Voting over type and generosity of a pension system when some individuals are myopic[1]

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Abstract

This paper studies the determination through majority voting of a pension scheme when society consists of far-sighted and myopic individuals. All individuals have the same basic preferences but myopics tend to adopt a short term view (instant gratification) when dealing with retirement saving. Consequently, they will find themselves with low consumption after retirement and regret their insufficient savings decisions. Henceforth, when voting they tend to commit themselves into forced saving. We consider a pension scheme that is characterized by two parameters: the payroll tax rate (that determines the size or generosity of the system) and the "Bismarckian factor" that determines its redistributiveness. Individuals vote sequentially. We examine how the introduction of myopic agents affects the generosity and the redistributiveness of the pension system. Our main result is that a flat pension system is always chosen when all individuals are of one kind (all far-sighted or all myopic), while a less redistributive system may be chosen if society is composed of both myopic and far-sighted agents. Furthermore, while myopic individuals tend to prefer larger payroll taxes than their far-sighted counterparts, the generosity of the system does not always increase with the proportion of myopics.

Keywords: social security, myopia, dual-self model

JEL classification: H55, D91

1 Introduction

It has long been suspected and recent work has investigated the possibility that individuals may be "myopic" and not adequately save for their retirement unless a mandatory pension system forces them to do so. In his AEA Presidential address Peter Diamond brings out this point in a forceful way by saying: "*To my mind, the heart of the context for thinking about Social Security is that it substitutes for poor decision making and for missing insurance opportunities (missing perhaps because poor decision making implies low demand). The various shortcomings in preparation for retirement relate to different issues - inadequate overall provision for retirement relates to having a mandatory program [...]*".[1] Similarly, Assar Lindbeck and Mats Persson (2003) argue: "*A justification (for having a mandatory pension system) is based on paternalism: a mandatory system prevents myopic individuals from ending up in poverty in old age.[...] A person of this type is well served by some kind of commitment device, which could consist of a mandatory pension system, that prevents him from procrastinating. So far, however, there does not seem to be any formal political-economy model that explains how such a disciplinary device could be introduced and maintained by collective-decision making.*"

The notion of myopia we have in mind refers to the idea that people behave differently when they make short-run decisions and when they consider long-run trade-offs. To put it differently they acknowledge in surveys not to save enough for retirement and *ex post*, when it is too late they regret not to have saved more.[2] Undersaving can also result from the complexity of the retirement problem. Because this problem is beyond the reach of ordinary workers, a significant number may err by saving too little. Whatever the explanation for undersaving might be, it clearly leads to what has been called "new paternalism".[3] The idea is that the government has to intervene in retirement savings and that its objective should depend on something other than the objectives that govern individuals' short run decisions. The government ought to consider the long-term impact of decisions that individuals fail to consider because of problems of

[1] Diamond (2004).
[2] This idea goes back to Strotz (1956). See also Angeletos *et al.* (2001).
[3] See Benabou and Tirole (2004).

self-control or of complexity. The new paternalism is associated with the burgeoning field of behavioral economics and goes beyond the issue of forced saving; it has been applied to a set of activities such as smoking, drinking, overeating and gambling.

In most of these papers, the approach is normative: a benevolent government uses a second-best policy that induces individuals to make decisions that coincide as much as possible with their long run welfare. This is the approach used by Feldstein (1985) in a setting where agents may be totally or partially myopic and where the degree of myopia may differ across individuals (who are otherwise identical). Similarly, in a companion paper (Cremer *et al.* (2006)) we study the optimal design of a linear pension scheme when myopic and far-sighted individuals coexist but when individuals also differ in productivity.

In this paper we adopt a positive approach and present a simple political economy model in order to fill (at least in part) the gap mentioned by Lindbeck and Persson. We consider a society in which coexist two types of individuals: far-sighted ones who do not have to be forced to save and myopic ones. Individuals are also distinguished by their productivity. We assume that behind a kind of veil of ignorance myopic individuals are in a state of grace: they vote for the policy parameters by using their "true", long run, preferences while anticipating that they will make some decisions in a myopic way. In other words, at the moment they vote, they try to determine the social security system that will act as a commitment device. Observe that we use the term "myopic" for simplicity even though it is admittedly somewhat misleading. The problem with these individuals is not so much their short-sightedness, but their lack of self-control when savings and consumption decisions are made. At the voting stage these individuals effectively have a rather sophisticated behavior in that they anticipate their future (mis)behavior.[4] A possible justification for this combination of sophisticated and myopic behavior is the fact that voting is a low frequency event which can serve as a commitment mechanism while savings decisions are made in a continuous (and often reversible way)

[4] Our analysis could easily be adapted to accommodate for the existence of "full myopics", namely individuals who both save and vote myopically. This would simply add a mass of individuals who want a zero payroll tax and who do not care for the type of system.

which creates more opportunities to breach one's original plans.[5]

We adopt a rather simple framework, namely a linear scheme with a uniform payroll tax rate and pension benefits that have a contributory (Bismarckian) part and a flat rate (Beveridgean) part. To keep the model simple, we assume that the same distribution of productivity prevails in the two groups.

Individuals vote for two parameters: the tax rate that measures the size of the system and the relative importance of flat rate pension that measures the redistributiveness of the system. On the basis of these parameters, they then choose both their labor supply and their saving, if any. Myopic individuals do not save; yet when they vote they use the preferences of their rational "self". In other words, they seize the opportunity of voting to commit themselves to some forced saving knowing that as soon as out of the voting booth their myopic self will prevail.

People vote sequentially. They first vote on the *type* of pension system, Bismarckian or Beveridgean. Intermediate solutions are not considered for reasons of simplicity. They then vote on the tax rate which determines the size or *generosity* of the system. We show that whereas with homogeneous societies (only myopic or only far-sighted) the majority always votes for a Beveridgean pension system, with mixed societies, a Bismarckian system can emerge. Second, the relationship between tax rate (generosity) and the proportion of myopic individuals is more complicated than one would have conjectured. Intuitively one would predict a positive relationship because myopic individuals tend to prefer larger payroll taxes than their far-sighted counterparts. We show that this is indeed true for logarithmic utility functions with a specific distribution of productivities. However, more sophisticated patterns can emerge with alternative preferences. In particular we provide an example where the generosity is not a monotonic function of the proportion of myopics. Third, we find cases in which the (second-stage) vote on the payroll tax rates yields an "ends against the middle" solution, where low and high ability voters oppose the ones with intermediate ability.

The remainder of this paper is organized as follows. The model is presented in Section 2. Section 3 deals with the second stage of the voting game i.e., the vote on

[5]We thank Amy Finkelstein for suggesting this interpretation.

the *size* of the system given its *type* (Bismarckian or Beveridgean). Section 4 and 5 consider the first stage of the voting game and study the preferred type of pensions system anticipating the induced choice of the payroll tax rate. We first provide a in-depth study of the case of logarithmic utility (Section 4). Section 5 shows how the results are amended under alternative CES preferences (with more or less intertemporal substitution than the logarithmic case).

2 The model

2.1 Types of individuals, preferences and pension systems

There are two types of individuals, the far-sighted and the myopic. Utility of far-sighted individuals is given by

$$U = u(x) + u(d) = u\left(c - \ell^2/2\right) + u(d), \tag{1}$$

where c and d are first- and second-period consumption, ℓ is first-period labor supply and $x = c - \ell^2/2$ is consumption net of the (monetary) disutility of labor. In the second period individuals are retired.[6] The interest rate and the rate of population growth are both equal to zero. Utility function (1) is also that of myopics *ex post.* It corresponds to their rational self. *Ex ante*, the myopics totally forgo the second period; accordingly, they do not save and choose labor supply to maximize

$$U_M = u(x) = u(c - \ell^2/2). \tag{2}$$

In addition to this distinction, individuals differ also in productivity $w \in [w_-, w_+]$. The distribution of w is independent of the proportion λ of myopics in the population. It satisfies the standard property that the median wage, w^{med}, is smaller than the mean wage $\overline{w}$. Define

$$\theta_i = \frac{w_i^2}{Ew^2},$$

where E is the expectation operator. In the remainder of the paper we often find it convenient to index individuals by their level of θ rather than by w. The distribution

[6] The quadratic form for the labor disutility is adopted to make the problem more tractable. This is not that a restrictive assumption. The restrictive assumption is the quasi-linearity which implies no income effects.

of abilities w generates a distribution of θ that is denoted by $F(\theta)$. By definition, the average value of θ, denoted $\overline{\theta}$, equals 1 and one readily verifies that $\theta^{med} < \overline{\theta} = 1$ (where θ^{med} is the median).[7]

The pension system consists of a payroll tax τ and pension benefits p_i that are equal to

$$p_i = \tau\left(\alpha w_i \ell_i + (1-\alpha)Ew\ell\right) \tag{3}$$

where $Ew\ell$ is the average before tax income. The parameter α is often called the Bismarckian or the contributory parameter. When $\alpha = 0$, we have a flat-rate benefit (Beveridgean) pension system with $p_i = p = \tau Ew\ell$. When $\alpha = 1$, we have $p_i = \tau w_i \ell_i$ so that an individual's pension is proportional to his contributions (i.e., the system is purely contributive). Note that with zero interest and population growth rates it does not matter whether pensions are fully funded or based on the pay-as-you-go principle.[8]

The parameters α and τ are chosen by majority voting. The choice is restricted to "pure" Beveridgean or Bismarckian systems by imposing $\alpha \in \{0,1\}$. A sequential procedure is considered where the type of system (represented by α) is determined first, while the payroll tax rate τ (which in turn determines the generosity of the system) is set in a second stage. The problem is solved by backward induction. We assume that *all* individuals vote according to their "true" (*ex post*) preferences. However, the myopics will make their savings (and labor) supply decisions according to their ex ante preferences represented by (2) and they do anticipate this at the voting stage.[9]

Before turning to the study of the voting procedure, we have to examine the individuals' labor supply and savings decision in the presence of a Beveridgean or a Bismarckian pension system.

[7] To show this, use $w^{med} < \overline{w}$ along with the definition of θ_i and Jensen's inequality.

[8] Under certainty, our pure Bismarckian system is equivalent to a notional defined contribution (NDC) system.

[9] Throughout the paper we consider only a single generation and effectively assume that the voting game is only played once. In an intergenerational setting (and with our assumption on population growth and interest rate) this would correspond to a steady state of a sequence of votes where at each period only the young vote and make the (ad hoc) conjecture that the system they adopt will also be adopted by the next generation. This is clearly restrictive but at this point necessary for tractability. It would have been more consistent to provide on explicit modelling of the intergenerational game (following for instance Boldrin and Rustichini (2000)).

2.2 Labor supply and savings under a pension system

An individual now solves

$$\max_{l_i,s_i} u\left(w_i\left(1-\tau\right)\ell_i - s_i - \ell_i^2/2\right) + \beta_i u\left(s_i + p_i\right), \quad (4)$$
$$\text{s.t. } s_i \geq 0,$$

where $\beta_i = 0$ if he is myopic and $\beta_i = 1$ if he is far-sighted.

The solution (at least for the far-sighted) depends on the link between second period consumption and labor supply decisions which in turn depends on the pension system. We solve the problem separately for a Beveridgean and a Bismarckian system.

2.2.1 Beveridgean system: $\alpha = 0$

In that case, there is no link between pension and individual contributions so that the optimal labor supply is

$$\ell_i^* = w_i\left(1-\tau\right), \quad (5)$$

both for the far-sighted and for the myopics.[10] Using (3) we can now express the (flat) pension as a function of the payroll tax rate:

$$p = \tau\left(1-\tau\right)Ew^2. \quad (6)$$

To study the savings decision, substitute ℓ_i^* into (4) to obtain the "indirect" utility function:

$$v\left(w_i,\tau,s_i\right) = u\left(\frac{w_i^2\left(1-\tau\right)^2}{2} - s_i\right) + \beta_i u\left(s_i + \tau\left(1-\tau\right)Ew^2\right). \quad (7)$$

An interior solution (with $s_i > 0$) necessitates $\partial v/\partial s = 0$ which for $\beta_i = 1$ requires $x_i = d_i$. In other words, the far-sighted who save do perfectly smooth their consumption over time. On the other hand,

$$\frac{\partial v\left(w_i,\tau,0\right)}{\partial s_i} = -u'\left(\frac{w_i^2(1-\tau)^2}{2}\right) + \beta_i u'\left(\tau\left(1-\tau\right)Ew^2\right) \leq 0 \quad (8)$$

[10] The property that labor supply is independent of β is of course due to the specification of preferences (there is no income effect).

yields a corner solution with $s_i = 0$ and $x_i < d_i$. This case arises for all the myopics and for the far-sighted for whom the liquidity constraint is binding (they would like to borrow against their future pensions).

Straightforward manipulation of (7) and (8) then establishes the following lemma.

Lemma 1 *Under a Beveridgean pension system, the savings pattern is as follows:*
(i) $s_i = 0$ *for all the myopics and for the far-sighted with* $\theta \leq 2\tau/(1-\tau)$*;*
(ii) $s_i > 0$ *for the far-sighted with* $\theta > 2\tau/(1-\tau)$*.*

To sum up, with a flat rate pension myopics as well as the low ability far-sighted do not save; high ability far-sighted save and equalize marginal utility across the two periods.

2.2.2 Bismarckian system: $\alpha = 1$

The individual now solves (4) with $p_i = \tau w_i \ell_i$. Labor supply of the myopics does not depend on the pension system and thus continues to be given by (5). For the far-sighted labor supply does depend on the pension system and we have

$$\ell_i^* = \begin{cases} w_i & \text{when} \quad s_i > 0 \\ w_i \left(1 - \tau \left(1 - \frac{u'(p_i)}{u'(x_i)}\right)\right) & \text{when} \quad s_i = 0, \end{cases} \tag{9}$$

The far-sighted who save see the link between pension and labor income so that their labor supply is not distorted. Far-sighted who do not save put a lower weight on second period consumption (because of lower marginal utility of consumption) and are in between the other two categories in terms of labor supply. This is in sharp contrasts with the Beveridgean case where labor supply was similarly distorted for myopic and far-sighted individuals.

Turning to the saving decision, differentiating (7) with respect to s_i, making use of (9) and solving yields the following lemma:[11]

[11] The FOC for the far-sighted is

$$w_i (1-\tau) \ell_i^* - s_i - \frac{\ell_i^{*2}}{2} = s_i + \tau w_i \ell_i^*.$$

Substituting for ℓ_i^* (which equals w_i when $s_i > 0$) yields $s_i = w_i^2 (1-4\tau)/4$ which is positive if $\tau < 1/4$.

Lemma 2 *Under a Bismarckian pension system, the saving pattern is as follows*
(i) $s_i = 0$ *for all myopics and, if* $\tau \geq 1/4$, *for all the far-sighted,*
(ii) $s_i > 0$ *for all the far-sighted if* $\tau < 1/4$.

Consequently, there is no minimum productivity required for the far-sighted to save. Public pension and private savings have the same rate of return. In the absence of a pension system the far-sighted save 1/4 of their income. As long as $\tau \leq 1/4$, social security perfectly crowds out private saving which is determined by an interior solution so that consumption is perfectly smoothed across the two periods ($x = d$). For $\tau > 1/4$, nobody saves (corner solution).

We are now in a position to study the determination of α and τ through the voting procedure. We start with the second stage and determine the majority voting equilibrium for the payroll tax rate in both Bismarckian and Beveridgean systems.

3 Equilibrium tax rate for a given level of α

3.1 Most-preferred payroll tax rates

Let $\tau^*(\theta, \alpha)$ denote the most-preferred tax rate of individual θ given the type of social security system with $\alpha = 0$ or $\alpha = 1$. We successively study Beveridge ($\alpha = 0$) and then Bismarck ($\alpha = 1$) and naturally distinguish between myopic and far-sighted agents (when necessary). Recall that when voting the myopics adopt the same preferences as the far-sighted, anticipating however that they do not save and that their labor supply is chosen with $\beta = 0$.

3.1.1 Beveridgean case

In the Beveridgean case far-sighted and myopics have the same labor supply that is given by (5). Consequently, the most-preferred tax rate is the solution to

$$\max_{\tau} \; u\left(\frac{w_i^2 \left(1-\tau\right)^2}{2} - s_i\right) + u\left(s_i + \tau\left(1-\tau\right) E w^2\right),$$

where s_i is given by Lemma 1. Differentiating and rearranging yields

$$\tau^*(\theta, 0) = \frac{\kappa(\tau^*(\theta, 0)) - \theta}{2\kappa(\tau^*(\theta, 0)) - \theta}, \tag{10}$$

where

$$\kappa(\tau) = \frac{u'(d_i)}{u'(x_i)} = \frac{u'\left[s_i + \tau\left(1-\tau\right)Ew^2\right]}{u'\left[\dfrac{w_i^2\left(1-\tau\right)^2}{2} - s_i\right]}$$

represents the ratio of the marginal utility of second period consumption to that of the first period consumption. This ratio is less than one for the far-sighted who are credit constrained, while it is equal to one for the far-sighted who save. Consequently, when an individual has positive savings, (10) reduces to

$$\tau^*(\theta, 0) = \frac{1-\theta}{2-\theta}. \tag{11}$$

Differentiating this expression with respect to θ then shows that the most-preferred tax rate is decreasing ($\partial\tau^*(\theta,0)/\partial\theta < 0$) over the range of θ's for which $s_i > 0$ and up to $\theta = \overline{\theta} = 1$. The intuition is straightforward: individuals with $\theta < 1$ gain from the social security system, because of the redistribution it entails. Their preferred contribution rate trades off gains from redistribution and distortions from taxation, so that τ^* decreases with individual productivity. Furthermore, the far-sighted with $\theta > \overline{\theta}$ necessarily want $s_i > 0$ so that $\tau^*(\theta, 0) = 0$. When $\theta > \overline{\theta} = 1$, private saving is a better instrument than social security to transfer resources across periods. These individuals favor zero pensions and taxes.

We then compare the most-preferred tax rate of two individuals with the same productivity, one being a far-sighted who saves and the other one being myopic. Consider any individual with $\theta > 2/3$. From (11), we know that this individual most-preferred contribution rate is lower than 1/4. Moreover, since $\theta > 2\tau/\left(1-\tau\right)$ is satisfied with $\theta > 2/3$ and $\tau < 1/4$, such an individual will indeed save at his most-preferred contribution rate. On the other hand, a myopic individual with the same θ will not save, although he should: we then have that $\kappa > 1$ for this myopic individual. From equation (10), we see that the most-preferred contribution rate increases with κ. Comparing the preferred tax rates of these two individuals, we then obtain that it is higher for the myopic than for the far-sighted (assuming that the latter is not liquidity constrained). Intuitively, the myopic anticipates when voting over τ that he will not save enough, and he compensates this by increasing forced saving through the social security scheme.

Observe that the most-preferred contribution rate is the same for myopic and far-sighted individuals (of a given θ) if the latter is credit constrained. Furthermore, the most-preferred contribution rate does not depend on the proportion of myopic individuals in society: this is due to the fact that labor supply is similarly distorted for both types of agents in the Beveridgean system, so that the tax base upon which pension is based depends only on the contribution rate.

Finally, it is not possible to state in general whether the most-preferred contribution rate is monotone with θ for the non-savers (myopics or credit-constrained far-sighted). This is due to the fact that increasing θ has two conflicting effects on $\tau^*(\theta, 0)$. On the one hand, increasing θ for a given κ decreases the most-preferred tax rate: a richer individual benefits less from the redistribution embedded in the Beveridgean program. On the other hand, increasing θ also increases κ, which increases $\tau^*(\theta, 0)$, other things equal: as an individual grows richer, his marginal utility of second period consumption increases relative to his first period one, which tends to increase his most-preferred contribution rate. Which of these effects dominates depends on the utility function and more precisely on the elasticity of substitution across periods.

To resolve this ambiguity, we will restrict ourselves in the rest of this paper to the family of utility functions exhibiting a constant elasticity of substitution:

$$u(x) = \frac{x^\varepsilon}{\varepsilon}. \tag{12}$$

With this specification, the elasticity of substitution is given by $\rho = 1/(1-\varepsilon)$. Note that $\varepsilon = 0$ yields a logarithmic utility (with $\rho = 1$); $\varepsilon < 0$ yields $\rho < 1$ (complements) while $0 < \varepsilon < 1$ yields $\rho > 1$ (substitutes). In that case, equation (10) can be written as follows.

$$\theta^\varepsilon = \left(\frac{2\tau^*(\theta,0)}{1-\tau^*(\theta,0)}\right)^\varepsilon \frac{1-2\tau^*(\theta,0)}{2\tau^*(\theta,0)}. \tag{13}$$

Now observe that equations (11) and (13) are both satisfied when $\theta = 2/3$ and $\tau = 1/4$, whatever the value of ε. Those who save at their most-preferred value of τ are the far-sighted with $\theta > 2/3$. As for the non savers, their behavior depends on the value of ε. For $\varepsilon = 0$ (logarithmic utility), all non savers most prefer $\tau = 1/4$. For $0 < \varepsilon < 1$, we obtain that $\partial\tau^*(\theta,0)/\partial\theta < 0$ for the non savers, while for $-\infty < \varepsilon < 0$ we have $\partial\tau^*(\theta,0)/\partial\theta > 0$ for the non savers.

Intuitively, when ε is positive, it is easy to substitute resources across periods. Accordingly, the total income received over the two periods matters more, and the redistributive effect of increasing θ is large: the most-preferred τ decreases with θ. When ε is negative, substitution across periods is difficult, the marginal utility of consumption effect is bigger and hence the most-preferred contribution rate increases with θ. For $\varepsilon = 0$, both effects perfectly cancel out so that the most-preferred contribution rate is the same for all non savers.

The results for the CES utility function are summarized in the following proposition

Proposition 1 *Assume that all individuals have CES preferences, specified by (12). When the pension system is Beveridgean ($\alpha = 0$), the pattern of most-preferred tax rates (represented in Figure 1) depends on the elasticity of substitution between first- and second period consumption; it satisfies the following properties:*
(i) For the myopics, τ^* is constant (at 1/4) when $\varepsilon = 0$. It is increasing when $\varepsilon < 0$ and decreasing when $0 < \varepsilon < 1$.
(ii) The far-sighted with $\theta < 2/3$ do not save when τ is at their most-preferred level and have the same level of τ^* as their myopic counterpart .
(iii)For the far-sighted, τ^* is decreasing for $\theta \in [2/3, 1]$ while $\tau^* = 0$ for $\theta > \overline{\theta} = 1$.

It can be shown that the utility is concave in τ (accounting for the endogenous saving decision) so that we can apply the usual median voter theorem in the rest of the paper.

3.1.2 Bismarckian system

For the far-sighted, there is perfect crowding out between pensions and private saving as long as $\tau < 1/4$. They are indifferent between any $\tau \in [0, 1/4]$. Above 1/4 utility decreases with τ. Individuals are then forced to save more than they want.

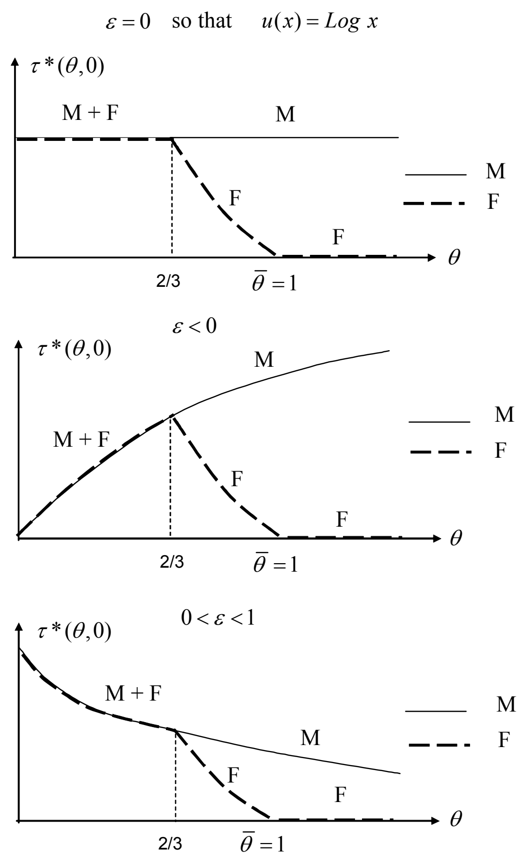

Figure 1: The pattern of most preferred payroll tax rates under a Beveridgean system depending on the level of the elasticity of substitution.

ε	$\tau^*(\theta, 1)$
-10	0.320
-2	0.294
-1	0.280
-1/2	0.269
-1/4	0.260
0	0.25
1/4	0.234
1/2	0.211
3/4	0.168
9/10	0.113
99/100	0.027

Table 1: Most-preferred tax rate of the myopics under a Bismarckian system

As for the myopic, we have

$$\max_{\tau} \quad u\left(\frac{w_i^2\left(1-\tau\right)^2}{2}\right)+u\left(\tau(1-\tau)w_i^2\right)$$

so the desired tax rate is characterized by

$$\tau^*=\frac{u'\left(d_i\right)-u'\left(x_i\right)}{2u'\left(d_i\right)-u'\left(x_i\right)}$$

With the CES, specified by (12), $\tau^*\left(\theta, 1\right)$ is independent of θ for the myopics. Table 1 gives the most-preferred tax rate for different values of ε.

To interpret these results, recall that the elasticity of substitution is given by $\rho = 1/(1-\varepsilon)$. When ε tends towards minus infinity, the agent tries to equalize utility levels across periods and favors a tax rate close to 1/3. As ε tends towards 1, the agent only cares about the sum of his two consumption levels. Forced saving then has no benefits and is inefficient because of tax distortions. His most-preferred tax rate tends towards zero. Summing up, we have

Proposition 2 *Assume that all individuals have CES preferences, specified by (12). When the pension system is Bismarckian ($\alpha = 1$), the pattern of most-preferred tax rates satisfies the following properties:*

(i) For the far-sighted the most-preferred tax rate is not uniquely defined; we have

$\tau^*(\theta, 1) \in [0, 1/4]$.

(ii) For the myopics, the most-preferred tax rate is independent of θ*; its level is a decreasing function of* ε*.*

For the remainder of the analysis, we will have to adopt a specific level of ε. Most of our arguments are developed for the case where ε tends toward zero, i.e. where the utility is logarithmic and $u(x) = \ln(x)$. However, we shall also consider two alternative and extreme possibilities in the family of CES utility functions: the case of perfect substitution between consumptions in the two period of life ($\varepsilon = 1$) and the case of zero substitution ($\varepsilon = -\infty$). In all cases, our objective is to show how the majority chosen pension system (α,τ) varies when the proportion of myopic individuals changes.

3.2 Majority voting payroll tax rate

Assume for the time being that $u(x) = \ln(x)$ and let $\tau^V(\alpha, \lambda)$ denote the voting equilibrium payroll tax rate (for a given level of α). Recall that $\lambda \in [0, 1]$ denotes the fraction of myopic individuals. We shall first determine the majority voting equilibrium tax rate in a Beveridgean system, before turning to the Bismarckian system. These results will put us in a position to return to the first stage of the voting procedure and study the vote between Beveridge and Bismarck as a function of the proportion of myopics in society.

3.2.1 Equilibrium payroll tax rate under a Beveridgean system

We know from Proposition 1 that all myopic and all far-sighted individuals with $\theta < 2/3$ most prefer a tax rate of 1/4. When they represent a majority, i.e., when $\lambda + (1 - \lambda)F(2/3) \geq 1/2$, the majority voting equilibrium contribution rate is given by $\tau^V(0, \lambda) = 1/4$. If not, the pivotal voter, $\widehat{\theta}$, is a far-sighted individual with $\widehat{\theta} \in]2/3, 1[$, such that

$$\lambda + (1 - \lambda)F(\widehat{\theta}) = 1/2, \tag{14}$$

whose most-preferred tax rate is specified by (11) and equal to $(1-\widehat{\theta})/(2-\widehat{\theta}) < 1/4$. Consequently, we then have $\tau^V(0,\lambda) = (1-\widehat{\theta})/(2-\widehat{\theta}) < 1/4$.[12] Observe that when $\lambda > 0$, (14) implies $\widehat{\theta} < \theta^{med}$, which in turn explains that we must have $\widehat{\theta} < 1$. Furthermore, one can easily show that $\partial\tau^V/\partial\lambda \geq 0$. The results are summarized in the following proposition:

Proposition 3 *Assume* $u(x) = \ln(x)$. *The majority voting equilibrium tax rate under a Beveridgean system is given by*

$$\tau^V(0,\lambda) = \begin{cases} 1/4 & \text{if} \quad \lambda + (1-\lambda)F(2/3) \geq 1/2 \\ (1-\hat{\theta})/(2-\hat{\theta}) < 1/4 & \text{otherwise,} \end{cases}$$

where $\widehat{\theta} \in]2/3, 1[$ *is defined by (14). Furthermore,* $\widehat{\theta}$ *is non decreasing in* λ *and* $\widehat{\theta} < \theta^{med}$ *whenever* $\lambda > 0$.

For future reference, we can now evaluate individuals' utility levels at the (second stage) voting equilibrium. The far-sighted who do not save (i.e., with $\theta < 2\tau^V(0,\lambda)/[1-\tau^V(0,\lambda)]$; see Lemma 1) and the myopics have the same utility given by

$$\ln\left[\frac{\left(1-\tau^V(0,\lambda)\right)^2}{2}w_i^2\right] + \ln\left[\tau^V(0,\lambda)(1-\tau^V(0,\lambda))Ew^2\right]. \tag{15}$$

The far-sighted who save ($\theta \geq 2\tau^V(0,\lambda)/(1-\tau^V(0,\lambda))$), on the other hand, have a utility level of

$$2\ln\left[\frac{\left(1-\tau^V(0,\lambda)\right)^2}{4}w_i^2 + \frac{\tau^V(0,\lambda)(1-\tau^V(0,\lambda))}{2}Ew^2\right]. \tag{16}$$

The comparison of these expressions with their counterparts for the Bismarckian system will enable us to study the individuals' preferences in the first stage of the voting game (vote between $\alpha = 0$ and $\alpha = 1$).

3.2.2 Equilibrium payroll tax rate under a Bismarckian system

We now turn to the vote under a Bismarckian system which is even simpler to study. According to Proposition 2 all the far-sighted are indifferent between all tax rates up

[12] It is important to distinguish $\widehat{\theta}$ and θ^{med}; θ^{med} is the median value of θ in the distribution while $\widehat{\theta}$ is the productivity index of the pivotal voter.

to 1/4 , while all myopics most prefer $\tau = 1/4$. Consequently, we have[13]

Proposition 4 *Assume $u(x) = \ln(x)$. The majority voting equilibrium tax rate under a Bismarckian system is given by*

$$\tau^V(0, \lambda) = 1/4, \text{ for all } \lambda \geq 0.$$

As in the Beveridgean case, we can now evaluate individuals' utility levels at the (second stage) voting equilibrium. For the far-sighted this yields:

$$2\ln\left(\frac{w_i^2}{4}\right), \tag{17}$$

while the utility of myopics is given by

$$\ln\left(\frac{9w_i^2}{32}\right) + \ln\left(\frac{3w_i^2}{16}\right). \tag{18}$$

We are now in a position to study the first stage of the voting procedure.

4 Voting over α with logarithmic preferences

We start with the preferences of the far-sighted over the two systems before turning to the myopics. Since we are dealing with the first stage of the procedure, the relevant choice is now between two vectors (α, τ), namely $(0, \tau^V(0, \lambda))$ in the Beveridgean case and $(1, \tau^V(1, \lambda)) = (1, 1/4)$ in the Bismarckian case. We then determine which of the two systems obtains a majority of votes, as a function of the proportion of myopics.

4.1 Preferences of the far-sighted

Tedious algebra shows that

$$\ln\left[\frac{(1-\tau)^2}{2}w_i^2\right] + \ln\left[\tau(1-\tau)Ew^2\right] \geq 2\ln\left(\frac{w_i^2}{4}\right)$$

holds for all $\theta \in [0, 2\tau/(1-\tau)]$ and $\tau \leq 1/4$. Consequently, the utility level specified by (15) is at least as large as that given by (17) so that all the far-sighted who do not save prefer Beveridge to Bismarck.

[13] When $\lambda = 0$, the equilibrium tax rate is not unique. However, the induced allocation is unique and we can without any loss of generality set $\tau^V(0, 0) = 1/4$.

Next, determine $\tilde{\theta}_F$ the threshold value of θ such that a far-sighted who saves is indifferent between Beveridge and Bismarck, which using (16) and (17) requires

$$\frac{\left(1-\tau^V(0,\lambda)\right)^2}{4}w_i^2+\frac{\tau^V(0,\lambda)(1-\tau^V(0,\lambda))}{2}Ew^2=\frac{w_i^2}{4}.$$

Solving yields

$$\tilde{\theta}_F=\frac{2-2\tau^V(0,\lambda)}{2-\tau^V(0,\lambda)}, \tag{19}$$

with all $\theta<\tilde{\theta}_F$ preferring Beveridge to Bismarck. The value of $\tilde{\theta}_F$ as a function of $\tau^V(0,\lambda)$ is depicted on Figure 2 (curve labeled F); it decreases with τ, and goes from 1 for τ arbitrary small to 6/7 when τ=1/4.

The intuition for the properties of this locus is straightforward. When $\tau^V(0,\lambda)$ equals zero, the two systems are totally equivalent for the far-sighted. Increasing $\tau^V(0,\lambda)$ introduces redistribution from high to low incomes and thus benefits low-income individuals. On the other hand, this redistribution generates distortions in labor supply. When $\tau^V(0,\lambda)$ is arbitrary small, these distortions are of second order, and all individuals whose Beveridgean pension exceeds their contributions (i.e., those with a square ability lower than the average square ability) prefer Beveridge to Bismarck. With a labor supply distortion proportional to the square of the Beveridgean contribution rate, increasing $\tau^V(0,\lambda)$ results in a decrease in $\tilde{\theta}_F$: individuals with square abilities slightly lower than the average shift their preference towards Bismarck because of the increasing distortions generated by the Beveridgean system.

4.2 Preferences of the myopics

As for myopics, the productivity of a voter indifferent between the two systems is determined by setting (15) equal to (18). Solving for θ, we obtain

$$\tilde{\theta}_M=\frac{256}{27}(\tau^V(0,\lambda)-3\left(\tau^V(0,\lambda)\right)^2+3\left(\tau^V(0,\lambda)\right)^3-\left(\tau^V(0,\lambda)\right)^4).$$

All myopics with $\theta<\tilde{\theta}_M$ prefer Beveridge to Bismarck while the opposite holds for $\theta>\tilde{\theta}_M$. The value of $\tilde{\theta}_M$ as a function of $\tau^V(0,\lambda)$ is depicted on Figure 2 (curve labeled M); it is increasing in $\tau^V(0,\lambda)$ and goes from zero when $\tau^V(0,\lambda)=0$ to 1 when $\tau^V(0,\lambda)=1/4$.

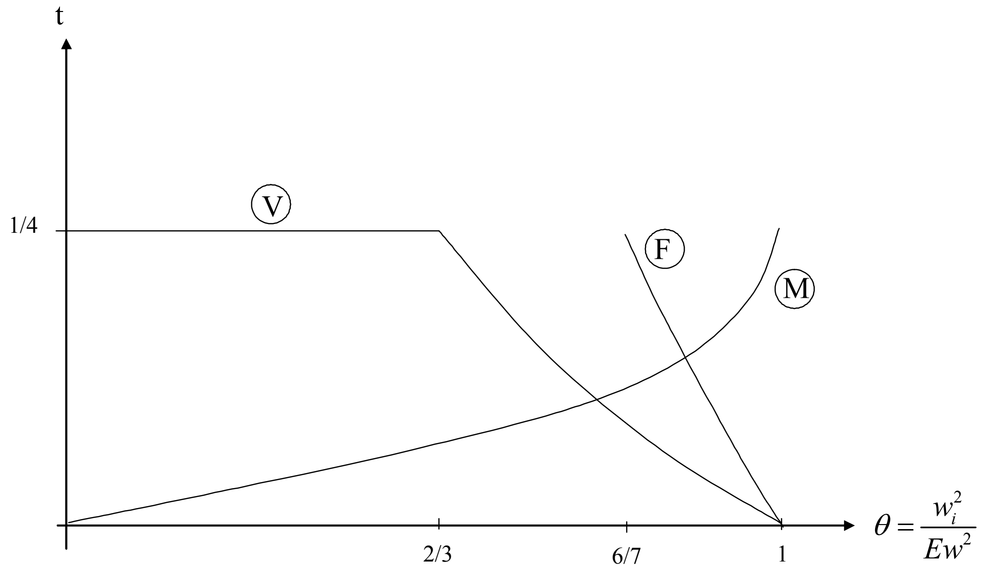

Figure 2: The locus F represents all combinations of θ and τ such that the far-sighted individual with the corresponding level of θ is indifferent between Beveridge (with a tax rate of τ and Bismarck (with a tax rate of 1/4), i.e., between the bundles $(0, \tau)$ and $(1, 1/4)$. The locus M is defined in the same way, but for the myopics. Finally, the curve V, borrowed from Figure 1, represents $\tau^*(\theta, 0)$ (most preferred tax under a Beveridgean system) for the far-sighted.

The reason why $\tilde{\theta}_M$ increases with $\tau^V(0,\lambda)$ is as follows. When $\tau^V(0,\lambda) = 1/4$, the tax rates are the same in both systems, and myopic individuals, whose square ability is lower than the average, support Beveridge because they benefit from redistribution. Observe that for a given payroll tax rate, myopics (unlike the far-sighted) have the same labor supply (given by (5)) under Beveridge and under Bismarck. As $\tau^V(0,\lambda)$ decreases from 1/4, we move away from the most-preferred contribution rate of all myopics, which means that the Beveridgean system gets less and less attractive for them, and accordingly the indifferent myopic's θ value decreases. When $\tau^V(0,\lambda)$ reaches zero, all myopics strictly prefer the Bismarckian system, since they get no income in the Beveridgean system, which gives a utility level of minus infinity with the logarithmic utility function.

The two kinds of voters thus react in opposite directions to a variation in $\tau^V(0,\lambda)$: an increase in $\tau^V(0,\lambda) \in [0, 1/4[$ increases the political support for Beveridge among the myopics but decreases it among the far-sighted. Observe also that $\tilde{\theta}_M < \tilde{\theta}_F$ for low values of $\tau^V(0,\lambda)$ while the reverse holds for higher values of $\tau^V(0,\lambda)$: depending on the value of $\tau^V(0,\lambda)$, the proportion of myopics in favor of Beveridge may be larger or smaller than among the far-sighted.

4.3 Equilibrium level of α

The determination of this equilibrium is the easiest for extreme values of the proportion of the myopics, namely $\lambda = 0$ and $\lambda = 1$. We shall first examine these two cases and then turn to the (more interesting) intermediate levels of λ.

4.3.1 $\lambda = 0$: no myopics

With only far-sighted individuals the equilibrium pension system is always Beveridgean. The easiest way to establish this is to use curves V and F in Figure 2. The V curve gives the most-preferred tax rate of the far-sighted under Beveridge; the majority voting level of τ is given by the most-preferred tax rate of the median $\theta = \theta^{med}$. Now, this means that for any level of τ^V, the inverse of the V curve gives us the location of the median individual. Similarly, for a given τ^V the F curve gives the identity of the voter indifferent between this Beveridgean contribution rate and a Bismarckian system (which always implies an equilibrium tax rate of 1/4). A majority of voters prefer Beveridge because the F curve is everywhere to the right of the V curve. This in turn requires

$$\frac{2-2\tau}{2-\tau} \geq \frac{1-2\tau}{1-\tau}$$

for $0 \leq \tau \leq 1/4$, which can be easily verified. This geometrical argument shows that there is always a majority in favor of Beveridge, consisting of all the individuals who would have wanted a (weakly) higher Beveridgean contribution rate (at least one half of the population, since this rate is chosen by majority voting) plus some others with less-than-average square abilities.

Intuitively, we have a situation where the median individual θ^{med} (who is the decisive voter in the second stage) is part of the winning majority in the first stage. Now, with $\theta^{med} < \overline{\theta} = 1$ this individual gains from redistribution; it is thus plain that the Beveridgean system (along with his most-preferred level of payroll tax) dominates any Bismarckian system.[14]

4.3.2 $\lambda = 1$: all myopics

In this case it is also easy to show that the majority will vote in favor of the Beveridgean system. This is because, from Propositions 1 and 2 the majority voting equilibrium contribution rate is the same in both systems: $\tau^V(0,1) = \tau^V(1,1) = 1/4$. When voting over Bismarck vs Beveridge, all agents forecast that the same contribution rate will emerge in both systems. The only difference is that the pension is based on one's own income in the case of Bismarck and on the average income in the case of Beveridge. All individuals with an income lower than average ($\theta < 1$) prefer Beveridge while the more-than-average productive individuals prefer Bismarck. With $\theta^{med} < \overline{\theta} = 1$ the first category represents a majority so that Beveridge is adopted.

Intuitively, we thus have again a situation where the median is decisive in both stages. In the case of a mixed society to which we now turn this is no longer true which explains why a different solution may arise.

[14] The only reason the median could possible prefer Bismarck would be to obtain a more suitable tax rate in the second stage.

4.3.3 $0 < \lambda < 1$: mixed society

As λ increases, $\tau^V(0,\lambda)$ weakly increases, which increases the political support for Beveridge among the myopics but decreases it among the far-sighted. Recall that when λ is positive, the pivotal voter, $\widehat{\theta}$, is no longer equal to θ^{med} (the median level of θ amongst the far-sighted); see Proposition 3. In particular, when $\tau^V(0,\lambda) < 1/4$, this pivotal voter is a far-sighted individual, but he has an ability that is lower than the median ability among far-sighted. Consequently, the argument presented in the case where $\lambda = 0$ (Subsection 4.3.1) cannot be used when $\lambda > 0$. Therefore, the possibility that a majority of far-sighted prefers Bismarck can no longer be ruled out. As a matter of fact, it appears likely that a majority of myopics will vote for Bismarck if $\tau^V(0,\lambda)$ is low enough, that is if the median in the population is a far-sighted with a square ability close enough to the average square ability. We then cannot exclude the case where a majority in the population favors the Bismarckian system for some interior values of λ.

The numerical example reported in Table 2 shows that a vote in favor of the Bismarckian system is not only a theoretical conjecture but can effectively occur. In other words, $(\alpha, \tau) = (1, 1/4)$ can be the equilibrium of the considered sequential voting procedure for intermediate levels of λ. The example considers a Beta (2,4) distribution for θ with support $[0, 16/3]$.

The results pertaining to the vote over α are summarized in the following proposition:

Proposition 5 *Assume $u(x) = \ln(x)$. When society consists only of far-sighted or of myopic individuals ($\lambda = 0$ or $\lambda = 1$), the equilibrium of a sequential voting procedure implies a Beveridgean pension system ($\alpha = 0$). When both types of individuals coexist ($0 < \lambda < 1$) an equilibrium with a Bismarckian pension system is possible.*

The intuition behind Proposition 5 is that modifying λ has two impacts on the majority voting result. On the one hand, λ influences the majority voting equilibrium level of the Beveridgean contribution rate: as λ increases, the Beveridgean contribution rate (weakly) increases, which increases the political support for this system among the myopics but decreases it among the far-sighted. On the other hand, λ also affects the vote share of both groups in society. When there are only myopics or only far-sighted,

λ	$\widehat{\theta}$	$\tau^V(0,\lambda)$	$\widetilde{\theta}_M$	$F(\widetilde{\theta}_M)$	$\widetilde{\theta}_F$	$F(\widetilde{\theta}_F)$	Support for Beveridge	α^V
0	0.941	0.055	-	-	0.972	0.520	0.520	0
0.02	0.926	0.069	0.525	0.213	0.964	0.516	0.509	0
0.05	0.903	0.089	0.636	0.287	0.954	0.508	0.497	1
0.10	0.860	0.123	0.785	0.392	0.935	0.495	0.485	1
0.125	0.838	0.140	0.844	0.433	0.925	0.489	0.482	1
0.250	0.702	0.230	0.995	0.536	0.870	0.451	0.472	1
0.275	0.669	0.249	0.999	0.539	0.858	0.443	0.469	1
0.277	[0,2/3]	0.250	1	0.539	0.857	0.442	0.469	1
0.5	-	0.250	1	0.539	0.857	0.442	0.491	1
0.597	-	0.250	1	0.539	0.857	0.442	0.500	0/1
0.99	-	0.250	1	0.539	0.857	0.442	0.538	0
1	-	0.250	1	0.539	-	-	0.539	0

Table 2: Voting equilibrium as a function of the proportion of myopics, when θ is distributed over $[0, 16/3]$ according to a Beta (2,4) and when $u(x) = \ln(x)$. Recall that from the definition of $\widetilde{\theta}_M$ and $\widetilde{\theta}_F$, $F(\widetilde{\theta}_M)$ and $F(\widetilde{\theta}_F)$ indicate the proportion of myopics and far-sighted who are in favor of Beveridge.

a majority always supports Beveridge because of its redistributive element. When both groups coexist in society, the majority voting Beveridgean contribution rate does not reflect the preferences of any single group. In that case, it is possible that a majority in society, composed of myopics and far-sighted, prefers Bismarck to Beveridge. In the numerical example reported in Table 2 a majority favors Beveridge if λ is close enough to either zero or one, and the reverse holds if both groups are important enough in society.

Let us now turn to the generosity of the pension system. Because myopic individuals tend to prefer larger payroll taxes than their far-sighted counterparts, intuition suggests that τ increases (or at least does not decrease) with the proportion of myopic individuals. This is true for any *given* system, Beveridgean or Bismarckian, as shown in Section 4. However, it may not be true when the pension system itself changes endogenously with λ. To study the possible monotonicity of the relationship between τ and λ we then have to take a closer look at its behavior at the levels of τ for which a switch in α occurs.

It is plain that τ cannot decrease when society moves from Beveridge to Bismarck, since the highest value of τ under Beveridge is 1/4, which corresponds to the generosity of the Bismarckian system. On the other hand, we cannot exclude that τ decreases when moving from Bismarck to Beveridge.

Observe that there exists a threshold value $\lambda^{\circ} < 1/2$ above which $\tau^{V}(0, \lambda) = 1/4$. Once this threshold, is reached, further increases in λ do not affect the majority voting equilibrium level of the Beveridgean contribution rate, but only the vote share of the myopics and far-sighted. When $\tau^{V}(0, \lambda) = 1/4$, a majority of myopics favor Beveridge. As for far-sighted, it depends whether $F(6/7)$ is smaller or larger than 1/2. It is thus possible that a majority in the population favors Bismarck even when $\lambda \geq \lambda^{\circ}$. Any change of pension system from Bismarck to Beveridge that occurs for $\lambda > \lambda^{\circ}$ (as in Table 2 where $\lambda^{\circ} = 0.277$) keeps τ constant (at 1/4). On the other hand, a similar change occurring for $\lambda < \lambda^{\circ}$ would decrease the generosity of the equilibrium pension system. In the next section we provide a numerical example where τ is not monotonically increasing in λ.

5 Voting over α with alternative CES preferences

So far, the results concerning the voting equilibria have been obtained for the case of logarithmic utility ($\varepsilon \to 0$). We have also considered alternative levels of ε. In particular, we have studied the two extreme possibilities in the family of CES utility functions: the case of perfect substitution between consumptions in the two periods of life ($\varepsilon = 1$) and the case of no substitution at all ($\varepsilon = -\infty$). A detailed report of the results would be too tedious and involve too much repetition. We shall restrict ourselves to sketching the main results.[15]

With perfect substitution (and with zero interest, discount and population growth rates) there is no need for saving and transferring resources between lifetime periods has no impact on an individual's utility. Consequently, a Beveridgean pension scheme is equivalent to a standard linear income tax (à la Sheshinsky). A Bismarckian system

[15] More details are provided in a technical appendix that is available on the first author's website (http://www.idei.fr/vitae.php?i=31#id1).

on the other hand has no impact at all.[16] The second stage under Beveridge is now a classical vote over a linear income tax problem yielding a positive tax as long as $\theta^{med} < \overline{\theta}$. Since far-sighted and myopics vote in the same way, the proportion of myopics has no impact. Under Bismarck, there is no unique equilibrium but all tax rates yield the same allocation (equivalent to the laissez-faire). Further, it is easily shown that a majority of individuals prefers the Beveridgean solution to the laissez-faire so that the first-stage vote *always* yields $\alpha = 0$. This is because with $\theta^{med} < \overline{\theta}$ a majority gains from the redistribution implied by the pension system. To sum up, when consumption levels in the two periods are perfect substitutes, the presence of myopics has no impact. Neither the size, nor the redistributive character of the pension system is affected. This does of course not come as a surprise because with perfect substitutes it is plain that myopia does not effectively matter at all. It thus appears a Bismarckian system can only emerge if the degree of substitution between first- and second period consumption is not too high.

With perfect complementarity, individuals aim at equating consumption between the two periods. In the Beveridgean case, the most-preferred rate increases with ability for myopic agents, but it first increases and then decreases for the far-sighted. This situation may lead to an "ends against the middle" voting equilibrium. In the Bismarckian case, the equilibrium tax rate now depends on the parameter λ, the fraction of myopic individuals (recall that this was not the case with a logarithmic utility). The equilibrium rate under Bismarck is $1/4$ for $\lambda \leqslant 1/2$ and $1/3$ otherwise. Consequently we have a discontinuity. An argument similar to the one used in Subsection 4.3 shows that for $\lambda = 0$ or 1, the Beveridgean system always prevails. For an interior λ, Bismarck becomes possible and moreover, there is a discontinuity in the political support for either system as λ becomes larger than $1/2$. These results are illustrated in Table 3 that is based on the same distribution of θ's as Table 2 but where utility is $\min[x, d]$. Overall, the results pertaining to α are similar to those in the logarithmic case. However, unlike in Table 2, the size of the pension system is no longer an increasing function of the proportion of myopics.

[16] So that labor supply under Bismarck no longer differs between myopics and far-sighted.

λ	$\tau^V(0,\lambda)$	$\tau^V(1,\lambda)$	$F(\widetilde{\theta}_M)$	$F(\widetilde{\theta}_F)$	Support f. Bev.	α^V	$\tau^V(\alpha^V,\lambda)$
0	0.044	0.25	-	0.524	0.524	0	0.044
0.03	0.056	0.25	0.073	0.520	0.507	0	0.056
0.35	0.156	0.25	0.334	0.482	0.430	1	0.25
0.50	0.195	0.25	0.428	0.466	0.447	1	0.25
0.501	0.195	0.33	0.337	0.720	0.528	0	0.195
0.55	0.207	0.33	0.360	0.697	0.512	0	0.207
0.60	0.220	0.33	0.382	0.677	0.500	0/1	0.220/0.33
0.72	0.249	0.33	0.432	0.634	0.488	1	0.33
0.75	0.260	0.33	0.448	0.620	0.491	1	0.33
0.80	0.276	0.33	0.471	0.601	0.497	1	0.33
0.95	0.311	0.33	0.515	0.562	0.518	0	0.31
1	0.320	0.33	0.525	-	0.525	0	0.32

Table 3: Voting equilibrium as a function of proportion of myopics, when θ is distributed over $[0, 16/3]$ according to a Beta (2,4) and when $U_F = \min[x, d]$ (perfect complements). Recall that from the definition of $\widetilde{\theta}_M$ and $\widetilde{\theta}_F$, $F(\widetilde{\theta}_M)$ and $F(\widetilde{\theta}_F)$ indicate the proportion of myopics and far-sighted who are in favor of Beveridge.

6 Conclusion

In this paper we have considered a society consisting of myopic and far-sighted individuals who have to choose the type of social security they want (Bismarck or Beveridge) and the generosity of pension benefits represented by the payroll tax rate. Myopic individuals act myopically when choosing private saving and labor supply. Yet, when they vote on the size of the pension system (the payroll tax) and possibly on the Bismarckian degree of this system they act rationally looking for a commitment device. The double heterogeneity (rationality and productivity) along with the two dimensions that characterize a pension scheme make majority voting rather complex. We focus our attention on a sequential voting procedure where the determination of the Bismarckian factor precedes that of the tax rate. The second stage of this procedure is in itself already quite complex. For example, whereas the productive far-sighted tend to vote for a zero tax, productive myopic will surely vote for a positive tax. Furthermore, the poor (and liquidity constrained) far-sighted have (over some range) the same voting behavior as their myopic counterparts. This implies interesting coalitions and in some cases "ends against the middle" type of equilibria (vote on the payroll tax for a given α).

The challenging and most interesting issue is the determination of the degree of redistribution operated through the pension system. We show that when there are only individuals of a single type (far-sighted or myopic) a majority of voters prefer a Beveridgean pension system. However, when both types of agents coexist, it may be the case that a majority of voters prefer Bismarck to Beveridge. Switches from Bismarck to Beveridge in turn explain the surprising result that the generosity of the pension system does not always increase with the proportion of myopics.

In this paper, we have made a number of simplifying assumptions. We now discuss their importance for our results. Quadratic disutility of labor is not crucial; what makes a difference is the quasi-linear specification that assumes away income effects.

We assume independence between ability and myopia. Instead, we could have assumed a negative correlation: less productive individuals being relatively more myopic. This would complicate the analysis but would not fundamentally change our results. We could have also adopted a positive level of β for the myopics; as long as this level is sufficiently small the qualitative results would not change. More ambitiously, one could consider a continuum of discount factors but this would have clearly made our problem intractable.

In the same line, the dichotomous choice between contributive and flat rate pensions is restrictive. One can easily guess that intermediate solutions or even solutions such as $\alpha < 0$ could emerge as it appears in our normative paper (Cremer et al. (2006)). Again, we did not do it for reason of tractability, but there is no reason to believe that the qualitative nature of results would change.

Finally, we have chosen sequential voting. The sequence appears rather natural, the type of social security, contributive or not, being a more fundamental feature than its generosity. Alternative models of the political process could have been considered, the results of which cannot be anticipated. This point like the others is in our future research agenda.

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