VOTING OVER TAXES WITH ENDOGENOUS ALTRUISM

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ABSTRACT

In this paper we examine the vote over income tax schedules in a society in which individuals may have various degrees of altruism. Specifically, we study whether the conjecture that societies where individuals feel concern for each other are more favorable to income redistribution than societies made of egoistic individuales is true. In this respect, we set up a simple and plausible model in which altruistic individuals turn out to unanimously oppose tax increases.

1. INTRODUCTION

In this paper we examine the vote over income tax schedules in a society in which individuals may have various degrees of altruism. Specifically, we study whether the conjecture that societies where individuals feel concern for each other are more favorable to income redistribution than societies made of egoistic individuales is true. In this respect, we set up a simple and plausible model in which altruistic individuals turn out to unanimously oppose tax increases.

To the best of our knowledge, the literature on voting over income tax schedules has focussed on the case of egoistic individuals[1]. The case for altruistic individuals poses a number of specific difficulties. In the first place, the very notion of altruism is but the mere negation of egoism and gives room for any arbitrary degree of concern for each other. There are too many degrees of freedom, so that by appropriately chosen wheights to the well-being of others one can obtain radically different scenarios. Further, in an economy with individuals who differ from each other in their abilities and incomes, what kind of relationship –if any– is most appropriate to assume between altruism felt and this characteristic? In fact, there is also the question whether the deserving of somebody else's esteem has to be correlated with income.

In order to have a more determinate model of voting over taxes by altruistic individuals, we have borrowed the model of endogenous formation of interpersonal esteems developed in Esteban and Kranich (2001). Following their work, we consider a production economy in which each agent contributes labor to the production of a single consumption good. The agents differ in their productivities, and their wage earnings are subject to a purely redistributive linear income tax. Individuals have private, or direct, preferences over their own consumption bundles, but they also have social, or extended, preferences which reflect their esteem or concern for others. We consider the particular example in which agents revise their esteem for others in view of the amount of labor they supply relative to the mean[2], increasing their esteem for those who supply more than the mean level of effort and decreasing their concern for those who supply less[3]. We focus on the stationary outcomes of this dynamic process.

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[1] The seminal paper of Roberts (1977), followed by Meltzer and Richard (1981), are the basic references. Recently, the literature has concentrated on the case in which individuals vote for political parties. The papers by Cukierman and Meltzer (1991), Alesina and Rodrik (1994), Persson and Tabellini (1994), and Roemer (1998 and 1999) are relevant here.

[2] Thus, for example, if people work 40 hours per week on average, then those who work more are perceived as being industrious and those who work less are perceived as being lazy.

[3] The role of esteem in explaining social behavior has already been strongly emphasized by Homans (1961). There, he develops the view that agents reward other agents' highly valuable actions with greater esteem.

There are two types of stationary equilibria. In one all individuals conform to the standard of behavior and supply precisely the mean level of effort. Here, there is no social exclusion and altruism is inversely related to income. This equilibrium is attainable only if there is sufficient redistribution relative to the degree of inequality in individual productivities. In the other type of equilibrium society becomes stratified into two or three clusters: one group of highly productive "winners" who work more than the average number of hours and earn the full admiration of everyone, a second group of low productivity "losers" who work less than the mean and earn no esteem from others, and possibly a third group consisting of those with intermediate productivities who supply exactly the mean number of labor hours and may garner a range of esteem levels. We then focus on the equal effort equilibrium and investigate whether a majority of individuals would favor an increase in taxation. On this respect, we obtain the surprising result that for all the taxes compatible with this steady state equilibrium individuals will unanimously favor a decrease in taxation. Since this result holds true for all taxes associated with this type of equilibrium, it follows that these equilibria will not persist if individuals had to vote over income taxation.

In the next section we describe the model and then proceed to describing the two types of steady states possible. Section 4 addresses the issue of the individual valuation of a change in taxes and proves the main result. The last section discusses the implication of this result and argues that it is likely to be pervasive to all models with altruistic sentiments.

2. THE MODEL

Our model shall closely follow the one laid down in Esteban and Kranich (2001).

We consider an $n-$agent production economy in which agents have different abilities and each contributes labor to the production of a single consumption good[4]. Let $N=\{1,...,n\}$ denote the set of individuals. Each derives direct utility from consumption and disutility from labor. However, their well-being also depends on their extended or social utility derived from the direct utility experienced by others.

We assume that all agents have the same direct preferences represented by the utility function

[4] Our description of the economy is similar to that in Sen (1966) and Ray and Ueda (1996). However, we depart from Sen in that we endogenize the extent of individual concern for others. This issue is addressed in the following section.

$$u = u(c, L),$$

where c denotes the consumption good and L denotes labor.

In order to permit an explicit characterization of individual behavior we shall restrict our attention to the following specification:

$$u(c, L) = c - \frac{1}{2}L^2. \tag{2.1}$$

The social utility of individual i given by

$$U_i = \sum_{j=1}^{n} \alpha_i^j u_j , \tag{2.2}$$

where α_j^i measures the sympathy or concern felt by individual i toward individual j. We assume $\alpha_j^i \leq \alpha_i^i$, for all i, j, and we normalize sentiments by taking $\alpha_i^i = 1$, for $i = 1, \ldots, n$. We also assume $\alpha_i^j \geq 0$ for all i, j, thus excluding malevolence[5]. For notational simplicity, we write $\alpha^i = (\alpha_1^i, \ldots, \alpha_n^i)$, and we denote the entire $n \times n$ matrix of coefficients by α[6].

Let us now introduce our assumptions concerning production.

Esteban and Kranich (2001) assume a CES production function with each individual labor type as an independent input. They demonstrate that the degree of labor input substitutability plays no role in the qualitative results there obtained. In order to facilitate the explicit analysis of equilibria we shall take the simplest form of production function in the CES family: the linear case. Specifically, we shall asume that

$$Y = \sum_{i=1}^{n} \beta_i L_i, \ \beta_i \geq 0 \quad \text{and} \quad \sum_{i=1}^{n} \beta_i = 1, \tag{2.3}$$

where β_i measures the productivity of individual i. Without loss of generality, we will assume that the agents are ordered such that $\beta_1 \leq \beta_2 \leq \ldots \leq \beta_n$.

The marginal productivity of L_j is

$$\frac{\partial Y}{\partial L_j} = \beta_j. \tag{2.4}$$

For later reference, it will be useful to note that for the case in which $L_j = L$, for all $j = 1, \ldots, n$, we have

$$Y(L) = L\,. \tag{2.5}$$

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[5] The critical assumption for our results is that α_j^i is bounded below, even if this is an arbitrary negative number. We take the bound to be zero for convenience.

We suppose labor income is taxed at a given rate $\tau \in [0,1]$ and the proceedings are redistributed equally among all agents. The tax schedulle is thus linear.

Individual after-tax disposable income is

$$y_i = (1-\tau) w_i L_i + \frac{\tau \sum_{h=1}^{n} w_h L_h}{n}, \qquad (2.6)$$

which is entirely consumed, so that $c_i = y_i$.

Given the wage vector w, the tax rate τ, and the altruism coefficients α^i, the choice problem facing individual i consists of selecting the labor supply L_i to solve:

$$\max_{L_i} U_i(L). \qquad (2.7)$$

Substituting from (2.1), (2.2) and (2.6), (2.7) can be rewritten as

$$\max_{L_i} \sum_{j=1}^{n} \alpha_j^i \left[(1-\tau) w_j L_j + \frac{\tau \sum_{h=1}^{n} w_h L_h}{n} \right] - \frac{1}{2} \sum_{j=1}^{n} \alpha_j^i L_j^2. \qquad (2.8)$$

Since U_i is concave, an interior solution to (2.8) is given by

$$L_i = w_i \left[(1-\tau) + \tau \frac{\alpha_i}{n} \right], \qquad (2.9)$$

where $\alpha_i \equiv \sum_{j=1}^{n} \alpha_j^i$ is the total altruism felt by i. Equation (2.9) then describes the optimal behavior of an individual when facing the parameters $\langle w, \tau, \alpha^i \rangle$.

Collectively, given the technology, parametrized by $\beta = (\beta_1, \ldots, \beta_n)$, as well as τ and α, an equilibrium consists of $n-$vectors $\mathbf{L}$ and $\mathbf{w}$ such that for all $i \in N, L_i$ satisfies (2.9) and $w_i = \frac{\partial Y}{\partial L_i} = \beta_i$.

The expresions above describing individual behavior closely follow the ones obtained in Esteban and Kranich (2001).

3. EQUILIBRIUM INDIVIDUAL SENTIMENTS

As in Esteban and Kranich (2001) we let individual sentiments for each other agent be determined endogenously. Individual sentiments are reflected in the coefficient matrix α.

The key element of the model is the assumption that each individual formulates a standard of behavior for others. In our case, such a standard consists of an expected labor supply. Then if individual j's actual labor supply exceeds i's standard for j, then i increases its esteem for j. Conversely, if j supplies less than the standard, then i lowers its esteem. If j exactly conforms to i's standard, then no adjustment occurs.

Treating time as a discrete variable, let $L_j(t)$ be j's actual labor supply at time $t, L_j^i(t)$ be the amount of labor i thinks j should contribute at t, and $\alpha_j^i(t)$ be the esteem i feels for j at t. Then we require only that $\alpha_j^i(t+1) \gtrless \alpha_j^i(t)$ as $L_j(t) \gtrless L_j^i(t)$. Alternatively, we write

$$\alpha_j^i(t+1) = g_i\left(\alpha_j^i(t), L_j(t) - L_j^i(t)\right), \tag{3.1}$$

where g_i is an arbitrary function that is nondecreasing in both arguments, bounded above by 1, bounded below by 0, and $g_i(\alpha, 0) = \alpha$, and we assume g_i is given.

Then given $\langle \beta, \tau \rangle$, a stationary equilibrium is a triple $(\boldsymbol{\alpha}, \mathbf{L}, \mathbf{w})$ such that (L, w) is an equilibrium with respect to (β, τ, α), as defined above, and for all $i, j, i \neq j$.

In the present paper we concentrate on the simple rule that each agent takes the mean behavior as the societal norm and judges other agents' actions accordingly. Thus, anyone supplying labor in excess of the mean earns additional respect, while anyone contributing less loses respect. Notice that in this case all agents revise their coefficients uniformly, that is, all revise their concern for, say, j in the same direction (with the exception of j herself). Stating this formally, let $\bar{L}(t)$ denote the mean of $\{L_1(t), \ldots, L_n(t)\}$. According to the mean standard of behavior, $L_j^i(t) = \bar{L}(t)$, for all $i, j = 1, \ldots, n, i \neq j$.

As shown in Esteban and Kranich (2001), the model we have described has two types of stationary solutions. One corresponds to the case in which everyone conforms to the average behavior. In this case, whatever is the matrix of coefficients necessary to support such an equilibrium, it will clearly be stationary since no agent will have reason to modify its esteem for any other agent. In the second type, society is divided into clusters: one set of individuals who conspicuously work more than the average and earn maximal esteem/concern from others, another set who work less than the mean and garner no esteem, and possibly a third set who work precisely the average.

As shown in their Proposition 1, a common effort equilibrium exists if and only if

$$\frac{n}{n-1} \frac{\beta_n - \beta_1}{\beta_n} \leq \tau \leq 1. \tag{3.2}$$

In words, it requires a minimum level of redistribution for individuals to develop altruistic sentiments for each other sufficient to support a common effort equilibrium.

From (9), we can obtain that in a common effort equilibrium we shall have that there is a level of labor supply L and individual sentiments for each other such that,

$$L = \beta_i \left[(1-\tau) + \tau \frac{\alpha_i}{n} \right], \tag{3.3}$$

for each individual $i = 1,\ldots,n$.

Clearly, there are multiple common effort steaty state equilibria. Condition (12) states that for that for any τ satisfying this inequality, there exist $\alpha \in [0,n]$ and $L > 0$ such that (13) is satisfied for every individual i. For each L, (13) defines a relationship between α and β which entails that individuals with lower productivity are more altruistic than individuals with higher productivity. Notice that, since all individuals work the same amount of hours, income will be positively correlated with productivity. Hence, altruism will be inversely related to income.

Given L and β, the maximum degree of altruism corresponds to the individual with the lowest productivity β_1, and the smallest altruism to the largest productivity β_n. Since $\alpha_i \in [1,n]$, feasibility requires that

$$\alpha_1 = -\frac{(1-\tau)n}{\tau} + \frac{nL}{\tau}\frac{1}{\beta_1} \leq n, \tag{3.4}$$

and

$$\alpha_n = -\frac{(1-\tau)n}{\tau} + \frac{nL}{\tau}\frac{1}{\beta_n} \leq 1. \tag{3.5}$$

The two restrictions together imply (3.2).

Finally, observe that the equilibrium levels of labor supply L satisfy

$$\beta_n [(1-\tau)] + \frac{\tau}{n} \leq L \leq \beta_1 \quad .(3.6)$$

In the second type of equilibria society is partitioned into clusters. There can be two or three clusters formed by the individuals supplying above and below the mean labor supply, and possibly a middle group comforming to mean behavior. As shown in Esteban and Kranich (2001), a necessary condition for the existence of a three-cluster equilibrium is that

$$\frac{\beta_{b+m} - \beta_{b+1}}{\beta_{b+m}} \leq \frac{(m-1)\tau}{n - \tau b}. \tag{3.7}$$

where b and m are the size of the groups supplying labor below the mean and at the mean, respectively.

Notice that (3.7) generalizes restriction (3.2), which is necessary and sufficient for the existence of a common effort equilibrium. Indeed, this corresponds to the case in which $m = n$ and $b = 0$. Also, (3.7) sets an implicit upper bound on the size of m. As $\tau \to 0$ the $RHS \to 0$ and hence the support of the productivities of the eventual members of the middle class vanishes. Further, since $m \le n - 2$ and $b \ge 1$, we have

$$\frac{(m-1)\tau}{n-\tau b} \le \frac{(n-3)\tau}{n-\tau}. \tag{3.8}$$

Therefore, a necessary condition for the existence of a three-cluster equilibrium is that

$$\frac{\beta_{b+m} - \beta_{b+1}}{\beta_{b+m}} \le \frac{(n-3)\tau}{n-\tau}. \tag{3.9}$$

Clearly, the lower is τ, the smaller the permissible support for the distribution of productivities of the middle class and hence the smaller that class will be.

In this second type of stationary equilibrium individual preferences are such that the group with low labor supply earns no esteem from the rest of society, while the ones performing above average are admired by everyone. In this case we can properly speak of social exclusion towards the poor.

4. VOTING OVER TAX SCHEDULES

In the previous section we have seen that there are two scenarios possible. In one, we have that the entire population conforms to a common pattern of behavior and that the endogenously generated sentiments, while being inversely related to income, do not show any form of discrimination on the basis of individual characteristics. Indeed, the nature of the equilibrium does not depend on how individuals allocate their total altruism among their fellow citizens. In the second scenario, the way esteem is allocated is indeed positively correlated with individual productivity.

Let us now consider the different attitudes towards taxation. Intuitively we should expect that in the clustered equilibrium, because of the universal admiration felt towards the highly productive individuals, even the poor might not be favorable to taxing the rich. Further, because of the, again universal, lack of esteem for the poor no one would value the equalizing transfers of the linear tax system as beneficial. Therefore, the most plausible outcome is that redistribution would be minimal, if any.

Let us now consider the case for taxation in a society at the common effort equilibrium. Here, all individuals display positive degrees of altruism and hence there are good reasons to expect a more favorable attitude towards high taxation. It is true that sentiments need not be directed towards the very poor. In equilibrium, each individual can allocate her total esteem quite freely. But, at least if we restrict to equilibria in which all individuals have a preference for the poor we would expect a majoritarian support for high taxation.

In this section -and this is the main result of this paper- we shall prove that, contrary to the above intuition, even in an altruistic equilibrium taxes always are universaly disliked.

We shall examine the individual valuation of a marginal change in taxes. Of course, we shall assume that individuals are aware that a change in the tax schedule will vary not only her own labor supply but that of everybody else in the economy as well. This change will affect both aggregate output –and hence total tax collection– as well as individual utility due to a different labor supply. To this effect, we shall take that individual labor supply schedules are public knowledge.

Further, labor supply depends on individual altruism, which in turn would be eventually influenced by the new tax. In that respect, we assume that individuals are not that sophisticated and that take current preferences as fixed.

In the tradition of the literature of voting over taxes, our exercise will consist of computing the change in the (social) utility of each individual induced by a marginal variation in the tax rate -and the corresponding uniform transfer. The next step is to check for the monotonicity of this derivative with respect to income (or labor supply or productivities). The point then is to verify whether the median voter would or not be favorable to an increase in taxation. Because of the monotonicity of the marginal utility of taxation one can deduce whether a majority would favor an increase in taxation.

Let us compute the marginal utility of taxation for individual i.

Differentiating the (social) utility of individual i (2) with respect to t we have

$$\frac{dU_i}{dt} = \sum_j \alpha_j^i \Delta_j \, , \tag{4.1}$$

where,

$$\Delta_j \equiv \frac{du_j}{dt} = \frac{dc_j}{dt} - L_j \frac{dL_j}{dt} \tag{4.2}$$

is the marginal direct utility of a change in taxation for individual j.

Differentiating individual consumption (6) and labor supply (9) we have

$$\Delta_j = -\beta_j L_j + (1-t)\beta_j \frac{\partial L_j}{\partial t} + \frac{\partial}{\partial t}\left(\frac{tY}{n}\right) - L_j \frac{\partial L_j}{\partial t} =$$
$$= -\beta_j L_j - \left(L_j - (1-t)\beta_j\right)\frac{\partial L_j}{\partial t} + \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right) =$$
$$= -\frac{\alpha_j}{n}\beta_j^2\left(1 - t\frac{n-\alpha_j}{n}\right) - (1-t)\beta_j^2\frac{n-\alpha_j}{n} + \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right) = \qquad (4.3)$$
$$= -(1-t)\beta_j^2\frac{\alpha_j}{n} - t\beta_j^2\left(\frac{\alpha_j}{n}\right)^2 - (1-t)\beta_j^2 + (1-t)\beta_j^2\frac{\alpha_j}{n} + \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right) =$$
$$= -\beta_j^2\left[1 - t + t\left(\frac{\alpha_j}{n}\right)^2\right] + \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right)$$

By combining (19) and (21) we have that the marginal utility of taxation is the weighted sum of the terms Δ_j, which in turn are the sum of a term equal for all individuals $-\frac{\partial}{\partial t}\left(t\frac{Y}{n}\right)$- and a term that varies with j, that is, with the productivity parameter β. To establish whether $\frac{dU_i}{dt}$ is monotonic with respect to income - and to β - observe first that

$$\sum_j \alpha_i^j \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right) = \alpha_i \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right).$$

It is immediate that, for all equilibria in which individual altruism varies monotonically with the productivity parameter, the expression above will be also monotonic with respect to productivity.

We now need to assess the properties of the terms

$$-\beta_j^2\left[1 - t + t\left(\frac{\alpha_j}{n}\right)^2\right].$$

Multiplying and dividing them by

$$\left[1 - t + t\frac{\alpha_j}{n}\right]^2$$

we finally obtain

$$\Delta_j = -\beta_j^2\left[1 - t + t\frac{\alpha_i}{n}\right]^2 \frac{1 - t + t\left(\frac{\alpha_j}{n}\right)^2}{1 - t + t\left(\frac{\alpha_j}{n}\right)^2} + \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right). \qquad (4.4)$$

Using (9) we can write

$$\Delta_j = -L_j^2 A_j + \frac{\partial}{\partial t}\left(t\frac{Y}{n}\right), \qquad (4.5)$$

where

$$A_j = \frac{1-t+t\left(\frac{\alpha_j}{n}\right)^2}{\left[1-t+t\frac{\alpha_j}{n}\right]^2}.$$

It can be readily verified A_j is decreasing in α_j.

Using this fact in (23), we have the following Lemma.

Lemma 4.1. For all equilibria in which labor supply is non-decreasing in β and altruism is non-increasing in β, we have that Δ decreases with β.

Specifically, in all common effort equilibria Δ decreases with β.

From Lemma 1 it follows (certainly in the common effort equilibria) that

$$-\beta_n^2\left[1-t+t\left(\frac{\alpha n}{n}\right)^2\right]+\frac{\partial}{\partial t}\left(t\frac{Y}{n}\right)\le \Delta_j \le -\beta_1^2\left[1-t+t\left(\frac{\alpha_1}{n}\right)^2\right]+\frac{\partial}{\partial t}\left(t\frac{Y}{n}\right). \qquad (4.6)$$

Let us now compute the derivative of the tax revenue with respect to the marginal tax rate

$$\frac{\partial}{\partial t}\left(t\frac{Y}{n}\right)=\frac{Y}{n}+t\sum_j \beta_j\frac{\partial L_j}{\partial t}=\frac{Y}{n}-\frac{t}{n}\sum_j \beta_j^2\frac{n-\alpha_j}{n}=$$
$$=\frac{1}{n}\left(Y-\sum_j \beta_j\left[\beta_j-L_j\right]\right)=\frac{1}{n}\left(2Y-\sum_j \beta_j^2\right) \qquad (4.7)$$

Using (3) and (9) we find,

$$\frac{\partial}{\partial t}\left(t\frac{Y}{n}\right)=\frac{1}{n}\left(\sum_j \beta_j^2-2t\sum_j \beta_j^2\frac{n-\alpha_j}{n}\right) \qquad (4.8)$$

Using (26) in the left hand side of (24) –which we denote LHS(24)– we have that

$$\text{LHS}(24)=\frac{1}{n}\left(\sum_j \beta_j^2-2t\sum_j \beta_j^2\frac{n-\alpha_j}{n}-n\beta_n^2+nt\beta_n^2\frac{n^2-\alpha_n^2}{n^2}\right)=$$
$$=\frac{1}{n}\left(\left[\sum_j \beta_j^2-2t\sum_j \beta_j^2\frac{n-\alpha_j}{n}\right]-\left[n\beta_n^2-tn\beta_n^2\frac{n-\alpha_n}{n}\frac{n+\alpha_n}{n}\right]\right)= \qquad (4.9)$$
$$=\frac{1}{n}\left(\sum_j \beta_j^2\left(1-2t\frac{n-\alpha_j}{n}\right)-\sum_j \beta_n^2\left(1-\frac{n+\alpha_n}{n}t\frac{n-\alpha_n}{n}\right)\right)$$

Let us now examine the terms

$$\beta_j^2\left(1-2t\frac{n-\alpha_j}{n}\right).$$

Using (9) we can write

$$\beta_j^2\left(1-2t\frac{n-\alpha_j}{n}\right)=-\beta_j^2 t\frac{n-\alpha_j}{n}+\beta_j L_j=-\beta_j\left[\beta_j t\frac{n-\alpha_j}{n}\right]+\beta_j L_j=$$
$$=-\beta_j\left(\beta_j-L_j\right)+\beta_j L_j=2\beta_j L_j-\beta_j^2\equiv B.$$

Differentiating B with respect to β we have,

$$\frac{\partial B}{\partial\beta}=2L_j+2\beta_j\frac{dL_j}{d\beta_j}-2\beta_j$$

We know that $L_j<\beta_j$ and that, in a common effort equilibrium, $\frac{\partial L_j}{\partial\beta_j}=0$.

Hence, in the common effort equilibrium we shakk have that

$$\frac{\partial B}{\partial\beta}<0$$

This means that

$$\beta_n^2\left(1-2t\frac{n-\alpha_n}{n}\right)<\beta_j^2\left(1-2t\frac{n-\alpha_j}{n}\right)<\beta_1^2\left(1-2t\frac{n-\alpha_1}{n}\right) \qquad (4.10)$$

Therefore, going back to (27)

$$LHS(24)>\frac{1}{2}\left[n\beta_n^2\left(1-2t\frac{n-\alpha_n}{n}\right)-n\beta_n^2\left(1-\frac{n+\alpha_n}{n}t\frac{n-\alpha_j}{n}\right)\right] \qquad (4.11)$$

Observe now that the RHS of (29) is negative. We have thus found a lower bound for LHS(24).

Let us now examine the right hand side of (24), $RHS(24)$.The expression will be the same as in (27) where α_1 and β_1 take the place of (α_n,β_n). Hence

$$RHS(24)=\frac{1}{n}\sum_j\beta_j^2\left(1-2t\frac{n-\alpha_j}{n}\right)-\sum_j\beta_1^2 1-\frac{n+\alpha_1}{n}t\frac{n-\alpha_1}{n} \qquad (4.12)$$

Using (28) we finally have that

$$RHS(24)<\beta_j^2\left[\frac{n+\alpha_1}{n}-2\right]\frac{n-\alpha_1}{n}\leq 0 \qquad (4.13)$$

We have thus proven our main Proposition.

Proposition 4.2. *In any common effort equilibrium and for every tax rate all individuals will unanimously prefer a decrease in taxation*.

The statement of the Proposition above is valid for all common effort equilibria and tax rates compatible with it. Hence, it follows that no common effort equilibrium is sustainable as a political equilibrium.

5. DISCUSSION OF THE MAIN RESULT

Let us start by stressing the meaning of our result. The statement of our Proposition is valid for all economies described by our model in Section 2 that posses an equilibrium in which all individuals supply the same amount of labor time and altruism is inversely related to income. We do not need this altruism to emerge endogenously. Our model of endogenous formation of individual sentiments plays the role of showing that this particular situation is not arbitrary, but can be a natural outcome of the described process of updating of individual sentiments

It is somewhat paradoxical that even allowing for altruism to be allocated with a positive bias towards the poor, in any common effort equilibrium, there is a unanimous preference for tax reductions. In this section we will discuss this result in some detail. We will first uncover the economic arguments behind the mathematical derivation and examine later the generality of our result. As we shall see, our negative result opens interesting questions about taxation in an economy with altruistic individuals.

Let us first consider the derivative of the individual (social) utility with respect to the tax rate t. This is given in expression (19) and consists of a weighted average of the direct individual marginal utilities with respect to t. The key point is whether this average is non-negative for the majority of individuals, at least for some value of the tax rate t. The way the literature has handled this problem has been by examining whether the marginal utility with respect to taxation is monotonic with income (or productivity) and then verify for which tax rate would the marginal utility of the median voter be zero. Lemma 1 shows that under some reasonable assumptions –certainly satisfied in a common effort equilibrium– indeed individual direct marginal utilities are monotonic with respect to productivity (and income). Yet, our main proposition establishes that even the marginal utility of the poorest person will be negative and hence nobody will be supporting an increase in taxation.

The point we want to stress is that the difficulty in having a majoritarian support for taxation might be an endemic problem in economies with altruism. It may well be that the strong result that even the poorer person is negative to an increase in taxes heavily depends on the simple assumptions we have made concerning preferences and technology. Suppose now that we had a different specification for which marginal utilities were still monotonic and strcitly positive for poor individuals. Consider for a moment the social marginal valuation by the most productive individual. If this agent also is the most egoistic –say $\alpha_n = 1$– only her own private disutility will enter into her valuation and hence would oppose an increase in taxation. Let us now consider to poorest person, who also is the most altruistic –say $\alpha_1 = n$–. Her social marginal valuation will give equal weight to her positive direct marginal utility than to the negative marginal utility by the most productive person in the economy. Take now the second poorest -who will be less altruistic- and assume that her altruistic feelings are preferably directed in favor of the poor so that she stops being concerned about the most productive individual. In view of (19), it is clear that the social marginal valuation by this individual will be higher than that of the poorest person in the economy. Going now to the other end of the economy –and assuming the same pattern for the allocation of altruism– the second most productive individual will consider her own direct disutility as well as the positive marginal utility of the poorest individual, with an ambiguous net result. It is plain that the social marginal valuation by the different individuals will not be monotonic with respect to income even if private marginal valuations are.

The puzzling conclusion is, that contrary to first intuition, in altruistic societies the poor might not be favorable to an increase in taxation when altruism is negatively related to income. In general, we cannot expect a monotonic social marginal valuation by the different individuals. Hence, there are little hopes that the case of voting over taxes can be handled.

Our model of endogenous formation of individual sentiments shows that the negative relationship between altruism and income is a common feature of ALL steady state equilibria that this model possess. Therefore, in as much as our model captures actual patterns of behavior, our paper demonstrates that individual attitudes towards taxation need not be monotonically related to income.

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