The Single Mindedness Theory: Micro-foundation and Application to Labor Market

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1. Introduction

The stylized facts which refer to the workers' behavior in the U.S. labor market show that the participation of older persons to the labor force has been increasingly declining over the last century. If the labor force participation of men age 65–69 was around 60% in the 50's, the same figure had fallen to 26% in the 90's. In many OECD countries, workers withdraw from the labor market well before the social retirement age. Eventually, this long-term decline associated with an increase in the life expectation has led to a considerable increase in retirement years. Otherwise, the Government expenditure for Social Security has been skyrocketing and so has been the percentage of workers covered by the System. This situation may become financially unsustainable over the next years, unless Governments undertake the structural reforms of Social Security Systems as required by many economists (see Feldstein & Liebman [2001] among the others).

Over the last few years, the economic literature has been trying to give plausible explanations to this strong change in the old workers' lifestyle. According to an OECD survey [2005] financial incentives embedded into public pensions and other assistance schemes pull old workers into retirement. Nevertheless, the OECD makes a distinction between the *pull factors of retirement* and the *push factors of retirement*. The former include all those financial benefits that incentive workers to anticipate their retirement age while the latter refer to negative perceptions by old workers about their capacity or productivity and to socio-demographic characteristics.

In this paper I take the distance from the OECD's vision, which considers financial benefits as a *pull factor* of retirement. Otherwise, referring to the single mindedness theory, I suggest that preferences of workers (especially the old) for leisure shape the modern Social Security Systems characteristics. Thus, behind the generosity of the transfer by Governments there is a precise political mechanism, driven by individuals who use their power of influence over the Government to obtain what they need to finance their leisure.

I use an OLG model which considers a society divided into two groups of workers: the old and the young. Furthermore, I assume that there is a political competition among two parties which aim to maximize the share of votes and have to decide an optimal policy vector which encompasses the labor marginal tax rate and the optimal transfers among cohorts.

The core assumption of the model is based on the concept of "single mindedness", defined as the ability of a social group to be focused on a single issue rather than many. The idea was introduced by Mulligan & Sala-i-Martin [1999] who assumed that the old have more needs for leisure than the young and this necessity would explain why the old require (and obtain) generous pensions transfer by Government and why the Social Security expenditures in the U.S. have been increased so much over the last decades. They adopted an OLG model with a society divided into old and young workers and showed that

> **retired elderly can concentrate on issue that relate only to their age such as the pension or the health system**

while the young have to choose among

> **age-related and occupation issues**

Eventually, they concluded,

> **the elderly are politically powerful because they are more single minded and [...] more single minded groups tend to vote for larger social security programs that benefit them and induce further retirement.**

Thus, according to this theory, there would exist in the economy a group, the old workers, which has a sort of political superpower which enables it to dictate the optimal taxation and transfers system, both for the young and for the old workers (a sort of tyranny of the elder or "Gerontocracy", to quote the author).

Indeed, neither Demographics nor the need for assistance would explain the skyrocketing increase in the Governments' expenditure for Social Security Systems and the broad reduction in retirement age over the last decades, but preferences of the old for leisure would provide a more suitable explanation to this upward trend.

Over the recent years, economists like Profeta [2002] have attempted to formalize the single mindedness theory but, unfortunately, the empirical evidence does not seem to provide robust support, at least with reference to the

U.S. reality. In a recent work, Diamond [2005], in an attempt to describe the linkage between the Social Security System and the retirement in the U.S., wrote in his conclusions:

> **there is clear evidence from both previous work [...] that the broad structure of the SS program influences retirement timing. Evidence on the effects of variation in the benefits provided by this program is less clear, however.**

Furthermore, Sala-i-Martin himself recognized that the "Gerontocracy models" can be applied mostly to the U.S. society, where powerful lobbies have a great influence on the Government's decisions; for instance, the American Association of Retired People was evaluated by *Fortune* to be the most influencial lobby of the U.S. Otherwise, in the European context, it seems that an analogous power of influence is exerted by labor unions.

2. The model

I consider an OLG model, where individual agents live only for two periods: the first period t represents the present and the second $t + 1$ represents the future. At time t there are two generations coexisting together: the young and the old. I assume that the generation of the old was born old and had no youth. Furthermore, the generation of the young does not have any progeny. As a consequence, the world ends at time $t + 1$. Generations are unlinked, meaning that there is no possibility to leave any bequests. Individuals consume all the available income earned at a given period of time; thus, it is not possible neither to save nor to borrow money.

Then, let a population of size equal to one be partitioned into two discrete groups of workers, the young and the old, each of them endowed with a unity of labor time. Thus, the space of groups is $G = \{Y, O\}$, where Y denotes the group of young workers and O the group of old workers. I will use index I to denote a social group, capital letters to indicate the group and small letters to indicate single individuals belonging to the I-th group. The two groups have different size. That is: $n^o \neq n^y$ where n^I denotes the size of group I. The size of a group does not change over time.

Each worker has to decide how to divide his time between work and leisure, denoted by l. I assume also that leisure can be employed to attend several activities, such as relaxing, taking care of family, participating in political activities and many others. Thus, the leisure can be seen as a vector of N activities $\vec{l} = l(l_1, l_2, ..., l_N)$, where $l_n \geq 0$.

Furthermore, I introduce one of the core assumptions of the model. I assume that the old and the young are identical in every respect except one: the intrinsic value of the old workers for leisure is assumed to be greater than the same value of the young workers. That is, $\psi^o >> \psi^y$, where Greek letter *psi* denotes the intrinsic value for leisure. Thus, the two social groups have different preferences with respect to the choice between work and leisure. This assumption is also supported by the empirical evidence. In fact, the economic science has produced many works which provide possible explanations to the existence of a difference in preferences. Moreover, over the last years, other social sciences like Sociology and Psychology added some very useful contributions. This is why I distinguish the economic reasons from the non-economic reasons.

The economic reasons are summarized in the work by Mulligan and Salai-Martin [1999].

Differences in Labor Productivity. Since the labor productivity is declining in age, the old are less productive than the young and, as a consequence, they earn a lower wage. This theory would explain the willingness by the old to retire: less productive workers in the labor market find it profitable to devote relatively more of their time and effort to the political sector as to gain monetary transfers that they would not get if they relied on labor market. Nevertheless, for the theory to hold it is important to assume that leisure time devoted to political activities is a normal good. That is, an increase in the total leisure time provokes an increase in leisure time devoted to political activities, due to the income effect.

Differences in Human Capital Accumulation. The young are more engaged in self-financed human capital accumulation while they work than the old. As a consequence, the value of time for the young may be higher than their average hourly wage (see Stafford and Duncan [1985]).

Long-term employment contracts. The empirical evidence shows that due to the Lazear-type contracts, labor productivity for workers aged 60+ is significantly lower than wages.

As for the non-economic reasons, I refer to a work by Hershey, Henkens and Van Dalen [2006]. In comparing the Dutch with the U.S. Social Security System, the authors discovered that

> **the Americans had significantly longer future time perspectives, higher level of retirement goal clarity and they tended to be more engaged in retirement planning activities.**

Thus, these findings are able to explain the existence of socio-cultural differences in the preferences for retirement. They go on affirming that

> **American workers think, prepare and save more for retirement… beginning in early adulthood,**

focalizing on the difference among societies, where there exists a major difference in financial responsibility, different level of uncertainty for future pension payouts and different psychological pressures. Finally, in concluding that the success of political initiatives depends in part on

changing the dimensions of the psyche that motivate individuals to adaptively prepare for old age,

they implicitly recognize that the preferences of individuals for leisure may endogenously change over time, again due to cultural and psychological factors.

Finally, I assume that each worker has a personal ideological bias for political candidates, and this ideological difference generates heterogeneity among groups. The ideological bias is exogenously given.

Old workers' preferences can be represented by a quasi-linear utility function[1]. A representative young worker at time t has the following lifetime utility function:

$$U^o = c_t^o + \psi^o \log l_t^o \quad \forall o \in O \tag{1}$$

where c_t^o is the consumption at time t, l_t^o is the leisure at time t and ψ^o is a parameter representing the intrinsic preference of the old worker for leisure ($\psi^o \in [0, 1]$). The old worker consumes all his income:

$$c_t^o = w_t^o\left(1-\tau_{Lt}^o\right)\left(1-l_t^o\right)+b_t^o+r\left(S_t^o\right) \tag{2}$$

where w_t^o is the unitary wage per hour worked, τ_t^o is the tax rate on labor income, b_t^o is an intergenerational transfer and $r\left(S_t^o\right)$ represents the return which the old worker gains at the end of time t over an amount of money he accumulated. I assume that the intergenerational transfer is represented by a typical pay-as-you-go pension program, whilst $r\left(S_t^o\right)$ represents a quote of a mutual fund. The last day of work, the old workers withdraw the amount of money invested. Without loss of generality, I assume that the same day, the individual consumes all this amount of money and dies. Similarly, the preferences of a representative young worker y are given by the following lifetime utility function:

$$U^y = c_t^y + \psi^y \log l_t^y + \varphi^y \log l_t^o + \beta^y\left(c_{t+1}^y + \psi^y \log l_{t+1}^y\right) \quad \forall y \in Y \tag{3}$$

where c_t^y and c_{t+1}^y represent the consumption at time t and $t + 1$, l_t^y and l_{t+1}^y the leisure at time t and $t + 1$, β^y is the time preference discount factor of the young worker, ψ^y is the intrinsic preference of the young worker for leisure ($\psi^y \in [0, 1]$) and φ^y represents the intrinsic preference of the young for the leisure of the old ($\varphi^y \in [0, 1]$). Thus, the leisure of the old represents a positive externality for the young. This latest assumption is reinforced by the existence of social beliefs which consider the leisure of the old as a merit good. In

[1] A quasi-linear utility function entails the non existence of the income effect.

modern societies, individuals believe that the old deserve to retire after having spent an entire life to work. Furthermore, retired grandparents often provide their sons with a true help in the children babysitting, in carrying on some useful activities in sons' place, such as house cleaning, payment of bills and so on. Finally, the intrinsic value of leisure for the old worker is assumed to be strictly greater than the intrinsic value for the young: $\psi^o >> \psi^y$. Since the young know that at time $t + 1$ will be old, their utility function includes the leisure of the next period, weighted by a discount factor $\beta^y \in [0, 1]$. The young worker's inter temporal budget constraint is given by:

$$\begin{aligned} c_t^y + \beta^y c_{t+1}^y &= w_t^y\left(1-\tau_{Lt}^y\right)\left(1-l_t^y\right)+b_t^y + \\ &+r\left(S_t^y\right)+\beta^y\left(w_{t+1}^y\left(1-l_{t+1}^y\right)\left(1-\tau_{Lt+1}^y\right)+r\left(S_{t+1}^y\right)\right) \end{aligned} \tag{4}$$

Note that the young worker's budget constraint does not contain the term which refers to the intergenerational transfer at time $t + 1$, b_{t+1}^y since at period $t + 1$ there exists only generation Y and, by definition, it cannot exist any intergenerational transfer. Furthermore, I introduce the following budget constraints:

$$r\left(S_t^o\right) = T_t^o \tag{5}$$

$$r\left(S_t^y\right) = T_t^y \tag{6}$$

$$r\left(S_{t+1}^y\right) = T_{t+1}^y \tag{7}$$

$$\begin{gathered} n^o b_t^o + n^y b_t^y + \alpha\left|n^o b_t^o\right|\left|n^y b_t^y\right| = 0 \\ \left(b_t^o\right)\left(b_t^y\right) < 0 \end{gathered} \tag{8}$$

Since revenues are proportional to the amount of labor supplied, the taxation entails inefficiencies, since it distorts workers' decisions on the amount of labor supplied and determines the quota of pre-funded savings. T_t^o represents total revenues generated by the taxation of the old at time t and it is equal to $n^o \tau_{Lt}^o w_t^o\left(1-l_t^o\right)$ while T_t^y represents the total revenues generated by the taxation of the young at time $t+1$ and it is equal to $n^y \tau_{Lt+1}^y w_t^y\left(1-l_{t+1}^y\right)$. The condition $n^o b_t^o + n^y b_t^y + \alpha\left|n^o b_t^o\right|\left|n^y b_t^y\right| = 0$ assures that an intergenerational transfer exists, while the condition $\left(b_t^o\right)\left(b_t^y\right) < 0$ shows that the situation where both generations either get a positive transfer or suffer of a negative transfer is impossible to achieve. In other words, if one generation obtains a positive transfer, the other one has to finance for it. The term $\alpha\left|n^o b_t^o\right|\left|n^y b_t^y\right|$ represents an efficiency loss which takes place via a redistribution process and can be measured by the amount of resources wasted during this process. For instance, one may think that this loss is due to the existence of bureaucracy costs or to rent grabbed by politicians. The parameter $\alpha \in [0, 1]$ represents the measure of the loss which is quadratic in the transfers. To avoid the case in which a difference in wage levels is the solely responsible for the existence of retirement I impose that wages are exogenously determined $w_t^o = w_t^y = w_{t+1}^y = w$. Furthermore, without loss of generality, I normalize the wage rate to the unity.

2.1. The Government

The literature has used different formulations for the Government's objective function. A typical normative approach considers a benevolent Government which aims to maximize a Social Utility Function by choosing the optimal tax rate on labor, subject to a budget constraint where tax revenues are equal to public good expenditures. Otherwise, some authors such as Edwards and Keen consider a Leviathan model where, referring to the famous milestone paper by Brennan and Buchanan [1980], they examine a Government which is concerned in part with maximizing the size of the public sector. Furthermore, the Edwards and Keen model assumes that the Government retains some degree of benevolence, perhaps because it has re-election concerns. Nevertheless, these concerns were not formally modeled. In this paper, I provide a possible explanation to this issue, introducing a political economy model where politicians act in order to maximize the probability of being re-elected. A public policy vector is given by $\vec{q} = (\tau_{Lt}^o, \tau_{Lt}^y, b_t^o, b_t^y)$, composed of two tax rates and two intergenerational transfers. Finally, the Government is committed to clear the budget constraint; this means that it cannot transfer more resources than those collected by taxing individuals at every period of time. Thus, I assume that the Budget Surplus (Deficit) must be equal to zero. Since the Government cannot issue bonds to collect more financial resources and can only rely on taxation, the increase in a social group's welfare entails the decrease in the welfare of the other social group, since the latter has to pay for the transfer.

2.2 A three-stage game

I consider a three-stage game where two candidates, say A and B, wish to maximize their number of votes to win elections[2]. Both of them have an ideological label (for instance they are seen as "Democrats" or "Republicans"). I assume that this label is exogenously given. In the first stage of the game, the two candidates, simultaneously and independently, announce a policy vector, $\vec{q}^A$ and $\vec{q}^B$; at this stage, they know the voters' policy preferences and also know their distributions, but not their realized values. Each voter in group I votes for candidate A if and only if the candidate A's policy vector provides him with a greater utility than that provided by the candidate B's policy vector. That is:

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[2] Lindbeck and Weibull [1987] and Dixit and Londregan [1996] demonstrated that the Nash equilibrium obtained if candidates maximize their vote share is identical to that obtained when candidates maximize their probability of winning.

$$V^i(\vec{q}^A)+\zeta+\xi^i>V^i(\vec{q}^B) \tag{9}$$

where the term ζ reflects the candidate A's general popularity among the electorate. It is not idiosyncratic and it is uniformly distributed on the interval $\left(-\frac{1}{2h},\frac{1}{2h}\right)$ with mean zero and density h. Otherwise, the term ξ^i represents an idiosyncratic component of voter's preferences for candidate A and I assume that voters are uniformly distributed on $\left(-\frac{1}{2s^I},\frac{1}{2s^I}\right)$, again with mean zero and density s^I. The assumption that voters care not only about transfers but also have unobserved exogenous preferences for one candidate assure the existence of a Nash equilibrium to the electoral-competition in a multi--dimensional model, according to Lindback & Weibull [1987] and Dixit & Londregan [1994]. In fact, the social choice theory states a negative result when affirms that any division of resources among cohorts can be beaten in a pairwise vote by some other division. The existence of preferences with respect to policies over which the parties cannot easily change position from election to election, or evaluations of the parties with respect to characteristics such as honesty and leadership which are valued by all voters (the so called valence issues) rules out the non-existence of an equilibrium. In each social group there are some swing voters, who are those individuals that do not have any particular preference for one of the two candidates. This category of voters is fundamental to evaluate the effect of a change in the equilibrium policy vector. In fact, suppose to start from a situation of equilibrium, where the candidate A's policy, $\vec{q}^A$ is exactly equal to the candidate B's policy, $\vec{q}^B$; a candidate knows that, should it deviate from that policy some swing voters will be better off whilst some other will be worse off. Thus, in choosing a policy, a candidate should calculate the number of swing voters which he would gain and compare it with the number of swing voters he would lose; intuitively, a change in a policy should be made if and only if a candidate evaluates that the number of swing voters gained is greater than the number of swing voters lost. Swing voters in group I are identified with the following expression:

$$\xi^i=V^i(\vec{q}^B)-V^i(\vec{q}^A)-\zeta \tag{10}$$

This expression affirms that a swing voter is indifferent between candidate A and candidate B; otherwise, all the voters with $\xi^{jI}<x^I$ vote for candidate B and all the voters with $\xi^{jI}>\xi^I$ vote for candidate A. I indicate the share of votes of candidate A in group I with:

$$\pi^A=\sum_I n^I s^I\left|\xi^i+\frac{1}{2s^I}\right| \tag{11}$$

and substituting (10) into (11) I obtain:

$$\pi^A=\sum_I n^I s^I\left[V^i(\vec{q}^B)-V^i(\vec{q}^A)-\zeta\right]+\frac{1}{2} \tag{12}$$

Note that π^A is a random variable since it depends on ζ which is also a random variable. Thus, the candidate A's probability of winning is:

$$\Pr^A = \Pr\left[\pi^A \geq \frac{1}{2}\right] = \Pr\left[\sum_I n^I s^I \left[V^i(\vec{q}^B) - V^i(\vec{q}^A) - \zeta\right] + \frac{1}{2} \geq \frac{1}{2}\right]$$

and rearranging the terms I obtain:

$$\Pr^A = \Pr\left[\pi^A \geq \frac{1}{2}\right] = \Pr\left[\sum_I n^I s^I \left[V^i(\vec{q}^B) - V^i(\vec{q}^A)\right] \geq \sum_I n^I s^I \zeta\right]$$

Candidate B wins with probability $\Pr^B = 1 - \Pr^A$. In this model, the probability of winning is thus a function of the distance between the two electoral platforms. In the second stage of the game elections take place. A candidate wins elections if and only if it obtains the majority of votes; in the case of a tie a coin is tossed as to choose the Government which will come to power. Furthermore, I assume that each party prefers to stay out from the competition than to enter and lose, that prefers to tie than stay out and it prefers to win than to tie. Another core assumption of the model affirms that the density of a social group is endogenously determined and it is a function of the amount of leisure devoted to political activities. In other words, the higher the leisure time spent in political activities by a social group, the higher the power of influence of that group on politicians and the higher the probability of being successful. Describing more in details the basic elements of the workers' decision problem, I assume that the leisure is a vector $\vec{l}$ of N activities which can be undertaken in the spare time (indexed by $n = 1, \ldots, N$). The consumption set is given by: $L = l \in \Re^N_+ : l_n \geq 0$ for $n = 1, \ldots, N$ where L is a convex set. Formally, I also assume that undertaking each activity entails a cost, represented by the price vector $\vec{p} = [p_1 \ldots p_N]' \in \Re^N_+$. Furthermore, the Walrasian or competitive budget set is given by $B_{p,l} = l \in \Re^N : \vec{p} \bullet \vec{l} \leq l$. Thus the endogenous density function may be written as $\vec{s} = s(\vec{l}(l_1, l_2, \ldots, l_N))$. Assuming that the political activity l_n is a normal good at (p, l) entails that $\frac{\partial l(l_1, \ldots, l_N)}{\partial l_n} > 0$. Figure 1 shows the wealth expansion path for p.

Furthermore, since the leisure vector directly enter into the density function, it can be seen that:

$$\frac{\partial s^I(l(l_1, l_2, \ldots, l_N))}{\partial l(l_1, l_2, \ldots, l_N)} \frac{\partial l(l_1, l_2, \ldots, l_N)}{\partial l_N} > 0 \tag{13}$$

Equation (13) says that the density function is monotonically increasing in leisure devoted to political activities. By the meaning of the chain rule we can divide the expression in two terms. The first term $\frac{\partial l(l_1, l_2, \ldots, l_N)}{\partial l_N}$ represents the effect of an increase in leisure devoted to political activities on total leisure time and it is positive. Otherwise, the term $\frac{\partial s^I(l(l_1, l_2, \ldots, l_N))}{\partial l(l_1, l_2, \ldots, l_N)}$ represents the effect of an increase in total leisure on the density function, which represents an indicator for the cohesion and the political power of a group. This term is positive, since an increase in time devoted to political activities is likely to increase the power of influence of a group. In this view leisure spent by individuals in political activities can be seen as an investment in time, whose return is represented by the monetary transfer they get from politicians. The size of the transfer is an increasing function of groups' density. Thus, I define the transfer b as a function $b = b(s^y, s^o)$, with $b' > 0$ and $b'' < 0$. Finally, I assume that if groups' density is the same no transfer occurs; that is $s^y = s^o = d^*$ implies that $b(d^*, d^*) = 0$. In this case, the two groups have the same political power. Summarizing, the endogenous density may be seen as a measure of the group's single mindedness; the higher the density of the group, the higher the single mindedness. This assumption would explain why those issues (or preferences) that are more commonly shared by individuals are politically more successful. Thus, I conclude that for the single mindedness theory to hold some requirements must hold:

- the existence of individuals with similar preferences toward one or more issues;
- the existence of institutions such as lobbies, labor unions or whatever, where individuals who share similar preferences can unite to increase their political power and influence politicians;
- the realization that, eventually, social groups which are able to focus on the smallest number of issues are more likely to get what they require and thus to shape Social Security Systems.

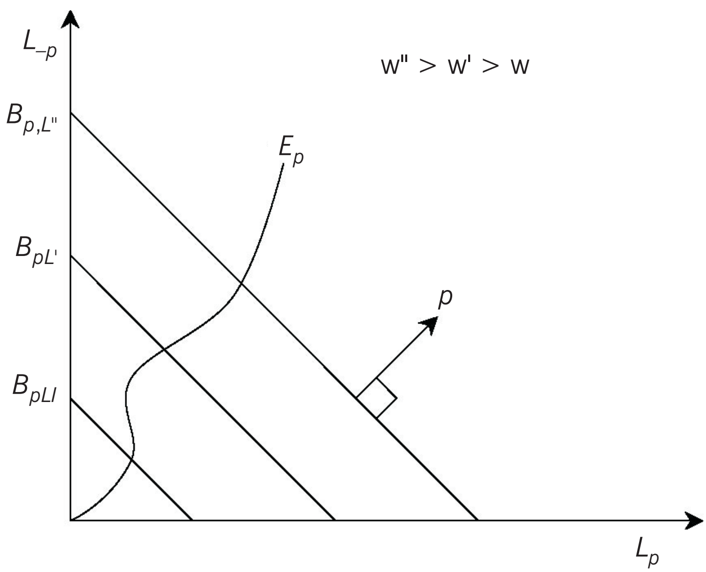

Figure 1.

The wealth expansion path

L_p = hours of leisure spent in political activities L_{-p} = hours of leisure spent in other activities
E_p = Engel's curve

Finally, in the third stage of the game, workers choose their work and leisure level, given the marginal tax rates and transfers chosen by the Government.

2.3. The equilibrium

I solve the game by backward induction, starting from the final stage. A representative old worker solves the following optimization problem:

$$\max U^o = c_t^o + \psi^o \log l_t^o$$
$$s.t.\ c_t^o = \left(1-\tau_{Lt}^o\right)\left(1-l_t^o\right) + b_t^o + r\left(S_t^o\right)$$

Solving with respect to l_t^o I obtain an expression for the optimal labor supply:

$$l_t^{o*} = \frac{\psi^o}{\left(1-\tau_{Lt}^o\right)} \tag{14}$$

and substituting into (1) I obtain an expression for the Indirect Utility Function:

$$V^o = \left(1-\tau_{Lt}^o\right) - \psi^o + b_t^o + r\left(S_t^o\right) + \psi^o \log \psi^o - \psi^o \log\left(1-\tau_{Lt}^o\right) \tag{15}$$

I do the same for the representative young worker:

$$\max U^y = c_t^y + \psi^y \log l_t^y + \varphi^y \log l_t^o + \beta^y\left(c_{t+1}^y + \psi^y \log l_{t+1}^y\right) \tag{16}$$
$$s.t.\ c_t^y + \beta^y c_{t+1}^y = \left(1-\tau_{Lt}^y\right)\left(1-l_t^y\right) + b_t^{ly} + r\left(S_t^y\right) + \beta^y\left(\left(1-l_{t+1}^y\right)\left(1-\tau_{Lt+1}^y\right) + r\left(S_{t+1}^y\right)\right)$$
$$l_t^{y*} = \frac{\psi^y}{\left(1-\tau_{Lt}^y\right)}$$

$$V^y = \left(1-\tau_{Lt}^y\right) - \psi^y + b_t^y + r\left(S_t^y\right) + \psi^y \log \psi^y - \psi^y \log\left(1-\tau_{Lt}^y\right) + \varphi^y \log \psi^o -$$
$$-\varphi^y \log\left(1-\tau_{Lt}^y\right) + \beta^y\left(1-\psi^y\right)\left(1-\tau_{Lt+1}^y\right) + \beta^y \psi^y\left(\log \psi^y + \beta^y r\left(S_{t+1}^y\right)\right) \tag{17}$$

2.4. Deriving a formula for the optimal labor taxation

In the second stage of the game elections take place. It is easy to verify that the elections' outcome is a tie. The proof arises from the resolution of the first stage, where it will be demonstrated that in equilibrium, both parties choose an identical policy vector. In the first stage, the two candidates choose their policy vectors. They face exactly the same optimization problem and maximize their share of votes or, equivalently, the probability of winning. The resolution is made for candidate A, but it also holds for candidate B.

$$\max \pi^A = \frac{1}{2} + \sum_{I=\{o,\,y\}} n^I s^I\left[V^i\left(\vec{q}^A\right) - V^i\left(\vec{q}^b\right)\right]$$
$$s.t.\ T_1 \equiv r\left(S_t^o\right) = T_t^o$$

$$T_2 \equiv r\left(S_t^y\right) = T_t^y$$

$$T_3 \equiv r\left(S_{t+1}^y\right) = T_{t+1}^y$$

$$T_4 \equiv n^o b_t^o + n^y b_t^y + \alpha \left| n^o b_t^o \right| \left| n^y b_t^y \right| = 0$$

$$T_5 \equiv b_t^o b_t^y < 0$$

In Appendix 1 I provide a complete resolution to the problem.

Proposition 1. In equilibrium both candidates' policy vectors converge to the same platform; that is $\vec{q}^A = \vec{q}^B = \vec{q}^*$.

Proof: $\vec{q}^*$ represents the policy which captures the highest number of swing voters. Suppose instead there exists other two policies $\vec{q}'$ and $\vec{q}''$; in moving from $\vec{q}^*$ to $\vec{q}'$ (or $\vec{q}''$) a candidate loses more swing voters than those he/she is able to gain. Thus, suppose a starting point where candidate A chooses $\vec{q}'$ and candidate B chooses $\vec{q}''$ such that by choosing $\vec{q}'$ and $\vec{q}''$ the elections outcome is a tie. If one candidate moved toward $\vec{q}^*$, he/she would be able to gain more swing voters than those he/she loses and thus, he/she would win the elections. So, choosing any policy but $\vec{q}^*$ cannot be an optimal answer. The only policy which represents a Nash Equilibrium is $\vec{q}^*$ since it is the intersection between the optimal answers of the two candidates and no candidate has an incentive to deviate. Since each candidate maximizes his/her share of votes, in equilibrium the two candidates receive both one half of votes; if one candidate should receive less than one half of votes he/she would always have the possibility to adopt the platform chosen by the other candidate and get the same number of votes.

Corollary 1: The utility levels reached by workers are the same; that is: $V^{iA} = V^{iB}$

Proposition 2. The marginal tax rate on labor is positive for the old and equal to zero for the young workers. That is, the young workers are taxed less than the old workers.
Proof: From the First Order Conditions (see Appendix), we obtain $\frac{n^y s^y \varphi^o}{1-r_{Lt}^o} = \frac{n^o s^o \tau_{Lt}^o \psi^o}{\left(1-r_{Lt}^o\right)^2}$ and finally we get an expression for the optimal marginal tax rate of the old:

$$\tau_{Lt}^{o*} = \frac{1}{1+m} \tag{18}$$

with $m = \frac{n^o s^o \psi^o}{n^y s^y \varphi^o}$. The same for the optimal marginal tax rate of the young:

$$n^y s^y \left(-\frac{\tau_{Lt}^y \psi^y}{\left(1-\tau_{Lt}^y\right)^2} \right) = 0$$

which gives a marginal tax rate equal to zero

$$\tau_{Lt}^{y*} = 0 \qquad (19)$$

Equations (18) and (19) represent the structure of the optimal taxation in a political economy framework with social groups characterized by the presence of swing voters. Furthermore, the comparative statics shows that $\frac{\partial \tau_{Lt}^o}{\partial n^o} < 0$, $\frac{\partial \tau_{Lt}^o}{\partial s^o} < 0$, $\frac{\partial \tau_{Lt}^o}{\partial n^y} > 0$, $\frac{\partial \tau_{Lt}^o}{\partial s^y} > 0$, $\frac{\partial \tau_{Lt}^o}{\partial \varphi^o} < 0$. Thus, the political economy framework suggests that tax rates should be differentiate. Equations (18) and (19) tell us that social groups in society must be taxed with different tax rates. But unlike a typical normative approach, it also suggests that tax rates should be lower for those social groups which are more numerous, in turn, for those social groups who have the highest ability to drive the elections outcome. Indeed, if the normative approach suggests that in an ideal world Governments should tax less the poorest social groups, the political economy approach suggests that in a real world Governments tax less social groups which are more able to threat politicians in the electoral competition. Note that the result showing that the old are taxed heavier than the young is interesting. Usually, one may think that individuals who hold the greater power in society should be able to be taxed with lower marginal rates. Instead, this result is completely in syntony with the single mindedness theory. Why should the old accept higher marginal tax rates if they have more political power? The answer is twofold. First of all, a high tax rate entails a greater pre-funded savings for the old. Otherwise, the pre-funded savings for the young is equal to zero, since the marginal tax rate is also equal to zero. This is perfectly rational; the young prefer to spend their labor income and thus are more prone to accept lower tax rate, while the old attribute more importance to the pension transfers, since they will represent the only income once they retire. Secondly, by assumption, the old attach a higher weight to leisure than the young; thus, higher tax rates forces them to anticipate retirement and enjoy leisure. An important conclusion I suggest is that more single mindedness drives higher tax rates. The explanation is very subtle and stands in the following terms. The old know that once retired their only income source is represented by pension transfers. They also know that to force the Government to increase their pensions, they have to spend a fraction of their leisure in political activities. At this point, a free-riding problem arises. If no one incentive existed, nobody would voluntary retire to promote political initiatives, whose benefit would be shared among all the members of the group. Thus, an incentive is necessary as to force the old to retire and this is represented by keeping marginal tax rates high so that the individual are discouraged to work and prefer to leave the labor force. Then, I conclude that the old accept higher tax rates as a system to solve a free-riding problem among the members of the group.

Proposition 3. The old offer a lower supply of labor than the young due to the difference between l_t^o and l_t^y.

Proof: Since $\tau_{Lt}^o > \tau_{Lt}^y = 0$, and $\psi^o >> \xi^y$ by hypothesis, then $l_t^{o*} = \frac{\psi^o}{(1-\tau_{Lt}^o)} > l_t^{y*} = \psi^y$.

Corollary 2. The old workers are more single minded than the young ($s^o > s^y$).

Proof: Since $\tau_{Lt}^o > \tau_{Lt}^y = 0$ and $\psi^o >> \psi^y$ then $l_t^{o*} > l_t^{y*}$. Since s is a positive function of l, then $s^o = s(l_t^o) > s^y = s(l_t^y)$.

Proposition 4. There exist Social Security transfers from the young to the old. That is: $b_t^o > 0$ and $b_t^y < 0$.

Proof: From the first order conditions with respect to b_t^o and b_t^y, it follows that $\frac{s^o}{s^y} = \frac{1-\alpha n^y b_t^y}{1-\alpha n^o b_t^o}$. From Corollary 2, $s^o = s(l_t^o) > s^{ly} = s(l_t^y)$ it must be $1-\alpha^l n^y b_t^y >$ $> 1-\alpha^l n^o b_t^o$ for the workers. Since $\alpha^l n^o b_t^o > 1-\alpha n^y b_t^y$, under conditions $b_t^o b_t^y < 0$, and α, n^o, n^y it must be $b_t^o > 0$ and $b_t^y < 0$. The equilibrium levels of the transfers between the young and the old are the following:

$$b_t^y = \frac{1-\sqrt{\frac{s^o}{s^y}}}{\alpha n^y} \tag{20}$$

$$b_t^o = \frac{1-\sqrt{\frac{s^y}{s^o}}}{\alpha n^o} \tag{21}$$

$$b_{t+1}^y = 0 \tag{22}$$

Given the budget constraint: $n^o b_t^o = \frac{-n^y b_t^y}{1-\alpha n^y b_t^y}$ taking into account the equilibrium conditions $\frac{s^o}{s^y} = \frac{1-\alpha n^y b_t^y}{1-\alpha n^o b_t^o}$, it is

$$\frac{s^o}{s^y} = \frac{1-\alpha n^y b_t^y}{\alpha n^y \frac{b_t^y}{1-\alpha n^y b_t^y}+1} = \left(1-\alpha n^y b_t^y\right)^2$$

Solving with respect to b_t^y and b_t^o we obtain the optimal values. Furthermore, since at time $t + 1$ only the young generation exists, there does not exist any intergenerational transfer, by definition. Note that when densities of both groups are the same, transfers are equal to zero; that is if $s^o = s^y$, then $b^o = b^y = 0$.

Proposition 5. A transfer in the I-th group decreases with an increase in the amount of resources distorted by government and with an increase in the density of the other group, whilst it increases with an increase in the density of his own group.

Proof: Calculating total differentials, we obtain $\frac{\partial b_t^I}{\partial \alpha}<0$, $\frac{\partial b_t^I}{\partial s^I}>0$, $\frac{\partial b_t^I}{\partial s^{-I}}<0$. Proposition 5 supports the single-mindedness theory: the higher the homogeneity among a group, the higher the power of influence of that group on the Government and the higher the transfer that the group gets.

Proposition 6. The optimal Lagrange multiplier assumes the following value:

$$\lambda^* = \sqrt{s^o s^y} \tag{23}$$

Proof: $\lambda = \frac{n^o s^o}{n^o - n^o n^y \alpha b_t^y} = \frac{s^o}{1-n^y \alpha b_t^y} = \frac{s^y}{1-n^o \alpha b_t^o}$; substituting the optimal intergenerational transfers value we obtain: λ^*. The Lagrange multiplier represents the increase in the probability of winning for a candidate, if he/she had an additional dollar available to spend on redistribution.

3. Conclusions

I introduced a political economy model which analysis the optimal taxation problem when candidates are supposed to be voter seekers which aim to maximize the probability to win elections in a society characterized by different social groups. I derived the optimal taxation structure in a framework characterized by overlapping generations; I demonstrated that the optimal taxation on labor depends on the numerosity, density and single mindedness of groups. Furthermore the old receive a net transfer from the young. I suggested also a counter-intuitive result: the marginal tax rate levied on the old is higher than that levied on the young, which is equal to zero. Although this result is surprising, I demonstrated that it is perfectly rational in a political economy model based on the single mindedness theory: the old group force candidates to elevate their marginal tax rates because they recognize that this is a system which enables them to solve a free-riding problem between members of the group, who are forced to leave the labor market and to start the lobbying activity once they retire. Finally, I demonstrated that this surprising result actually holds also in reality; the U.S. situation shows that the retirement age has increasingly reduced over the last decades; furthermore, the implicit marginal tax rate on labor was evaluated to be very high especially for the old and low-wage workers. Nevertheless, studies on the application of the single mindedness theory to the labor market are at the very beginning and they open new interesting fields of research. This model is far from being able to explain the relationship between social groups' behavior and labor market characteristics. For instance, it would be interesting to analyze more in detail the role of institutions, such as labor unions or associations of retirees in the political outcome; another field of research could study the conflicts among unions and employers endogenizing the bargaining power of the two social groups according to the single mindedness theory's assumptions. Finally, this model does not take into account any issue which refers to savings; it would be useful to analyze the effect of savings in different pensions schemes, such as the PAYG or the Fully-Funded systems. I hope that these issues could be analyzed in future works.

4. Appendix 1

In this Appendix I provide a complete resolution to the candidates' problem. The two candidates face exactly the same optimization problem; they maximize their share of votes or, equivalently, the probability of winning. The resolution is made for candidate A, but it also holds for candidate B.

$$\max \pi^A = \frac{1}{2} + \sum_{I=\{o,\ y\}} n^I s^I \left[V^i(\vec{q}^A) - V^i(\vec{q}^B) \right]$$

$$s.t.\ T_1 \equiv r\left(S_t^o\right) = T_t^o$$

$$T_2 \equiv r\left(S_t^y\right) = T_t^y$$

$$T_3 \equiv r\left(S_{t+1}^y\right) = T_{t+1}^y$$

$$T_4 \equiv n^o b_t^o + n^y b_t^y + \alpha \left| n^o b_t^o \right| \left| n^y b_t^y \right| = 0$$

$$T_5 \equiv b_t^o b_t^y < 0$$

where: $s^I = s^I\ (l(\tau_{Lt},\ w))$.

I substitute T_1, T_2 and T_3 into the IUF of individuals and I write the Lagrangian function:

$$L = \frac{1}{2} + \sum_{I=\{o,\ y\}} n^i s^i \left[V^i(\vec{q}^A) - V^i(\vec{q}^B) \right] + \lambda(T_4)$$

I obtain the following first order conditions:

$$\frac{\partial L}{\partial \tau_{Lt}^o} \equiv n^o \frac{\partial s^0}{\partial L} \frac{\partial L}{\partial \tau_{Lt}^o} \left(V^{oA} - V^{oB}\right) + n^o s^o \left(\frac{\partial V^o}{\partial \tau_{Lt}^o}\right) + n^y s^y \left(\frac{\partial V^y}{\partial \tau_{Lt}^o}\right) = 0 \tag{1}$$

$$\frac{\partial L}{\partial \tau_{Lt}^y} \equiv n^y \frac{\partial s^y}{\partial L} \frac{\partial L}{\partial \tau_{Lt}^y} \left(V^{yA} - V^{yB}\right) + n^y s^y \left(\frac{\partial V^y}{\partial \tau_{Lt}^y}\right) = 0 \tag{2}$$

$$\frac{\partial L}{\partial b_t^o} \equiv n^o s^o = \lambda\left(n^o - n^o n^y \alpha b_t^y\right) \tag{3}$$

$$\frac{\partial L}{\partial b_t^o} \equiv n^y s^y = \lambda\left(n^y - n^y n^o \alpha b_t^o\right) \tag{4}$$

$\lambda \geq 0$

According to the result stated in Corollary 1, FOC's can be re-written in the following manner:

$$\frac{\partial L}{\partial \tau_{Lt}^{o}} \equiv n^{o} s^{o}\left(\frac{\partial V^{o}}{\partial \tau_{Lt}^{o}}\right) + n^{y} s^{y}\left(\frac{\partial V^{y}}{\partial \tau_{Lt}^{o}}\right) = 0 \quad (1)$$

$$\frac{\partial L}{\partial \tau_{Lt}^{y}} \equiv n^{y} s^{y}\left(\frac{\partial V^{y}}{\partial \tau_{Lt}^{y}}\right) = 0 \quad (2)$$

$$\frac{\partial L}{\partial b_{t}^{o}} \equiv n^{o} s^{o} = \lambda\left(n^{o} - n^{o} n^{y} \alpha b_{t}^{y}\right) \quad (3)$$

$$\frac{\partial L}{\partial b_{t}^{y}} \equiv n^{y} s^{y} = \lambda\left(n^{y} - n^{y} n^{o} \alpha b_{t}^{o}\right) \quad (4)$$

$\lambda \geq 0$

and after some easy calculations, I obtain:

$$\frac{\partial L}{\partial \tau_{Lt}^{o}} \equiv n^{o} s^{o}\left(-1 + \frac{\psi^{o}}{\left(1-\tau_{Lt}^{o}\right)} - \frac{\tau_{Lt}^{o}\psi^{o}}{\left(1-\tau_{Lt}^{o}\right)^{2}} + \left(1 - \frac{\psi^{o}}{\left(1-\tau_{Lt}^{y}\right)}\right)\right) + \frac{n^{y} s^{y} \varphi^{0}}{\left(1-\tau_{Lt}^{y}\right)} = 0 \quad (1)$$

$$\frac{\partial L}{\partial \tau_{Lt}^{y}} \equiv n^{y} s^{y}\left(-1 + \frac{\psi^{y}}{\left(1-\tau_{Lt}^{o}\right)} - \frac{\tau_{Lt}^{y}\psi^{y}}{\left(1-\tau_{Lt}^{y}\right)^{2}} + \left(1 - \frac{\psi^{y}}{\left(1-\tau_{Lt}^{y}\right)}\right)\right) = 0 \quad (2)$$

$$\frac{\partial L}{\partial b_{t}^{o}} \equiv n^{o} s^{o} = \lambda\left(n^{o} - n^{o} n^{y} \alpha b_{t}^{y}\right) \quad (3)$$

$$\frac{\partial L}{\partial b_{t}^{y}} \equiv n^{y} s^{y} = \lambda\left(n^{y} - n^{y} n^{o} \alpha b_{t}^{o}\right) \quad (4)$$

$\lambda \geq 0$

$$\frac{\partial L}{\partial \tau_{Lt}^{o}} \equiv n^{o} s^{o}\left(-\frac{\tau_{Lt}^{o}\psi^{o}}{\left(1-\tau_{Lt}^{o}\right)^{2}}\right) + \frac{n^{y} s^{y} \varphi^{0}}{\left(1-\tau_{Lt}^{o}\right)} = 0 \quad (1)$$

$$\frac{\partial L}{\partial \tau_{Lt}^{y}} \equiv n^{y} s^{y}\left(-\frac{\tau_{Lt}^{y}\psi^{y}}{\left(1-\tau_{Lt}^{y}\right)^{2}}\right) = 0 \quad (2)$$

$$\frac{\partial L}{\partial b_{t}^{o}} \equiv s^{o} = \lambda\left(1 - n^{y} \alpha b_{t}^{y}\right) \quad (3)$$

$$\frac{\partial L}{\partial b_{t}^{y}} \equiv s^{y} = \lambda\left(1 - n^{o} \alpha b_{t}^{o}\right) \quad (4)$$

$\lambda \geq 0$

From FOC (1) we obtain $\frac{n^{y} s^{y} \varphi^{o}}{1-\tau_{Lt}^{o}} = \frac{n^{o} s^{o} \tau_{Lt}^{o} \psi^{o}}{\left(1-\tau_{Lt}^{o}\right)^{2}}$ and finally we get an expression for the optimal marginal tax rate for the old $\tau_{Lt}^{o} = \frac{1}{1+m}$, with $m = \frac{n^{o} s^{o} \psi^{o}}{n^{y} s^{y} \varphi^{o}}$.

From FOC (2) it is easy to verify that the optimal marginal tax rate for the young is equal to zero.

5. Appendix 2

In this Appendix I show that the single mindedness theory assures the existence of a positive transfer from the young workers to the old workers even in the absence of a positive externality in the utility of the young generated by the leisure of the old (i.e. when $\varphi^y = 0$). I write again the first order conditions to the maximization problem of candidates which are not changed:

$$\frac{\partial L}{\partial \tau^o_{Lt}} \equiv n^o \frac{\partial s^0}{\partial L}\frac{\partial L}{\partial \tau^o_{Lt}}\left(V^{oA} - V^{oB}\right) + n^o s^o \left(\frac{\partial V^o}{\partial \tau^o_{Lt}}\right) = 0 \quad (1)$$

$$\frac{\partial L}{\partial \tau^y_{Lt}} \equiv n^y \frac{\partial s^y}{\partial L}\frac{\partial L}{\partial \tau^y_{Lt}}\left(V^{yA} - V^{yB}\right) + n^y s^y \left(\frac{\partial V^y}{\partial \tau^y_{Lt}}\right) = 0 \quad (2)$$

$$\frac{\partial L}{\partial b^o_t} \equiv n^o s^o = \lambda\left(n^o - n^o n^y \alpha b^y_t\right) \quad (3)$$

$$\frac{\partial L}{\partial b^o_t} \equiv n^y s^y = \lambda\left(n^y - n^y n^o \alpha b^o_t\right) \quad (4)$$

$\lambda \geq 0$

According to the result stated in Corollary 1, FOC's can be re-written in the following manner:

$$\frac{\partial L}{\partial \tau^o_{Lt}} \equiv n^o s^o \frac{\partial V^0}{\partial \tau^o_{Lt}} = 0 \quad (1)$$

$$\frac{\partial L}{\partial \tau^y_{Lt}} \equiv n^y s^y \left(\frac{\partial V^y}{\partial \tau^y_{Lt}}\right) = 0 \quad (2)$$

$$\frac{\partial L}{\partial b^o_t} \equiv n^o s^o = \lambda\left(n^o - n^o n^y \alpha b^y_t\right) \quad (3)$$

$$\frac{\partial L}{\partial b^o_t} \equiv n^y s^y = \lambda\left(n^y - n^y n^o \alpha b^o_t\right) \quad (4)$$

$\lambda \geq 0$

and after some easy calculations, I obtain:

$$\frac{\partial L}{\partial \tau^o_{Lt}} \equiv n^o s^o \left(-1 + \frac{\psi^o}{\left(1-\tau^o_{Lt}\right)} - \frac{\tau^o_{Lt}\psi^o}{\left(1-\tau^o_{Lt}\right)^2} + \left(1 - \frac{\psi^o}{\left(1-\tau^o_{Lt}\right)}\right)\right) = 0 \quad (1)$$

$$\frac{\partial L}{\partial \tau^y_{Lt}} \equiv n^y s^y \left(-1 + \frac{\psi^y}{\left(1-\tau^y_{Lt}\right)} - \frac{\tau^y_{Lt}\psi^y}{\left(1-\tau^y_{Lt}\right)^2} + \left(1 - \frac{\psi^y}{\left(1-\tau^y_{Lt}\right)}\right)\right) = 0 \quad (2)$$

$$\frac{\partial L}{\partial b^o_t} \equiv n^o s^o = \lambda\left(n^o - n^o n^y \alpha b^y_t\right) \quad (3)$$

$$\frac{\partial L}{\partial b_t^o} \equiv n^y s^y = \lambda\left(n^y - n^y n^o \alpha b_t^o\right) \tag{4}$$

$\lambda \geq 0$

$$\frac{\partial L}{\partial \tau_{Lt}^o} \equiv n^o s^o \left(-\frac{\tau_{Lt}^o \psi^o}{\left(1-\tau_{Lt}^o\right)^2}\right) = 0 \tag{1}$$

$$\frac{\partial L}{\partial \tau_{Lt}^y} \equiv n^y s^y \left(-\frac{\tau_{Lt}^y \psi^y}{\left(1-\tau_{Lt}^y\right)^2}\right) = 0 \tag{2}$$

$$\frac{\partial L}{\partial b_t^o} \equiv s^o = \lambda\left(1 - n^y \alpha b_t^y\right) \tag{3}$$

$$\frac{\partial L}{\partial b_t^o} \equiv s^y = \lambda\left(1 - n^o \alpha b_t^o\right) \tag{4}$$

$\lambda \geq 0$

It is easy to verify, from FOC's (1) and (2) that both the marginal tax rates are equal to zero. Thus, neither the old nor the young workers invest in pre-funded pension schemes. Nevertheless, even in the absence of distorsive taxation, the leisure of the old is still higher than the leisure of the young, due to the difference in the parameter ψ; again, the older result to be more single minded than the young, and from FOC's (3) and (4) we can easily verify that the intergenerational transfers are exactly the same as before. Indeed, the old receive a positive transfer which is financed by the old. Unlike the previous case, the young do not get any benefit from the leisure of the old. They are worse off while the old are better off. A Pareto improvement is impossible to achieve, since if the Government desires to win elections it cannot reduce the amount of resources from the young to the old; otherwise it would lose swing voters in the group of the old and eventually it would lose the political competition.

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Abstract

The central purpose of this paper is to introduce a new political economy approach which explains the characteristics of Social Security Systems. This approach is based on the Single Mindedness Theory, which assumes that the more single minded groups are able to exert a greater power of influence on Governments and eventually obtain what they ask. Governments are seen as voting-maximizer policy-makers, whose unique goal is winning elections. Using an OLG model and a probabilistic voting approach, I analyze a society divided into two groups, the old and the young, which only differ as for their preferences for leisure. I show that, to win elections, the Government sets the marginal tax rates taking into account the numerosity and the density of groups; eventually, the old receive a positive transfer, whose burden is entirely carried by the young. Furthermore, the more single minded group (the old) is taxed with higher tax rates; this result can be explained by the necessity that the group of the old have to find a way out to solve a free-riding problem among its members. Indeed, higher tax rates induce the old to retire earlier, so that retirees may have more time to participate in political activities and support the old group's goals.