),$$

where α is the Bismarckian factor, that is the fraction of pension benefits that is related to contributions; we assume $0 \leq \alpha \leq 1$. When $\alpha = 1$, the pension scheme is purely Bismarckian (or contributory); when $\alpha = 0$, pension benefits are uniform and the scheme is labeled

Beveridgean. Finally throughout the paper we assume dynamic efficiency and positive population growth, namely, $\tau \geq n > 0$. These two assumptions are not only quite realistic but they imply first that if social security is actuarially fair, all workers definitively prefer a fully-funded scheme over an unfunded one and second that workers outnumber retirees.

We focus here on a PAYG scheme. Each individual votes for τ believing that the value of τ chosen by the majority will hold forever, at least for several periods. For the time being there is no tax distortion. We now derive the preferred tax rate of the retirees and then that of the workers.

The retirees

Each retiree has some nonnegative private saving s, with return r. He chooses the value of τ, τ^R that maximizes his consumption:

$$d = (1 + r)\, s + (1 + n)\, \tau\, (\alpha w + (1 - \alpha)\overline{w}).$$

The solution is straightforward: $\tau^R = 1$. In other words, without tax distortion or altruism for the younger generation, all retirees favor the maximum tax.

The workers

Each worker with earning w will choose $\tau^A(w)$, which maximizes:

$$v\,(\tau; w) = u(w - \tau) - s^* + \beta u((1+r)s^* + (1+n)\tau(\alpha w + (1 - \alpha)\overline{w}))$$

where $s^* \geq 0$ is the optimal level of private saving. Positive private saving is determined by the condition:

$$-u'(c) + \beta u'(d)(1 + r) = 0.$$

Note that a worker will always be in favor of a zero tax if:

$$1 + r > (\alpha + (1 - \alpha)/w)(1 + n).$$

In other words, he will vote against any tax if his wage is strictly higher than $\hat{w}$ defined as:

$$\hat{w} = \frac{1 - \alpha}{\dfrac{1 + r}{1 + n} - \alpha}\,\overline{w} \leq \overline{w}.$$

One easily checks that $\hat{w} = \overline{w}$ if $n = r$. Moreover, $\hat{w}$ decreases as n decreases and α increases. These properties are rather intuitive. When $n = r$ and $\alpha < 1$, there is redistribution from those with wage above $\overline{w}$ to those with wage below $\overline{w}$. When $n < r$ workers with wage

just below $\overline{w}$ would benefit from redistribution but still they would be better off with an individualized fully-funded scheme $(\tau = 0)$. The break-even wage level $\hat{w}$ decreases as n decreases relative to a fixed rate of interest; it increases as redistribution increases, redistribution making the PAYG system more attractive for those with wage below $\overline{w}$.

What is the tax rate chosen by workers? Clearly, for those with wage above $\hat{w}$ the most preferred tax rate is zero. Those with wage below $\hat{w}$ vote for a positive tax rate which increases as w increases. This latter property is due to our assumption of weak substitutability between present and future consumption. With such an assumption, the very low wage earners cannot push for a high tax rate because this would imply a too low level of consumption in the first period. Remember that $c = w\,(1 - t) - s$. Workers with relatively higher wages can afford to vote for higher tax rate.

Figure 2 shows in the case where $r = n$ what is the most preferred tax rate of the retirees and the workers. One notes that the retirees' most preferred tax rate is definitively higher than that chosen by the workers. This result is robust even when their most preferred rate is below 1 because of tax distortions.

The reason is simple. Retirees are only concerned with their retirement income. Workers are concerned with their retirement income but also with their disposable income during their first period of life.

From Figure 2, one clearly sees that as long as the number of retirees, plus the number of workers with below average wage, make a majority of voters, the levels of tax and thus of social security benefits are positive. Given that by assumption the median wage is below the average wage, we clearly have a positive tax rate. We denote this tax rate τ^* corresponding to a wage level $\widetilde{w}$. The number of workers in the interval $(\widetilde{w}, \overline{w})$ is equal to $\dfrac{n}{2}L$, which is needed to make a majority with the L retirees $\left(\dfrac{n}{2}L + L = L(2 + n)/2\right)$.

The majority consists of retirees and middle-wage earners. This majority imposes its most preferred tax rate on a group of workers with low and high wages. Such a result is related to Epple and Romano's (1996) "ends against the middle" (see also Casamatta, Cremer, and Pestieau, 1998) in which there is a coalition composed of the tails of the income distribution.

Figure 2. $r = n$, No Distortion
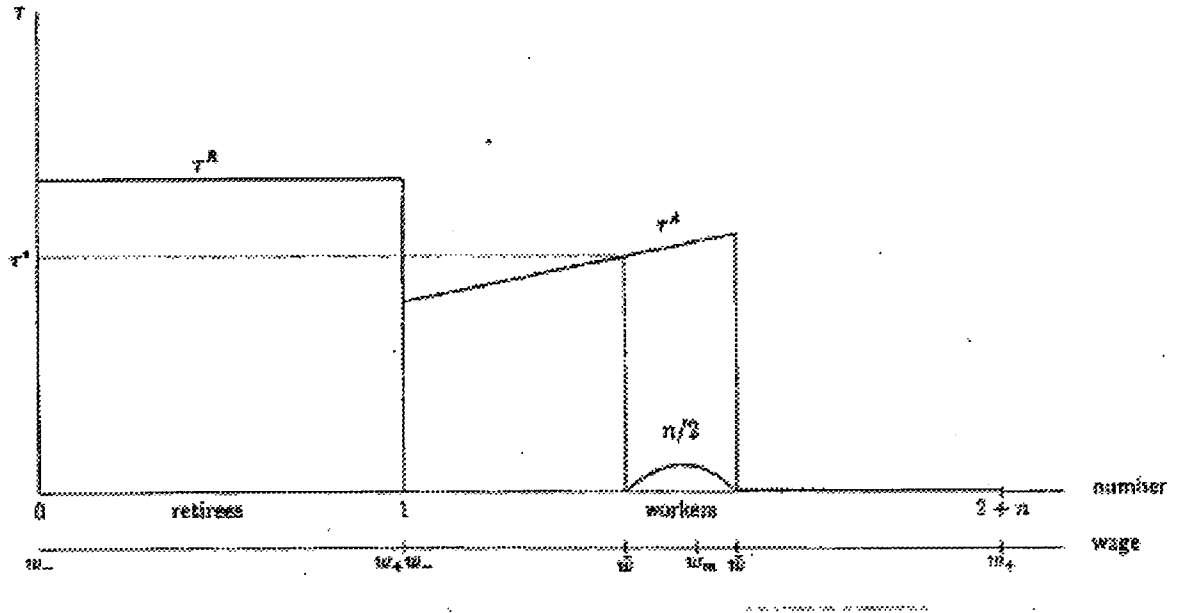
Let us now look at the case where $r > n$. Then the break-even wage level between those in favor and those against a positive payroll tax rate is not $\overline{w}$ but $\hat{w} < \overline{w}$. In other words, there are fewer workers ready to join the retirees to (w) vote for positive social security benefits, but at the same time, the number of workers relative to that of retirees has decreased.
A decline of fertility thus has two effects on the majority voting equilibrium: the first is the pure demographic effect and the second goes through the change in $\tilde{w}$. In Figure 3 we represent the majority voting equilibrium when $n < r$.

It is clear that when n becomes sufficiently low—yet positive to make sure that the retirees don't outnumber the workers—then the PAYG system can turn unattractive for a large majority of workers and the equilibrium tax rate falls to 0.

Finally, what is the effect of the Bismarckian factor α on the equilibrium tax rate? One can easily show that as long as the difference between the population growth rate and the rate of interest is small enough, then the effect is positive, like in Figure 2: the more redistributive the system, the less generous it is. However, when the rate of population growth is sufficiently high, the reverse result can occur.

Figure 3. Tax Equilibrium n < r and No Distortion
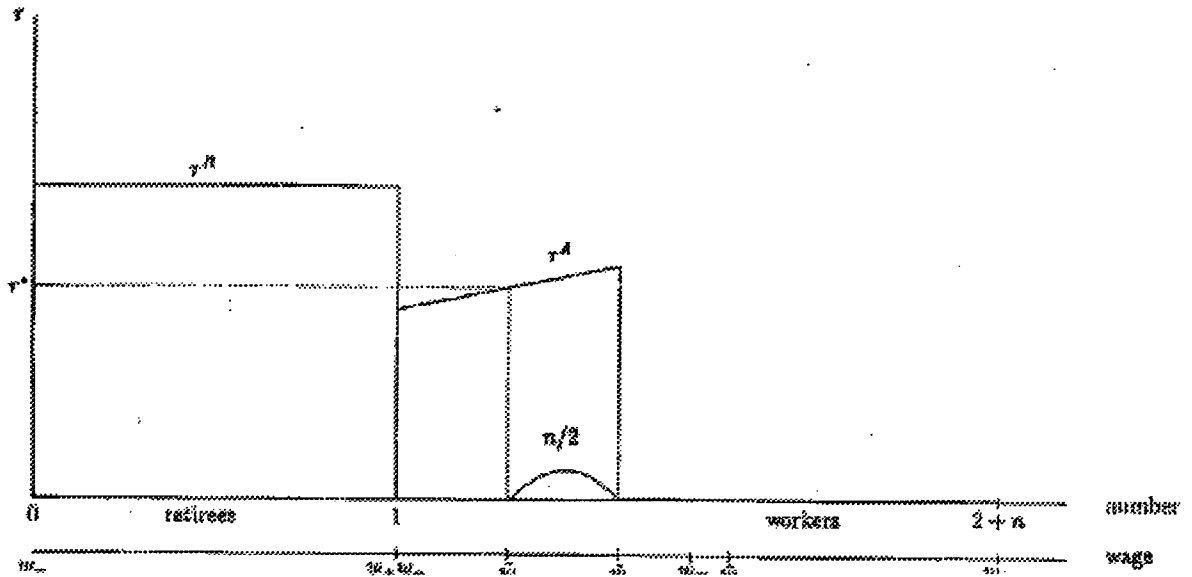
C. Pay-As-You-Go Versus Fully Funded

Up-to-now voting was restricted to PAYG. We would now like to compare the PAYG majority equilibrium with what could be given as an equivalent fully-funded scheme. Not concerned by the transition from one to the other, we just assume that vote takes place in two alternative steady states. To make the comparison fair, we assume that $r = n > 0$ and that the benefit rule is the same. In other words, we do not compare a PAYG system involving some redistribution to a totally individualized fully-funded system, as is often done in work on privatization of social security. Actually, an individualized fully-funded scheme here corresponds to private saving. With this assumption, there is a formal equivalence between the two systems of social security. However, there is a difference between the two: with a fully-funded scheme the retirees are not concerned by the vote. All decisions concerning them have been taken: private saving s and collective saving through pension funds, if any. Given the open economy assumption, r is also given. Finally by assumption, the Bismarckian factor α is given. As it appears from either Figure 2 or 3, when only the workers vote, the equilibrium tax rate is going to be lower than τ^*.

With $r = n$, $w_m < \overline{w}$. and in the absence of distortion, there will be a positive tax equilibrium in the fully-funded scheme. Yet, if any of these assumptions are dropped, the possibility of a zero tax arises.

What about social welfare? In the setting of this model, the comparison is not straightforward as we deal with heterogeneous individuals. In an identical individuals economy the answer is clear. For $n = r$ the two systems are identical. But with heterogeneous individuals, if $\alpha < 1$, the redistributive features of the collective scheme, PAYG or fully funded, differentiate them. With a Rawlsian criterion, the fully-funded scheme always dominates the PAYG one

as it gives the decisive vote to workers with lower earnings. With a general utilitarian criterion, the comparison is ambiguous, even though in our numerical examples the majority voting equilibrium tax with the fully-funded scheme is always preferable to that with the PAYG scheme. The idea is simple: the former involves only individuals who are at the start of their life.

D. Distortionary Payroll Taxation

Up to now the tax system was assumed to imply no efficiency loss, which is clearly not realistic. One of the alleged advantage toward the privatization of social security is, indeed, the huge efficiency costs that it involves. Let us look at the implication of distortionary taxation on the above results. To keep the presentation simple, we use a quadratic loss function such that the revenue constraint is now:

$$p(w) = (1+n)\tau(\alpha w + (1 - \gamma\tau)(1 - \alpha)\overline{w}),$$

where $\gamma \geq 0$ is the distortion factor. Note that the distortion applies only to the noncontributory part of social security. In other words, we assume that voters see through the budgetary veil that the fraction α of their tax payment is returned to them with a return of n. With this modification, what is the preferred tax rate of the retirees and of the worker? For the retirees, it is straightforward to show that they will choose a tax rate $\tau^R(w)$ defined by:

$$\tau^R(w) = \frac{1}{2\gamma}\left(1 + \frac{\alpha}{1-\alpha}\frac{w}{\overline{w}}\right) \leq 1$$

For $\gamma = 0, \tau^R(w = 1)$. Note that $\tau^R(w)$ is increasing w.

For the workers, assuming that $r = n$, the preferred tax of those earning less than $\overline{w}$ is first increasing and then decreasing. Workers with wages close to $\overline{w}$ can favor a positive tax and yet save. For these workers the preferred tax rate is

$$\tau^A(w) = \frac{(1+n)(\alpha w + (1-\alpha)\overline{w}) - w(1+r)}{(1+n)2\gamma(1-\alpha)\overline{w}},$$

with $\tau^A(w)$ decreasing with w and being equal to 0 when $w = \overline{w}$. For these workers with $w < \overline{w}$, social security is attractive up to a certain point; its relative return is now equal to $(\alpha + (1-\alpha)(1 - \gamma\tau)\overline{w}/w)$, which can be lower than 1 for some τ. For workers with wage close to $w_\lrcorner$, the preferred tax rate increases with w. Figure 4 presents this case. It is clear that the set of workers who join the retirees to form a majority in favor of a positive tax rate is different from what it was without distortion. In particular, those with earnings equal or just below $\overline{w}$ do not belong to that majority.

Figure 4. Tax Equilibrium with Distortion
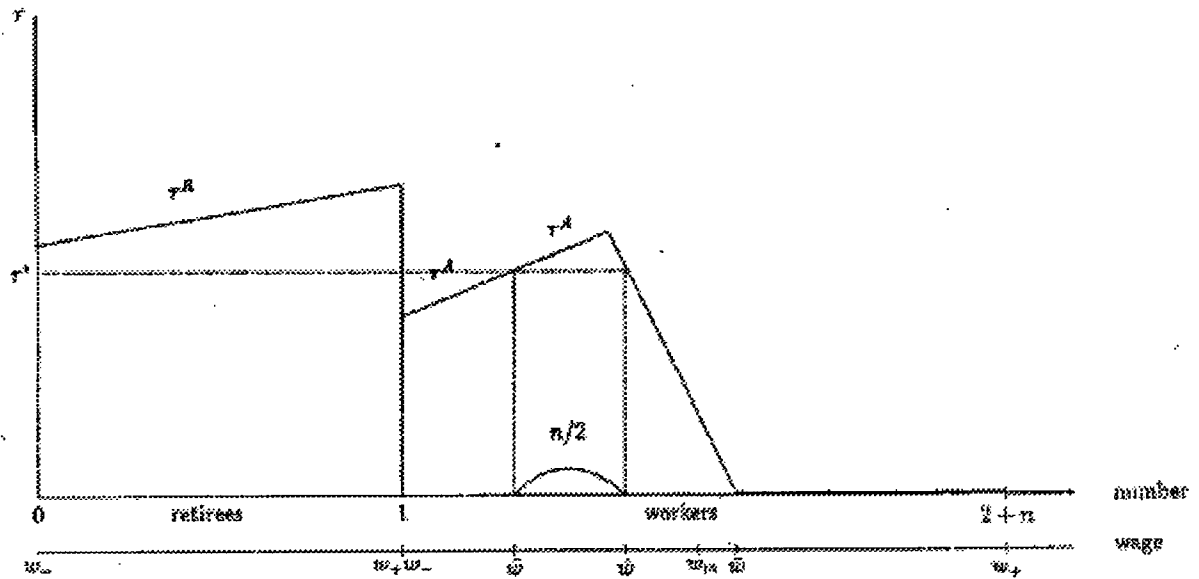
E. Choosing the Benefit Rule

In the previous sections, the more or less Bismarckian feature of the social security system was assumed given. In an earlier paper by Casamatta, Cremer, and Pestieau (1998) dealing with social insurance, the choice of the Bismarckian parameter α is made at the constitutional level with the expectation that the payroll tax is later determined through majority voting. One of the results of that paper is that a positive Bismarckian parameter could be desirable, even though given full control of both α and τ constitutional planner would choose α equal to zero whether his criterion is Rawlsian or utilitarian. The setting is static and corresponds to what is here called the "steady state." The result of a positive α is mainly due to the need for political support. By letting α be positive, the decisive voter with productivity $\tilde{w}$ will vote for a tax rate that better fits the preferences of the lowest wage individuals.

Indeed, we know that the lowest wageworkers would like a low tax rate. Assume that $\dfrac{d\tau}{d\alpha} < 0$, which is possible when $n < r$. Then by increasing α we obtain a tax rate that better fits the preferences of workers with wage w_-. At the same time, all these workers lose because the benefit structure is less redistributive. Formally, let us take a Rawlsian viewpoint, that is let us focus on the lifetime utility of the individuals with the lowest wage rate, w_-. We want to find the sign of $\dfrac{dU_-}{d\alpha}$ where U_- is the lifetime utility of the individual with the lowest wage. That is, we want to sign:

$$\frac{dU_-}{d\alpha} = \frac{\partial U}{\partial \alpha}_- + \frac{\partial U_-}{\partial \tau^*}_- \frac{d\tau^*}{d\alpha}_?$$

If $\frac{d\tau^*}{d\alpha} > 0$, then the Rawlsian constitutionalist will choose $\alpha = 0$. However, if $\frac{d\tau^*}{d\alpha} < 0$, it is not impossible that some positive α will be chosen. When this occurs, we really have the case which constitutes the gist of this paper: less formal redistribution can, in fact, imply more effective redistribution. Whether or not α is positive depends on the characteristics of each economy. These characteristics are basically the respective values of n and r, the distribution of earnings capacity w, the concavity of the utility functions, and the rate of time preference. These characteristics explain why different countries have different values for α and τ and why we cannot expect to have a particular pattern such as the one seen in Figure 3.

But the "constitutionalist" approach is not the only one. Alternatively, we could consider a setting where both α and τ are simultaneously chosen by the majority. If we follow de Donder and Hendricks (1998) in a paper dealing with a related topic, a positive α emerges in the set of equilibria they obtain. The case for a positive α is made stronger when the tax is distortionary, as shown by Moene and Wallerstein (1996).

We could also cite the approach suggested by Besley and Coate (1997), who also tackle the simultaneous choice of more than one-policy parameters. All these alternative approaches come to the same conclusion: the case for positive α is most likely because of the need to secure a sufficiently wide political support for the chosen policy package.

III. DEMOGRAPHIC SHOCK AND SOCIAL SECURITY REFORM

Up to now we have explored a stationary setting with stable prices and population growth. One of the main sources of debate on the future of social security is population aging. Aging, that is, the consequence of declining fertility and increasing longevity, has direct implications on the financial viability of PAYG social security systems. But more importantly, it modifies the political equilibrium not only as a result of the relative number of retirees, but also since the threat of losing benefits triggers more political activism and lobbying in that age group.

A. Majority Decision

Now suppose that we suddenly move from a setting where $n_b = r$ to one with $n_a < r$ where a and b stand for "before" and "after the shock." We still assume that the tax rate is chosen by the majority of voters who believe that the new population growth rate is going to last forever. Two scenarios are possible:

- A small fertility decline, in which case we have a new tax rate that can be either higher or lower than the previous one: $\tau_a^* < \tau_b^*$; or $\tau_a^* > \tau_b^*$.

- A large decline which implies a new tax rate $\tau_a^* = 0 < \tau_b^*$.

We will assume the latter case, namely, that the shock is big enough to imply a majority voting for the immediate dismantling of social security. The reason is simple. A majority of voters, all workers, prefer private saving and its relative high rate of return. Clearly, low wage earners who do so forgo the benefits of redistributive social security; but these benefits are more than offset by the gain arising from private saving. Going back to Figure 3, the shock implies a threshold wage $\hat{w}$, such that the retirees plus the workers with wage in the interval $(w_-, \hat{w})$ make up less than half of the total population.

Such an outcome is clearly of questionable merit. The transition generation of retirees, at least those without private saving, is left without resources. In any case, all retirees would receive less than they expected and this prospect would in all likelihood trigger the development of operative entrenched interests.

B. Entrenched Interests and Entitlements

Nowadays, the issue facing social security systems is that retirees expect to get benefits that are not based on the logic of pure financial returns or on current economic possibilities.[6] Instead, relying on a "committed" replacement ratio, they expect to receive a fixed percentage of their past average earnings, regardless of the current situation. This commitment holds particularly for the contributory (Bismarckian) part of pension benefits.[7] One understands right away that if the dependency ratio increases, because of falling fertility and mortality rates, and if those entitlements are politically constraining, there will be mounting pressure to decrease the noncontributory part of pension benefits. If this is not enough or not possible, there will be pressure to impose a tax rate higher than the majority chosen rate.

We distinguish two types of entitlements, the flexible and the rigid one. Flexible entitlement is when the interest group insists on a replacement ratio $\rho_t = \rho_t / w$ based on what the retirees expected to get when they were working and contributing to the social security system. After the transition period, individuals incorporate the new values of the parameters, namely the population growth rate and the tax rate, and base their entitlement on these new values. There is rigid entitlement when the retirees insist on their permanent rights to receive the replacement ratio that was implemented before the shock. These two types of entitlements have different implications that we will now study.

---

[6] See, on this, Disney (1996).

[7] In most European countries, the political weight of social insurees is much stronger than that of welfare recipients. In the United States, the social security lobby has much more voice than those benefiting from welfare payments do.

Let us use the following notation: $\tau_b^* > 0$ and $\tau_a^* = 0$ for the majority voting equilibrium tax rate before and after the shock and τ_t^c for the tax rate that is imposed to the majority because of the precommitted replacement ratio (t denotes the period; it is equal to 0 for the period before the shock, 1 for the period of the shock and 2, 3,...,for thereafter). Also, we use ρ_t for what the replacement ratio retirees feel entitled to. Consequently, a retiree with productivity w, having worked in t, expects a pension at least equal to his productivity times ρ_t.

Consider first the case of a rigid replacement ratio. Accordingly, the retirees expect to get a pension p_t least equal to $\overline{\varrho}\, w$, where

$$\overline{\varrho} = \tau_{\dot{\upsilon}}^*\alpha(1+n_b).$$

This, combined with the revenue constraint of the government implies

$$\tau_t^c = \frac{\tau_b^*\alpha(1+n_b)}{1+n_a} = \tau^c.$$

The consequence is clearly that the Beveridgean pension disappears and that the new tax rate τ^c is constant over time.

Let us now consider the case when the replacement rate is flexible. Individuals now acknowledge that with the change of population growth rate and of payroll taxation, their entitlement changes as well. The replacement ratio can now be written as:

$$\ell_t = \tau_{t-1}^c\alpha(1+n_{t-1})$$

and hence,

$$
\tau_t^c = \frac{\tau_{t-1}^c\alpha(1+n_{t-1})}{1+n_{t-1}} = \frac{\tau_b^*\alpha(1+n_b)}{1+n_a} \qquad for = 1
$$

$$
= \tau_{t-1}^c\alpha \qquad\qquad for\ t = 2, 3,...
$$

Clearly, the constrained tax rate decreases at a rate equal to $1 - \alpha$. Unavoidably, it eventually hits the majority voting equilibrium tax rate, that is, zero. We are thus faced with three scenarios depicted in Figure 5.

Figure 5. Utility Path of the Workers of Lowest Ability Following
a Demographic Shock: Three Alternative Settings

(Simple majority outcome, rigid entitlement, flexible entitlements)
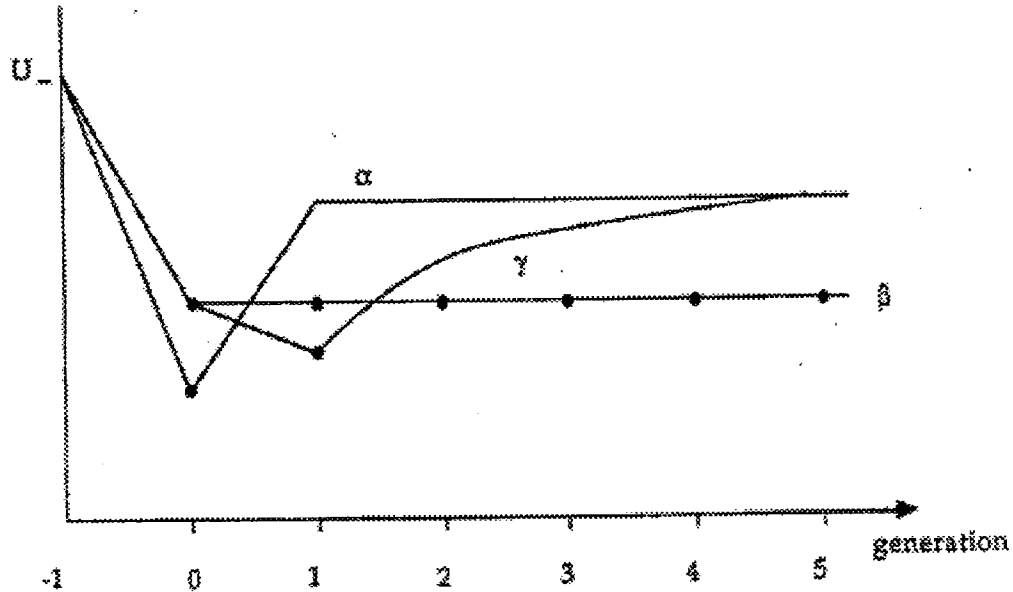
First, scenario α is the outcome of simple-majority voting when each individual has a vote and lobbying, vested interests, or different electoral participation rates do not affect the electoral process. Figure 5 focuses on the lifetime utility of the individuals with the lowest ability. The generation born in the period before the shock suffers from a huge drop in utility; $U_-(0)$, which denotes the lifetime utility of the lowest-wage workers having worked in period 0 is very low; in our simple model, their consumption in the second period of their life is zero. Then, for the subsequent generations, lifetime utility increases to reach a new steady-state equilibrium with exclusively private and fully-funded pensions. This equilibrium yields less utility than the one before the shock as there is no redistribution across wage levels.

Second, there is the outcome of the rigid entitlement scenario β; the decline in utility is limited and from period 1 on the level of lifetime utility is stable. Note that the lowest-wage individuals now save.

Third, there is the case of the flexible entitlement, which is scenario γ. It implies for at least one period a lower utility than the rigid entitlement. But rapidly the level of utility increases, reaching the level obtained without entitlement as the rate of payroll tax converges to 0. With $\tau^c_{t-1} = \alpha^c_{t-1}$, $\tau^c_\infty = 0$.

C. Why are the Old Politically Influent?

So far, we have assumed that the old were able to obtain favorable pension benefits even though there was a numerical majority for dismantling the social security system. In other words, the old have more political weight than indicated by their mere number.

A way to formalize such an outcome is to adopt a specification à la Grossman and Helpman (1998) wherein collective decision making depends on majority voting and lobbying.[8] It is often stated that the old have plenty of time to devote to lobbying and that they tend to be "single issue" lobbyists relative to other age groups for whom time is a scarce commodity and retirement income only one among many concerns.[9]
We can also add the argument developed by experimental economists that individuals tend to be extremely sensitive to unexpected losses, much more so than to unexpected gains (with reverse sign).[10]

One way to formalize this idea is through the rate of participation in the voting process. If rate is constant in the steady state, but is supposed to increase as a function of unexpected losses, it is possible that following a sudden decline in fertility, the retirees increase their voting participation and consequently have the majority of votes, thus, imposing the replacement ratio they find legitimate. Put together, these arguments may explain why elderly people can be very effective in maintaining what they consider to be their legitimate entitlement to a given replacement ratio.

D. Constitutional Choice

As we have observed, a positive α, the Bismarckian factor, could be desirable even though with full control of both α and τ the constitutional planner would choose α equal to zero. When we consider not only the steady state, but also the possibility of shocks, and when we assume that entrenched interests based on the contributive part of social security can shelter the low income pensioners from the tyranny of the majority, then we have an additional reason for pushing for the Bismarckian formula.

The problem for the Rawlsian constitutionalist is to find the value of α that maximizes the level of utility of the transition generations. That value of α is likely to be higher than the optimal value obtained in the steady state. Actually, the argument in favor of a Bismarckian "solidarity" is often used by unions which in Continental Europe are generally more

---

[8] See also Coate and Morris (1998).

[9] Mulligan and Sala-i-Martin (1999).

[10] See, on this, Thaler (1992), who argues that changes that make things worse loom much larger than improvements.

Bismarckian than Beveridgean. In other words, with the possibility of shocks and entrenched interests becoming operative, the case for a Bismarckian regime is stronger.
The question to raise is whether this is the best way to protect the worse-off individuals from the tyranny of the majority.

Up to now it was assumed that the noncontributory pension acted as a buffer; payroll tax was increased above its equilibrium level only as a second recourse. But we can also assume that as is the case in some countries, this noncontributory part cannot go below a floor denoted by $\bar{p}° > 0$. Then one can easily show that the dynamics of τ_t^c are not as simple as when $\bar{p}° = 0$. Indeed, it is possible that τ_t^c increases if $\bar{p}°$ is high enough. Indeed, one can write the dynamics of τ_t^c as:

$$\tau_1^c = \alpha\tau_b \frac{1+n_b}{1+n_a} + \frac{\bar{p}°}{\overline{w}(1+n_a)}$$

$$\tau_t^c = \alpha\tau_{t-1} + \frac{\bar{p}°}{\overline{w}(1=n_a)} \qquad t = 2,\ldots$$

It tends to $\tau_\infty^c = \frac{\bar{p}}{\overline{w}(1-\alpha)}$.

We can then consider the situation where the constitutional body can choose not only α but also $\bar{p}°$ so as to maximize the welfare of the worse-off individual. This gives one additional leverage. Indeed, with just α fixed at a rather high level, the intergenerational imbalance caused by the shock was taken care of but intragenerational redistribution was made impossible.

The question raised at this point is whether we need a combination of $\bar{p}°$ and α or just one of the two and then which one. We show that $\bar{p}°$ is a better instrument than α, which can thus be kept equal to 0.

This is pretty intuitive. A minimum pension takes care of the households with very low productivity, allowing for use of the parameter α to achieve some redistribution across households.

In any case, we are left with a fragile equilibrium after the shock. If the protection of the poor retirees is based on a minimum benefit, how robust will it be politically? We have to remember that that level is chosen ex ante behind the veil of ignorance. There is no political majority to support it. If, instead, we don't have a minimum benefit but find a public pension based on some entitled replacement ratio, the political basis is broader. Yet, a majority of voters is still in favor of dismantling the system.

To a large extent, the social compact based on a minimum benefit reminds one of the proposals made by the World Bank (1996).

IV. CONCLUSION

In this paper, we have derived the majority voting equilibrium level of a PAYG social security system in an overlapping-generations model with individuals of differing productivity. We have also examined the implication of an unexpected fertility decline. We have seen that if majority voting responds to such a shock, the payroll tax can either decrease or increase; if the shock is large enough, it can imply the immediate dismantlement of social security, a majority preferring private saving, and its relatively high rate of return.

At this point, we have introduced the possibility of a political barrier to such dismantlement. It relies on the concept of entrenched interest to supersede majority decision, such that retirees feel entitled to a given replacement ratio depending on their past contributions. We have also considered the possibility of a minimum level of benefit that can be determined by a Rawlsian constitutional planner. This planner not only determines the level of a minimum pension but also the degree in which social security benefits are linked to earnings, what we call the Bismarckian parameter.

If the planner can determine both the minimum pension and the Bismarckian parameter, the minimum pension is a better instrument from a Rawlsian viewpoint. If only the Bismarckian parameter is available, then it can be fixed at a rather high level so as to prevent the social security system from affecting intragenerational redistribution.

As a work in progress, this paper leaves a number of unanswered questions. In future research we would like to endogenize the emergence of entrenched interests. We have, paradoxically, viewed these entrenched interests as a good thing, a sort of protection against the tyranny of majority voting. Yet, it is clear that they often act as obstacles to socially desirable reforms. Furthermore, the assumption of commitment, that is, that workers vote with the belief that the economy is in steady state and that the tax rate chosen today will apply to them when retired, is questionable. Finally, we need to consider an objective less restrictive than the Rawlsian criterion, as we know that it has serious limits for problems involving intergenerational redistribution.

References

Besley, T., and S. Coate, 1997, "An Economic Model of Representative Democracy," *Quarterly Journal of Economics,* Vol. 108, pp. 85–114.

Boadway, Robin W., and David E. Wildasin, 1989, "A Median Voter Model of Social Security," *International Economic Review,* Vol. 30, pp. 307–28.

Browning, E. K., 1975, "Why is the Social Insurance Budget Too Large in a Democratic Society," *Economic Enquiry,* Vol. 13, pp. 373–88.

Casamatta, G., H. Cremer, and P. Pestieau, 1998, "Political Sustainability and the Design of Social Insurance," *Journal of Public Economics* (forthcoming).

————, 1999, "The Political Economy of Social Security," *Scandinavian Journal of Public Economics* (forthcoming).

Coate, S., and S. Morris, 1998, "Policy Persistence," *American Economic Review* (forthcoming).

Cremer H., and P. Pestieau, 1999, "Reforming our Pension System: Is it a Demographic, Financial or Political Problem?" *European Economic Review* (forthcoming).

de Donder, P., and J. Hindricks, 1998, "The Political Economy of Targeting," *Public Choice,* Vol. 95, pp. 177–200.

Disney, R., 1996, "Can we Afford to Grow Older?" (Cambridge, Massachusetts: MIT Press).

Epple, D., and R. Romano, 1996, "Public Provision of Private Goods," *Journal of Political Economy,* Vol. 104, pp. 57–84.

Esping-Andersen, G., ed., 1996, "Welfare States in Transition: National Adaptations in Global Economies," (London; Thousand Oaks, California: Sage).

Gelbach, J. B., and L. H. Pritchett, 1996, "Does More for the Poor Means Less for the Poor? The Politics of Tagging," World Bank Policy Research Working Paper No. 1523 (Washington: World Bank).

Grossman, G. M., and E. Helpman, 1998, "Intergenerational Redistribution with Short-lived Governments," *The Economic Journal,* Vol. 108, pp. 1299–1329.

Hu, S. C., 19782, "Social Security, Majority Voting and Dynamic Efficiency," *International Economic Review,* Vol. 23, pp. 269–87.

Johnson, P., 1998, "Pension Provision and Pensioner's Incomes in 10 OECD Countries," (unpublished; ISF).

Moene, K. O., and M. Wallerstein, 1996, "Self-interested for Welfare Spending," (unpublished; Chicago: Northwestern University).

Mullingan, C., and X. Sala-i-Martin, 1997, "Gerontocracy, Retirement, and Social Security," NBER Working Paper No. 7117 (Cambridge, Massachusetts: National Bureau of Economic Research).

Myles, G., 1995, *Public Economics* (New York: Cambridge University Press).

Tabellini, G. E., 1990, "A Positive Theory of Social Security," National Bureau of Economic Research Working Paper No. 3272 (Cambridge, Massachusetts: National Bureau of Economic Research).

Veale, M. R., 1986, "Public Pensions as Optimal Social Contract," *Journal of Public Economics*, Vol. 31, pp. 237–51.

World Bank, 1996, "Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth" (Oxford, England: Oxford University Press).