The Single-Mindedness Theory: Micro-foundation and Applications to Social Security Systems

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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 (SMT), 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 analyse a society divided into two groups, the old and the young, which only differ 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 borne 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 old have to find a way out to solve a free-riding problem amongst 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.

JEL Classification: D31, D72, J22, J26

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We work in order to have leisure (Aristotle)

1 Introduction

The stylized facts which refer to the workers' behavior in the U.S. labor market show that the participation to the labor force of the older persons 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 official retirement age. Eventually, this long-term decline associated with an increase in the life expectation has led to a considerable increase in the 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 runs into risk to 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 [15] 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 ([34]) financial incentives embedded into public pensions and other assistance schemes pull old workers into retirement. Nevertheless, the OECD makes a distinction among 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 theory was introduced by Mulligan & Sala-i-Martin [32] who assumed that the old have more needs for leisure

than the young and this necessity would explain why the 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 have a sort of political superpower and that 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 an 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 [35] 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 [12], 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 evaluate by *Fortune* to be the most

influencing lobby of the U.S.. Otherwise, in the European contest, it seems that an analogue power of influence is exerted by labor unions.

The paper is organized as follows: section 2 presents the model; section 3 presents a variant of the basic model represented by an altruistic model where the old generation takes care to the wealth of the young generation; section 4 provides some empirical evidence, section 5 concludes.

2 The basic 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 not a 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 bequest. 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 $\overline{t}$ hours of 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 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 $l = l(l_1, l_2, ..., l_N)$, 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 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 have 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 Sala-i-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 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 [39]).

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 [20]. 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 issues.

Finally, I assume that each worker has a personal ideological bias for one of the two 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[2]. A representative young worker at time t has the following lifetime utility function:

$$U^o = c_t^o + \psi^o \log l_t^o \tag{1}$$

$\forall\ o \in O$

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:

$$c_t^o = w^o(1 - \tau_{Lt}^o)(\bar{t} - l_t^o) + b_t^o + r(S_t^o) \tag{2}$$

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

where w^o is the unitary wage per hour worked, τ^o_{Lt} is the tax rate on labor income, $b^o_t > 0$ is an intergenerational transfer and $r(S^o_t)$ 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 $r(S^o_t)$ 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, we 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:

$$U^y = \ c^y_t + \psi^y \log l^y_t + \varphi^y \log l^o_t + \beta^y (c^y_{t+1} + \psi^y \log l^y_{t+1}) \tag{3}$$

$\forall y \in Y$

where c^y_t and c^y_{t+1} represent the consumption at time t and $t+1$, l^y_t and l^y_{t+1} 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 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 much higher than the intrinsic value for the young: $\psi^o >> \psi^y$. Without loss of generality I assume that $\psi^o > \frac{1}{2}$ and $\psi^y < \frac{1}{2}$ 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:

$$c^y_t + \beta^y c^y_{t+1} = w^y_t (1 - \tau^y_{Lt})(\bar{t} - l^y_t) + b^y_t$$

$$+ r(S^y_t) + \beta^y (w^y_{t+1}(\bar{t} - l^y_{t+1})(1 - \tau^y_{Lt+1}) + r(S^y_{t+1})) \tag{4}$$

Notice that the young worker's budget constraint does not contain the term which refers to the intergenerational transfer at time $t+1$, $b^y_{t+1} > 0$, since at period $t+1$ there exists only generation Y and it cannot exist any intergenerational transfer. Furthermore, I introduce the following budget constraints:

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

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

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

$$n^o b_t^o + n^y b_t^y + \alpha \left| n^o b_t^o \right| \left| n^y b_t^y \right| = 0 \tag{8}$$

$$(b_t^o)(b_t^y) < 0$$

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 $n^o \tau_{Lt}^o w^o(\bar{t} - l_t^o)$ while T_t^y the total revenues generated by the taxation of the young at time t and it is equal to $n^y \tau_{Lt}^y w^y(\bar{t} - l_t^y)$; T_{t+1}^y represents the total revenues generated by the taxation of the young at time $t+1$ and it is equal to $n^y \tau_{Lt+1}^y w^y(\bar{t} - l_{t+1}^y)$. 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 $(b_t^o)(b_t^y) < 0$ 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 result is derived by the assumption that both the transfers must be different from zero; thus, 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 burocracy 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: $w_t^o = w_t^y = w$. Furthermore, without loss of generality, I normalize the wage rate to the unity.

2.1 The Government

The literature has used different formulation 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 considers a Leviathan model where, referring to the famous milestone paper by Brennan and Buchanan [5], 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, this 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 [3]. 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 $\vec{q}^{B}$. As in Lindbeck and Weibull the component of every voter's welfare depends on fiscal policies chosen by candidates which affect his consumption and which is known by both parties, whilst the other component of welfare, which derives from personal attributes of the candidates, is only imperfectly observed by the parties. In other words, we are assuming that consumers' preferences for consumption are perfectly visible, whilst other political aspects such as ideology are not. The presence of uncertainty is fundamental for existence of an equilibrium, since in the absence of this assumption, the candidates would be able to perfectly observe workers' preferences and then we would have a discontinuous function. In this case, no equilibrium would exist, for any policy suggested by a candidate would be beaten by another policy. Indeed, suppose that Overall preferences of voter $i \in I$ may be written as:

$$U^{i} = V^{i}(\vec{q}) + \pi_A(\xi^{i} + \zeta)$$

[3] 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

where $\pi_A = 1$ if candidate A wins the elections and $\pi_A = 0$ if he loses. The term ζ reflects the candidate A's general popularity amongst the electorate. It is not idiosyncratic and it is uniformly distributed on the interval $(-\frac{1}{2h}, \frac{1}{2h})$ with mean zero and density h. Hence, the voter's choice is deterministic, and it is a discontinuous function of the utility differential between the two party vector of policies. Otherwise, the term ξ^i represents an idiosyncratic component of voter's preferences for candidate A and, assuming that it cannot be exactly observed by parties and that voters are uniformly distributed on $(-\frac{1}{2s^I}, \frac{1}{2s^I})$, again with mean zero and density s^I. Thus, 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:

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

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 Lindbeck & Weibull [27] and Dixit & Londregan [13]. 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 $\xi^{jI} < \xi^I$ 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:

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

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

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

where $s \equiv n^I s^I$. Notice 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:

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

and rearranging the terms I obtain:

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

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.

Definition 1 *A pair (q^{A*}, q^{B*}) is called a (pure strategy) Nash equilibrium (NE) in the expected-plurality game if $E(\pi^A - \pi^B | q^A, q^{B*}) \leq E(\pi^A - \pi^B | q^{A*}, q^{B*}) \leq E(\pi^{A*} - \pi^B | q^A, q^B)$ for all q^A, q^B which satisfy the budget constraint.*

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 which 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.

$$\vec{s} = s(\vec{l}(l_1, l_2, ..., l_N))$$

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 $n = 1, ..., N$). One such activity is lobbying, which I will denote with l_p, which requires some inputs as knowledge of political situation, telephones and time; The consumption set is given by: $L = \Re^N_+ = l \in \Re^N : l_n \geq 0$ for *n=1,...,N* where L is *convex set.* Each activity can be written as:

$$l_i = f_i(x_i, T_i) \tag{13}$$

where x_i is a vector of inputs which are necessary to undertake the activity and T_i a vector of time inputs using in performing the activity. The partial derivatives of l_i with respect to both x_i and T_i are non-negative, that is $\frac{\partial l_i}{\partial x_i} \geq 0$ and $\frac{\partial l_i}{\partial T_i} \geq 0$.

The main idea that individuals allocate time between different activities dates back to Gary Becker's works ([3]) where households are seen both as consumers and as producers and the amount of activities undertaken are determined by maximising a utility function subject to prices and constraints on resources. The great idea by Becker was considering that consumption activities full cost is equal to the sum of market prices and the forgone value of the time used up. Thus, a representative consumer solves the following maximization problem:

$$\max U = U(l_i, ..., l_n) = Z(x_1, ..., x_n; T_1, ..., T_n)$$

subject to

$$g(l_1, ..., l_n) = l$$

where g is an expenditure function of l_i and l is the bound on resources. The goods constraint is:

$$\sum_{i=1}^{n} p_i x_i = I = V + T_w \bar{w} \tag{14}$$

where p_i is a vector of unit prices, T_w is a vector of hours spent in working and $\bar{w}$ is the wage rate per unit of T_w. We have also a time constraint which can be written as:

$$\sum_{i=1}^{n} T_i = T_c = T - T_w \tag{15}$$

In other words the total available time T may be seen as the sum of total time devoted to work T_w and total time devoted to consumption activities T_c which is the sum of time devoted to single consumption activities T_i. Let us assume now that

$$T_i \equiv t_i l_i \tag{16}$$

$$x_i \equiv b_i l_i \tag{17}$$

where t_i is a vector giving the input of time per unit of l_i and b_i is a similar vector for market goods. Substituting (16) into (15), (15) and (17) into (14) we obtain:

$$\sum_{i=1}^{n} \underbrace{(p_i b_i + t_i \bar{w})}_{\pi_i} l_i = \underbrace{V + T\bar{w}}_{S} \tag{18}$$

π_i represents the sum of the unitary prices of the goods and of the time spent for l_i. Let us now denote the *full income* (the maximum money income achievable) by S; this can be seen as the sum of the total labor earnings I and the total earnings forgone in devoting time to consumption activities L. Thus:

$$L(l_1, ..., l_n) \equiv S - I(l_1, ..., l_n)$$

which can also be re-written as:

$$\sum_{i=1}^{n} p_i b_i l_i + L(l_1, ..., l_n) \equiv S \tag{19}$$

The equilibrium conditions resulting from maximising the utility function subject to (19) are:

$$U_i = T(p_i b_i + L_i) \tag{20}$$

where $p_i b_i$ is the direct and L_i the indirect component of the total marginal price $p_i b_i + L_i$. Suppose now to denote political activitiy (i.e. lobbying) by l_p and all the other consumption activities with l_{-p}. Figure 1 shows the equilibrium we find, where the slope of the full income opportunity curve, which is equal to the marginal prices and would be equal to slope of an indifference curve (equals to marginal utilities). In Appendix 3 I provide an alternative microfundation approach.

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

$$\frac{\partial s^{l(l_1, l_2, ..., l_N)}}{\partial l(l_1, l_2, ..., l_N)} \frac{\partial l(l_1, l_2, ..., l_N)}{\partial l_n} > 0 \tag{21}$$

Equation (21) 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 $\frac{\partial l(l_1, l_2, ..., l_N)}{\partial l_n}$ represents the effect of an increase in leisure devoted to political activities on total leisure time and it is positive. Otherwise, the term $\frac{\partial s^{l(l_1, l_2, ..., l_N)}}{\partial l(l_1, l_2, ..., l_N)}$

represents the effect of an increase in total leisure on the density function, which represents an indicator for the group cohesion and for the group political power. Also 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 the 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 b is a despair function ($b = b(s^y, s^o) = -b = b(s^y, s^o)$) and 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, according to Mulligan and Sala-i-Martin 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 and vice versa. 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 focalize on the smallest number of issues are more likely to get what they require and thus to shape Social Security Systems.*

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:

$$\max U^o = c_t^o + \psi^o \log l_t^o$$

$$s.t.\ c_t^o = (1 - \tau_{Lt}^o)(\bar{t} - l_t^o) + b_t^o + r(S_t^o)$$

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

$$l_t^{o*} = \frac{\psi^o}{(1-\tau_{Lt}^o)} \tag{22}$$

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

$$V_t^o = \bar{t}(1-\tau_{Lt}^o) - \psi^o + b_t^o + r(S_t^o) + \psi^o \log \psi^o - \overbrace{\psi^o \log w_t}^{=0} - \psi^o \log(1-\tau_{Lt}^o) \tag{23}$$

I do the same for the representative young worker:

$$\max \; U^y = c_t^y + \psi^y \log l_t^y + \varphi^y \log l_t^o + \beta^y (c_{t+1}^y + \psi^y \log l_{t+1}^y)$$

$$s.t.\; c_t^y + \beta^y c_{t+1}^y = (1-\tau_{Lt}^y)(\bar{t} - l_t^y) + b_t^y + r(S_t^y) + \beta^y((\bar{t} - l_{t+1}^y)(1-\tau_{Lt+1}^y) + r(S_{t+1}^y))$$

$$l_t^{y*} = \frac{\psi^y}{(1-\tau_{Lt}^y)} \tag{24}$$

$$V^y = \bar{t}(1-\tau_{Lt}^y) - \psi^y + b_t^y + r(S_t^y) + \psi^y \log \psi^y - \overbrace{\psi^y \log 1}^{=0} - \psi^y \log(1-\tau_{Lt}^y) + \varphi^y \log \psi^o$$
$$- \overbrace{\varphi^y \log 1}^{=0} - \varphi^y \log(1-\tau_{Lt}^o) + \beta^y(\bar{t} - \psi^y)(1-\tau_{Lt+1}^y) + \beta^y \psi^y (\log \psi^y - \overbrace{\log 1}^{=0}) + \beta^y r(S_{t+1}^y) \tag{25}$$

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.

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

$$s.t.\; T_1 \equiv r(S_t^o) = T_t^o$$
$$T_2 \equiv r(S_t^y) = T_t^y$$
$$T_3 \equiv r(S_{t+1}^y) = T_{t+1}^y$$
$$T_4 \equiv n^o b_t^o + n^y b_t^y + \alpha \left| n^o b_t^o \right| \left| n^y b_t^y \right| = 0$$
$$T_5 \equiv b_t^o b_t^y < 0$$

I provide a complete resolution to the problem in the Appendix.

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. Instead, suppose 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 it is able to gain. Thus, suppose a starting point where candidate A chooses $\vec{q}'$ and candidate B chooses $\vec{q}''$ such that in choosing $\vec{q}'$ and $\vec{q}''$ the elections outcome is a tie. If one candidate moved toward $\vec{q}^*$, it would be able to gain more swing voters than those it loses and thus, it would win the elections. So, choosing any policy but $\vec{q}^*$ cannot be an optimal answer. The only one policy which represents a Nash Equilibrium is $\vec{q}^*$ since it is the intersection between the optimal answers of the two candidates and no one candidate has an incentive to deviate. Since each candidate maximizes its 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 it would always have the possibility to adopt the platform chosen by the other candidate and get the same number of votes. Notice that what we found here is the multidimensional analogue of Hotelling's principle of minimum differentiation.

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:

$$\frac{n^y s^y \varphi^o}{1-\tau_{Lt}^o} = \frac{n^o s^o \tau_{Lt}^o \psi^o}{(1-\tau_{Lt}^o)^2}$$

and finally we get an expression for the optimal marginal tax rate of the old:

$$\tau_{Lt}^{o*} = \frac{1}{1+m} \tag{26}$$

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:

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

which gives a marginal tax rate equal to zero

$$\tau_{Lt}^{y*} = 0 \tag{27}$$

Equations (26) and (27) 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 $\frac{\partial \tau_{Lt}^{o}}{\partial n^{o}} < 0$, $\frac{\partial \tau_{Lt}^{o}}{\partial s^{o}} < 0$, $\frac{\partial \tau_{Lt}^{o}}{\partial \psi^{o}} < 0$, $\frac{\partial \tau_{Lt}^{o}}{\partial n^{y}} > 0$, $\frac{\partial \tau_{Lt}^{o}}{\partial s^{y}} > 0$, $\frac{\partial \tau_{Lt}^{o}}{\partial \varphi^{o}} < 0$.

Thus, the political economy framework suggests that tax rates should be differentiated, since equations (26) and (27) tell us that social groups in society must be taxed with different tax rates. 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 traditional normative approach suggests that a benvolent Governments *should tax* less the poorest social groups, the political economy approach suggests that in a real world vote-seeker Governments *tax* less social groups which are more able to threat politicians in the electoral competition.

Notice that the result which shows 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 SMT. 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 older 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 did not exist, 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 in order 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 $\psi^o >> \psi^y$ (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 $s^o = s(l_t^o) > s^y = s(l_t^y)$.

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 is: $\frac{s^o}{s^y} = \frac{1-\alpha n^y b_t^y}{1-\alpha n^o b_t^o}$. 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 $\alpha^l n^o b_t^o > \alpha n^y b_t^y$, 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:

$$b_t^y = \frac{1 - \sqrt{\frac{s^o}{s^y}}}{\alpha n^y} \tag{28}$$

$$b_t^o = \frac{1 - \sqrt{\frac{s^y}{s^o}}}{\alpha^l n^o} \tag{29}$$

$$b_{t+1}^y = 0 \tag{30}$$

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 $\frac{s^o}{s^y} = \frac{1-\alpha n^y b_t^y}{\alpha n^y \frac{b_t^y}{1-\alpha n^y b_t^y}+1} = (1-\alpha n^y b_t^y)^2$. 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. Notice 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 the 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 makes sense and spouses the SMT: the higher the homogeneity amongst 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 multipliers assume the following values:*

$$\lambda^* = \sqrt{s^o s^y} \tag{31}$$

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 has a political meaning: it represents the increase in the probability of winning for a candidate, if it had an additional dollar available to spend on redistribution.

3 The Altruistic Model

I consider now an altruistic model where the old workers are supposed to be parents of the young workers and they care of their offspring and the basic model allows for bequests. A classical altruistic model considers that households can be represented by a dinasty who is willing to perpetuate forever. Otherwise, in this framework the dinasty is concerned to survive only for two periods. With respect to the basic model, I will not consider the possibility to invest money in a mutual fund, so that the $r(S_t^I)$ component disappears. As a consequence the old worker's utility function is given by:

$$U^o = u^o + \sigma u^y$$

where σ represents the parents' marginal benefit of their offspring's utility, with $0 < \sigma < 1$. Thus, (1) can be re-written as:

$$U^o = c_t^o + \psi^o \log l_t^o + \sigma(c_t^y + \psi^y \log l_t^y + \varphi^y \log l_t^o + \beta^y (c_{t+1}^y + \psi^y \log l_{t+1}^y)) \tag{32}$$

The new budget constraint of the old is:

$$c_t^o = w^o(1 - \tau_{Lt}^o)(\bar{t} - l_t^o) + b_t^o - \chi_t \tag{33}$$

where χ_t represents the bequest which is left to the next generation. The new intertemporal budget constraint of the young at time t is:

$$\begin{aligned} c_t^y + \beta^y c_{t+1}^y &= w_t^y(1 - \tau_{Lt}^y)(\bar{t} - l_t^y) + b_t^y \\ &+ \beta^y(\chi_t^2 + w_{t+1}^y(\bar{t} - l_{t+1}^y)(1 - \tau_{Lt+1}^y) \end{aligned} \tag{34}$$

First-order conditions show that the optimal labor supply for the young is that same, whilst the new optimal labor supply for the old is:

$$l_t^{o*} = \frac{\psi^o + \sigma\varphi^y}{(1 - \tau_{Lt}^o)} \tag{35}$$

which shows that the higher the parameter which represents the positive externality the young get from the work of the old, the more the old are prone to work. The generosity stands right in here: the old are prone to renounce to their leisure. Furthermore, first-order conditions also shows that the optimal bequest is given by:

$$\chi^y = \frac{1}{\sigma} \tag{36}$$

The optimal tax rates become:

$$\tau_{lt}^{o*} = 1 - \psi^o - \sigma\varphi^y - \frac{n^y s^y \varphi^y}{n^o s^o} \tag{37}$$

$$\tau_{lt}^{y*} = 1 - \psi^y \tag{38}$$

and the optimal trasfer:

$$b_t^{o*} = \frac{1}{\alpha}(1 - \frac{1}{k} \tag{39}$$

$$b_t^{y*} = \frac{1 - k}{\alpha n^y} \tag{40}$$

where $k = \sqrt{\frac{s^o n^y}{n^o s^o \sigma + n^s s^y}}$.

In this case it's very easy to evaluate that the generosity parameter σ affects the optimal value of the model. First of all, notice that the parameter directly enters into the optimal tax rate of the old, decreasing its value; we can read this result in the following manner: the higher is the generosity of the old, the lower is the tax they are prone to pay. This is perfectly rational: indeed, in the previous model the old were willing to be tax more to reduce their working time and to have more time to lobby; this time their generosity make them more willing to work as to support the generation of the young and thus they are willing to be taxed less as not to reduce the labor supply. We can also see another difference with respect to the previous model, where the old were able to finance their reduction in labor-income with a higher intergenerational transfer, whilst now it is easy to verify that the optimal intergenerational trasfer for the young b_t^y increases with an increase of the generosity parameter. Thus, the introduction of altruistic variables in the model framework changes the nature of intergenerational trasfers and favor the young generation.

4 Theory and Evidence

In this section I analyse some empirical evidence which supports the single mindedness theory. I remind that if the single mindedness theory was right, we should expect high levels of retirement within the old workers accompanied by high marginal tax rates on labor. I will focus on the U.S. case referring to recent works by Peter Diamond (1997) and Mulligan & Sala-i-Martin (1999).

4.1 The Unceasing Decrease in Labor Market Participation Around the World

According to Diamond, the stylized facts would show that the participation of the older persons in the labor market has been gradually declining over the 20th century. For instance, in 1950 almost 60% of men age 65-69 partecipated in the labor force, while by 1990 this figure had fallen to 26%. Otherwise, the percentage of workers covered by SS System has significantly rose over the same period. There has been also a dramatic increase in the share of the older population receiving payments from public schemes. Thus, it seems there would exist a strong linkage between SS System and retirement. To asses this he analysed the *hazard rate*, defined as the increase in the rate of labor force leaving from the previous age, relative to the stock of workers participating at the previous age. The trend, both for males and females, shows the suggestive existence of two spikes around age 62, the age of eligibility for early retirement under Social Security and age 65, which is the legal retirement age. Trying to give an explanation to this phenomenon, Mulligan and Sala-i-Martin note that the Government retirement ages have not risen with an augmented life expectancy and a bettering in health, since we would expect the fraction of GDP devoted to public programs for the old to increase less than one-for-one, because the dead weight losses associated with SS taxes presumably increases with respect to an increasing rate, while in the real world this ratio varies exactly one-for-one with the fraction of the population over age 60. Secondly, the Social Security have mostly pay-as-you-go features, which means that an intergenerational transfer always exists. Identical results were achieved by Ruzik ([38]), which analised the retirement bahaviour in Poland, Hungary and Lithuania; the main result of the econometric analysis was that becoming unemployed at older age is a strong factor increasing probability of retirement and that there exists a strong linkage between retirement and the right to get a social security benefit in advanced age. Aguiar ([1]) tried to go more in details in anlasying the allocation of time; he confirmed results obtained by previous literature that leisure time has increased significantly in the United States over the last five decades, but he made a further effort to disaggregate uses of household time into specific categories, namely *market work time*, *non-market time*

and *leisure time*. The market work time is represented by a core market work (main jobs, second jobs, overtime, time spent working at home) plus time spent commuting to/from work and time spent on ancillary work activities (i.e. meating a meal); the study shows that this category has been remaining costant between 1965 and 2003 even though with a difference between men and women work. The non-market work encompasses activities such as household activities (i.e. cleaning, ironing, vacuuming), time spent obtaining goods and services (i.e. shopping) and time spent on other home production (i.e. gardening, vehicle repair). In this case, time spent in these activities has fallen sharply over the same period of time. Otherwise, leisure time, consisiting in the residual of work activities has been increased significanlty. Huovinen and Piekkola ([22], in a study on early retirement and time use of older Finns, argued that factors related to labor demand, in addition to personal financial incentives and health, are very important in determining the early retirement in Finland and that changes in how leisure time is valued explain the level of withdrawal from labor market. Finally Dorn & Sousa-Poza ([9]), analysing early retirement in Switzerland, discovered that early retirement positively depends on the level of wealth, the level of education, a negative attitude toward the job, preferences toward leisure and retirement incentives provided by firms. Thus, it seems that an hihg level of accomulated wealth entails a higher probability to retire. Table 1 shows the dramatic decline in the employment of older workers as a fraction of male populations which occured in some OECD countries over the last five decades. Except Japan, partecipation rates have been declining from above 80 percent to below 50 percent.

Table 1 - Employment of male workers at age 55 to 64 as a percentage of male populations of the same age

	1980	1990	1995	2000
Belgium	47.7	34.3	34.5	35, 1
Canada	71.3	60.3	53.7	57.7
France	65.3	43.0	38.4	38.5
Germany	64.1	52.0	48.2	48.2
Japan	82.2	80.4	80.8	78.4
United Kingdom	62.6	62.4	56.1	59.8
United States	69.7	65.2	63.6	65.6

Source: Fenge & Pestieau (2005)

4.1.1 Early Retirement: Free Choice or Forced Decision?

As we have demonstrated in the previous point, retirement data show a clear downward trend in labor market participation. A natural question arises: do people voluntarely retire earlier or are they forced to retire from labor market conditions? This question has not an easy answer since would require a perfect knowledge about individual preferences which we do not

have. Nevertheless, answering this question is fundamental to understand how workers react to a change in social security system variables, such as an increase in the legal retirement age, the transition from a PAYG System to a Fully Funded System or any other pension reform. The imporance of being able to answer this question is highlighted by the following example: imagine to introduce a policy which aims to supply education to the elder workers; if their preferences are such that they only desire to retire to enjoy more leisure time, rather than work, probably these measures would not be much effective; otherwise, suppose retirements take place due to labor market reasons (i.e. a negative economic trend which forces firms to incentive workers exodous, bad perception about the ability to permorm a job and so forth); in this case a good intervention by Governments in Social Security policies would stimulate workers to withdraw from earlier retirement. Strange enough, the economic literature has not been focusing so much over this issue. The main stream of literature on early-retirement believes that to understand workers' retirement decisions, we must focus on the *labor-supply side*; the main evidence this theory achieved is that earlier and more generous availability of public old-age benefits (or more generous early retirement regulations) tend to increase early exits form the labor market, since early retirement becomes a more attractive choice for individuals. Thus, labor-supply economists believe that early retirement is more a free choice than a forced decision. Empirical evidence about the retirement incentives (see Fenge & Pastieu ([17]), Coile and Gruber ([6] and Gruber and Wise ([19]) among the others) found that retirement incentives are strongly related to early retirement, that most wealthy people, that is people who would have more opportunities to continue to work,are more likely to retire early and that persons are more likely to prefer retirement to work as they get hold Otherwise, the *labor-demand side* perspective has not received the same attention and only in more recent years with Hutchens ([**?**]) has gained interest among economists. In this case, early retirement is seen more as a forced decision than a free choice.

4.1.2 Are preferences for leisure of the old higher than those of the young?

In the model I assumed that the intrinsic preference for leisure of the old were higher than that of the young ($\psi^o > \psi^y$). This assumption is the most difficult to verify, since it entails a complete knowledge about preferences of individuals which actually we do not have. Thus, this evaluation must take place adopting indirect proxies. A study by McGrattan & Rogerson ([28]) analysed changes in hours worked since 1950 for different demographic groups. They discovered that despite the average weekly hours worked per person at the aggregate level has not substantially changed over the period and college enrollments over the monitored period increased, the number of

weekly hours worked by individuals aged 15-24 increased nearly 10 percent and the number of hours worked by individuals aged 25-54 increased about 20 percent; otherwise, work hours of people aged 55-64 fell 6.5 percent and those of people aged 65-74 fell 57 percent. Thus, it seems that U.S. labor market has experimented a reallocation of hours worked among cohorts[4]. This result seems to confirm our assumption: the young prefer to work, although they have to invest in human capital while they are under 30, whilst the old over 50 prefer to retire. Despite the classical motivations the literature has brought to explain this phenomenon, it seems there also exist a "natural"tendency to retire soon after the middle age. In a next paper I will try to give a game theoretic explanation to this point adopting an evolutionary game theory model.

4.1.3 How do retirees use their leisure?

In the model I assumed that the the old have a higher level of preference for leisure than the young ($\psi^o >> \psi^y$) and I provided some theories which may support this hypothesis. The empirical evidence seems to confort theoretical results. Huovinen and Piekkola suggest that leisure allocation is a highly significant factor explaining retirement decisiona and that not only the overall increase in leisure time makes retirement more attractive but also the way this increased leisure is allocated. Results of the survey shown that the share of more active activities is higher amongst the non-employed, while passive activities (i.e. watching television, reading books and so forth) is higher amongst the empoloyed. In my opinion, an interesting consideration stated in this study is *the actively used leisure time works a substitute for decreased income to work*

4.2 SS System and Marginal Tax Rates

If we take into account the time pattern of tax/subsidy rates across earning groups, we would see that before age 62 the tax rate is higher, the higher is the wage earned by workers. For instance, consider a single worker with a last year of work equal to 55; the tax rate is equal to 4.3%. Consider again a single worker, but this time with a last year of work equal to 69; this time, the tax rate is equal to 44.2%. Finally, to discourage working, some countries tax the labor income of the elderly at 100% rates. Some example are derived from Spain and Belgium where "elderly are not allowed to collect their government pension if they earn any labor income at all and those benefits are typically close to or more than what the pensioner would have earned after taxes if he had kept working ". Otherwise, France

[4]monitoring disaggregate data among cohorts was essential to challange the classical theory by Prescott, who sustained looking at aggregate values that elasticity of substitution between consumption and leisure was near 1

"allows pensioners to receive labor income, but not from their preretirement occupation ". Furthermore, the authors evaluate that the size of the public pension benefits in some countries are nearly the size of the average worker's earnings and thus the range of income to which the 100% implicit tax rate is very large. But the most effective explanation for the high tax rate applied on the old refers to the free riding problem within a group. In this view, considering selfish individuals who does not care about interests of other members, the existence of high tax rates on labor income could be seen as a measure undertaken by the group itself to overcome the free-riding threat; thus, it would be the group itself which forces the Government to impose high tax rates in order to induce members to retire so that they can spend some additional leisure time in political activities to protect the group's interests.

4.3 The Political Economy of Early Retirement

The recent trend which refers to early retirement is something of unacceptable from a normative perspective. How can we justify policies which favour early retirement, when due to demographical causes and financial troubles the actual social security systems are universally considered unsustainable? The theory says that to meet financing problems and improvements in longevity the retirement age should be raised. Actually answers should be found in the political economy. According to recent studies (see Jacobs and Shapiro ([23]), Ferrera ([14]), and Boeri,Borsch-Supan, and Tabellini ([4])) it seems that both in the U.S. and in Europe the majority of people are against higher payroll taxes, lower benefits, and a higher retirement age. Surveys show that European citizens are neither happy with the existing programs nor willing to reform the welfare state. Even though the evidence about the political economy of early retirement seems to be clear and robust, we still lack of models which are able to explain the phenomenon. Even recent models (see Fenge & Pestieau ([17])) seems to suffer to mispecification problems; indeed in the model of political choice, individuals vote on a mandatory age of retirement, maximising a lifetime utility function where the age of retirement negativly affects the utility of voters. This seems incorrect, because an higher retirement age increases the monetary value of consumption; that is, consumption is a function of time spent in working. Furthermore, consumption is a monetary variable while the age of retirement is a time variable and, again, it seems quite incorrect to sum a monetary variable with a time variable. Finally, the model does not take into account the value of leisure, which is in my opinion the key point to understand the political economy of early retirement. In fact, an higher age of retirement *increases* the monetary value of total consumption, but *decreases* the value of total leisure. To understand why voters seem to be unwilling to increase the retirement age we have to find answers in individual preferences. If we assume that working

more means to have less leisure, as it is obvious, than people do not accept to work more simply because the monetary value of the consumption due to an increase in working time is lower than the monetary value of leisure. It is not the age of retirement *per se* who reduces the individual's utility but the reduced values of total leisure which an increase in the retirement age produces, instead.

4.4 Policy Implications of the altruistic model: some suggestions

The basic model I analysed is basically one in which two selfish group face each other and try to get the best from politicians. If the old are the moe single-minded group and do not care about society's welfare, they will end up with a greater amount of leisure which take the shape of early retirement financed by the social transfers borne by the young. This, obviously, sounds really unfair and unequal for the next generations of worker, because the general level of social security spending increases (and the total public spendig as well). This could lead to an increase in the poverty level amongst younger workers and to an unsustainability of the public finance. In a nutshell, the selfishness of the old translates in a reduction of the general welfare, expecially that of the future generations. The situation would improve if the old would be more generous with respect to the younger generation, internalizing the young group's needs. If they voluntarely reduced the total amount of their leisure working more, they would reduce both the ratio of early retired in the economy with all the beneficial consequences, *in primis* the reduction of social security spending and (most important) an increase in the sustainibility of the public finance. Unfortunately, the elder components of society hardly accept this vision and share this willingness to support an effort in increasing their total amount of hours worked. Otherwise, often there exists in society a common vision of pensions benefits as a *merit good*, a sort of untouchable right which the old deserve. In my opinion this vision has generated a bias towards what the present generation needs with respet to the future generation. The creation of *formalized inter-generational pacts* could represent a possible solution to all the imbalances previously discussed togheter with an increase in the fairness of pension systems.

5 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. One of the most interesting conclusion the model achieves states that eventually 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 SMT: the old group forces candidates to elevate their marginal tax rates because they recognize that this is a way 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. I also analyzed the consequences of an altruistic model, where the old take care of the welfare of the young. In such a framework, the old internalizes the preferences of the young in their utility funcion and, as a consequence, tend to reduce their leisure. 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 analyse more in details the role of institutions, such as labor unions or association of retirees on the political outcome (I will study this issue in a future work); 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 analyse 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.

6 Acknowledgments

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7 Appendix

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.

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

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

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

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

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

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

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:

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

I obtain the following first order conditions:
(1) $\frac{\partial L}{\partial \tau_{Lt}^o} \equiv n^o \frac{\partial s^o}{\partial L} \frac{\partial L}{\partial \tau_{Lt}^o} (V^{oA} - V^{oB}) + n^o s^o (\frac{\partial V^o}{\partial \tau_{Lt}^o}) + n^y s^y (\frac{\partial V^y}{\partial \tau_{Lt}^o}) = 0$

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

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

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

$\lambda \geq 0$

According to the result stated in Corollary 1, FOC's can be re-written in the following manner:
(1) $\frac{\partial L}{\partial \tau_{Lt}^o} \equiv n^o s^o (\frac{\partial V^o}{\partial \tau_{Lt}^o}) + n^y s^y (\frac{\partial V^y}{\partial \tau_{Lt}^o}) = 0$

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

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

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

$\lambda \geq 0$

and after some easy calculations, I obtain:
(1) $\frac{\partial L}{\partial \tau^o_{Lt}} \equiv n^o s^o(-\bar{t} + \frac{\psi^o}{(1-\tau^o_{Lt})} - \frac{\tau^o_{Lt}\psi^o}{(1-\tau^o_{Lt})^2} + (\bar{t} - \frac{\psi^o}{(1-\tau^o_{Lt})})) + \frac{n^y s^y \varphi^o}{(1-\tau^o_{Lt})} = 0$

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

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

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

$\lambda \geq 0$

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

(3) $\frac{\partial L}{\partial b^o_t} \equiv s^o = \lambda(1 - n^y \alpha b^y_t)$

(4) $\frac{\partial L}{\partial b^y_t} \equiv s^y = \lambda(1 - n^o \alpha b^o_t)$

$\lambda \geq 0$

From FOC (1) we obtain:

$$\frac{n^y s^y \varphi^o}{1-\tau^o_{Lt}} = \frac{n^o s^o \tau^o_{Lt}\psi^o}{(1-\tau^o_{Lt})^2}$$

and finally we get an expression for the optimal marginal tax rate for the old:

$$\tau^o_{Lt} = \frac{1}{1+m}$$

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.

8 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 has not changed:
(1) $\frac{\partial L}{\partial \tau^o_{Lt}} \equiv n^o \frac{\partial s^o}{\partial L} \frac{\partial L}{\partial \tau^o_{Lt}}(V^{oA} - V^{oB}) + n^o s^o(\frac{\partial V^o}{\partial \tau^o_{Lt}}) = 0$

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

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

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

$\lambda \geq 0$

According to the result stated in Corollary 1, FOC's can be re-written in the following manner:
(1) $\frac{\partial L}{\partial \tau_{Lt}^o} \equiv n^o s^o(\frac{\partial V^o}{\partial \tau_{Lt}^o}) = 0$

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

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

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

$\lambda \geq 0$

and after some easy calculations, I obtain:
(1) $\frac{\partial L}{\partial \tau_{Lt}^o} \equiv n^o s^o(-\bar{t} + \frac{\psi^o}{(1-\tau_{Lt}^o)} - \frac{\tau_{Lt}^o \psi^o}{(1-\tau_{Lt}^o)^2} + (\bar{t} - \frac{\psi^o}{(1-\tau_{Lt}^o)})) = 0$

(2) $\frac{\partial L}{\partial \tau_{Lt}^y} \equiv n^y s^y(-\bar{t} + \frac{\psi^y}{(1-\tau_{Lt}^y)} - \frac{\tau_{Lt}^y \psi^y}{(1-\tau_{Lt}^y)^2} + (\bar{t} - \frac{\psi^y}{(1-\tau_{Lt}^y)})) = 0$

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

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

$\lambda \geq 0$

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

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

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

$\lambda \geq 0$

It is easy to verify, from Foc's (1) and (2) that both the marginal tax rate are equal to zero. Thus, neither the old nor the young workers invest in pre-funded pension shemes. 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 of 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. Unlikely the previous case, the young does not get any benefit from the leisure of the old. They are worse off while the old are better off. A Pareto improvment is impossible to achieve, since if the Government desires to win elections 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.

9 Appendix 3

Suppose that individuals' preferences are represented by the following function:

$$\Lambda = U(c) + V(p) \tag{41}$$

with $U_1, V_1 > 0$ and $U_{11}, V_{11} < 0$ c represents a basket of market goods and p represents the political activity non-market good, which is produced according to a CRTS production function

$$p = H(l, d) = dH(\frac{l}{d}, 1) \tag{42}$$

with $H_1, H_2 > 0$ and $H_{11}, H_{22} < 0$. H is a standard function, d represents purchased inputs to undertake political activities and l is time spend in political activities. The fixed quantity of the worker input sells at the price c, again measured in terms of time. Suppose now that the worker has a total amount of time T (which I normalize to the unity) he can divide between working in the labor market for a market wage rate equal to w or using to undertake political activities. Define the function:

$$X(l, d) = V(dH(\frac{l}{d}, 1)) \tag{43}$$

Now, according to Paretian definitions, define l and p as complements when $X_{12} > 0$ and substitutes when $X_{12} > 0$. the individual's maximization problem is[5]:

$$\max_l U(w(\bar{t} - l) - cw) + X(l, d) \tag{44}$$

First Order Conditions are given by:

$$\overbrace{X_1(l, d)}^{V_1(dH(\frac{l}{d},1))H_1(\frac{l}{d},1)} \quad -wU_1(w(\bar{t} - l) - cw) = 0 \tag{45}$$

First order conditions state that the gain due to an extra unit of time spent in polical activities ($X_1(l, d) > 0$) is offset by the loss in terms of foregone utility in labor market ($wU_1(w(\bar{t} - l) - cw)$). Figure 2 shows the solution for l when l and d are *complements*, while Figure 3 shows hte solution for l when l and d are *substitutes*. Thus if we suppose that inputs to perform political activities are complements of time spent in these activities, we assist to an increase in leisure time devoted to non-market work. An increase in time spend in political activities requires a decrease in time spent in working. To evaluate whether l and d are complements or substitutes we analyse the following expression:

$$\overbrace{X_1(l, d)}^{marginal benefit of time spent in political activity} =$$

$$\overbrace{V_1(dH(\frac{l}{d}, 1))}^{marginal utility of political activity} \times \overbrace{H_1(\frac{l}{d}, 1)}^{marginal product of time spent in political activity}$$

[5]note the second order conditions entails $w^2U_{11} + X_{11} < 0$

Notice that $\frac{\partial V_1(dH(\frac{l}{d},1))}{\partial d} < 0$, whilst $\frac{\partial H_1(\frac{l}{d},1)}{\partial d} > 0$. Thus $X_{12} = -V_{11}H_1^2(\frac{l}{d}) - V_1H11\frac{l}{d^2} + V_{11}HH_1$ which depends on whether the elasticity of the marginal product of labor with respect to the time-goods ratio $-(\frac{l}{d})\frac{H_{11}}{H_1}$ is smaller or larger than the elasticity of marginal utility with respect to the political activity $-p\frac{V_{11}}{V_1}$, weighted by share of purchased inputs in output, $\frac{d(H-\frac{H_1l}{d})}{p}$.

Example 1

Suppose:

$$U(c) = \gamma \ln(c)$$
$$V(p) = (1-\gamma)\ln(p)$$

The "technology "used by worker to produce the political activity exploits a CES production function $H(l,d) = (d^\rho + l^\rho)^{\frac{1}{\rho}}$ and the worker's budget constraint is given by $c = w(\bar{t} - l - c)$. Thus, the worker maximization problem can be written as:

$$\max_l \ \gamma \ln w + \gamma \ln(\bar{t} - l - c) + (1-\gamma)\ln(d^\rho + l^\rho)^{\frac{1}{\rho}}$$

which entails the following first order conditions:

$$\frac{\gamma}{1-\gamma} = \frac{\bar{t} - l - c}{d^\rho + l^\rho} l^{\rho-1}$$

which is independent from the wage rate, since the increased opportunity cost of the political activity *substitution effect*is offset by the fact that higher wages make the worker wealthier *income effect*.

Example 2 - Effects of labor income taxation

Take now the setup from Example 1 but now $U(c) = \ln(c - \varsigma)$ and $c = (1-\tau)w(1-l) + t$ where τ represents the labor income taxation and t a positive lump-sum transfer which is a fraction θ of taxes collected by Government whose budget is $g + t = \tau w(\bar{t} - l)$. Solving the problem we obtain the following first order condition:

$$\frac{(1-\tau)w}{c - \varsigma} = 1$$

$$c = [1 - \tau(1-\theta)]w(\bar{t} - l)$$

and finally:

$$\bar{t} - l = \frac{1-\tau}{[1-\tau(1-\theta)]} + \frac{\varsigma}{w[1-\tau(1-\theta)]}$$

Three case arise:

1. $\varsigma = 0$ and $\theta = 0 \Rightarrow$ tax rate does not affect hours worked.
2. $\varsigma = 0$ and $\theta = 1 \Rightarrow$ higher tax rates reduce hours worked since only substitution effect holds.
3. $\varsigma > 0$ and $\theta = 0 \Rightarrow$ higher tax rated increrase hours worked since the (negative) income effect more than offset the (positive) substitution effect.

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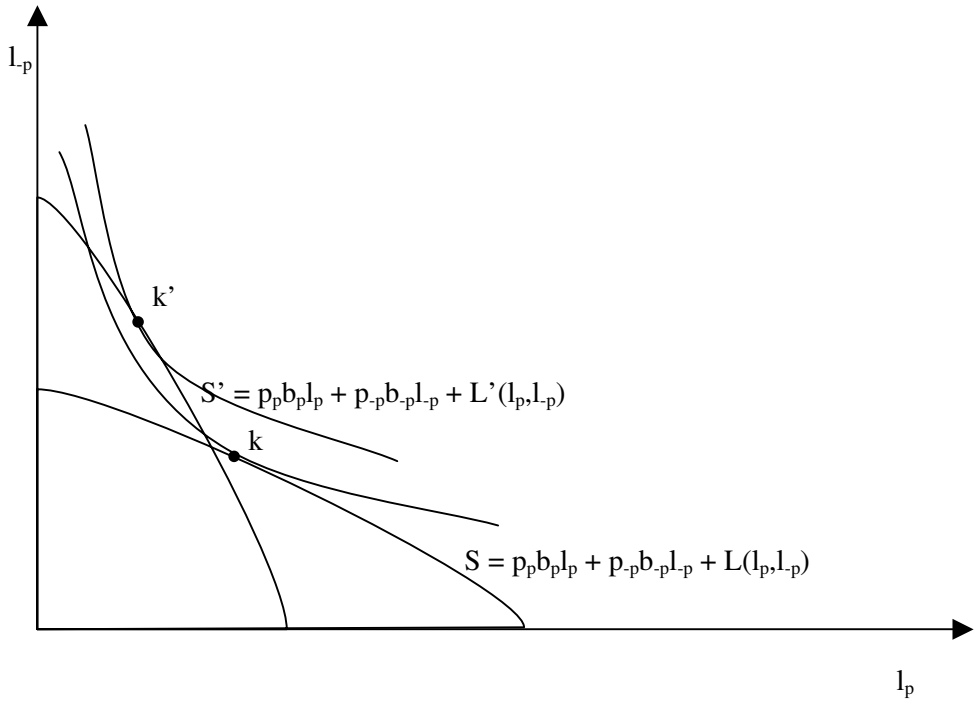

FIGURE 1

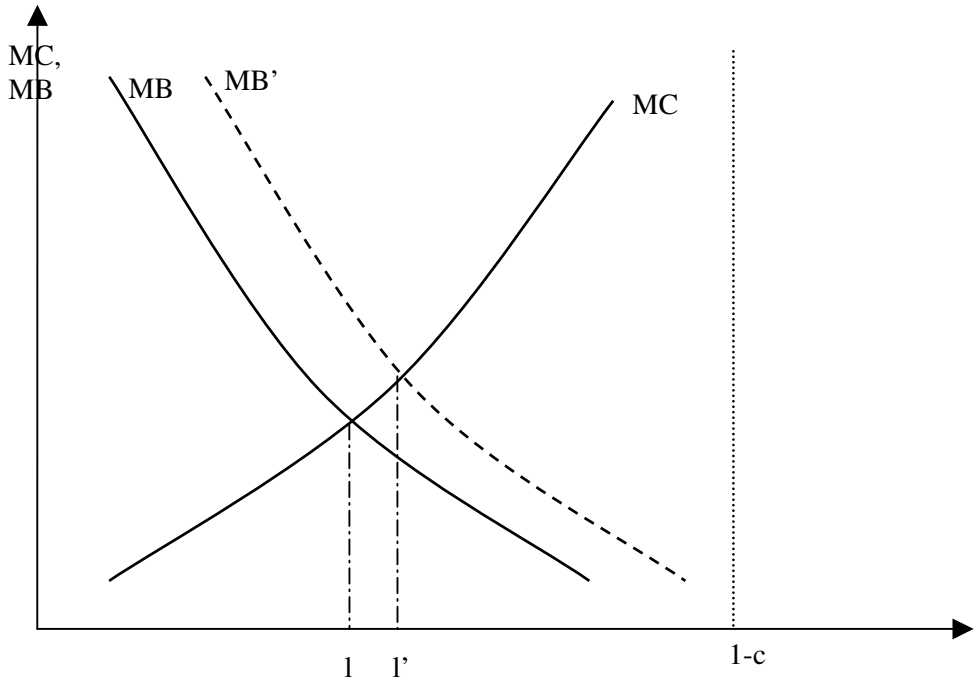

FIGURE 2

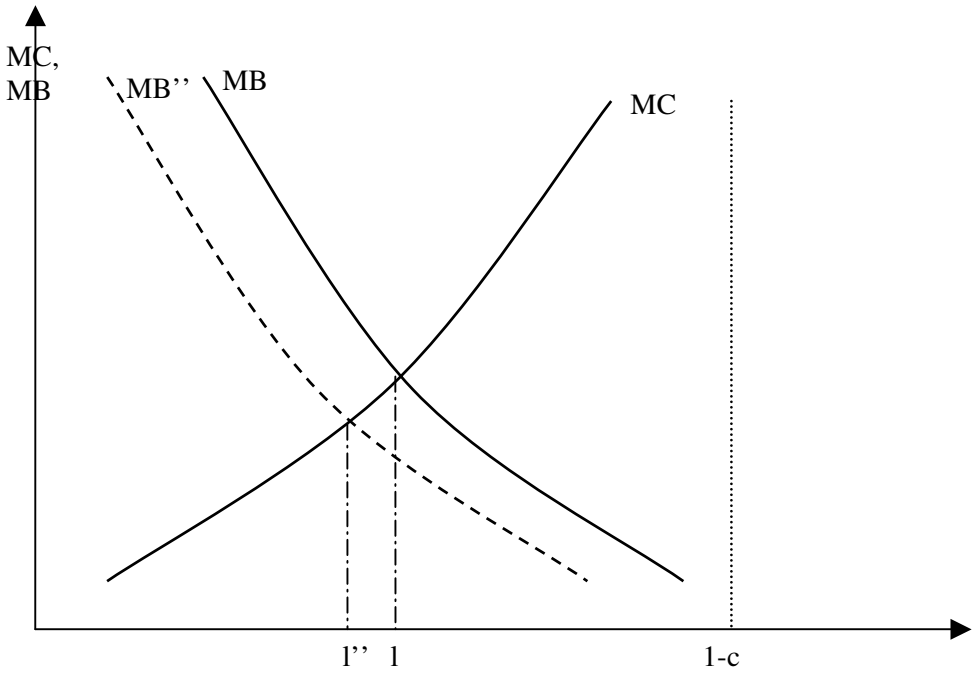

FIGURE 3