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MAJORITY VOTING AND PROGRESSIVITY*

Francisco MARHUENDA
Ignacio ORTUÑO-ORTÍN
Universidad de Alicante

The popular support obtained by two parties who propose two qualitatively different tax schemes is analyzed. We show that if the median voter is below the mean, then the most progressive proposal wins. We also extend this result to other elections for which the winning majority is not necessarily 50%.
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Introduction

The theory of income taxation has been a fundamental area of research in economics. An important question here refers to the fact that most democratic societies adopt income tax regimes with increasing average and marginal tax rates (Snyder and Kramer, 1988). This regularity in the type of progressive tax schemes across countries could be explained by assuming that the tax designer tries to maximize some utilitarian social welfare function.

An alternative approach is to consider the tax policies adopted in a democratic society as the outcome of a voting mechanism. In this case, it is usually assumed that political parties propose different tax schemes and agents, who are self-interested, vote for their most preferred one. This approach might be seen as unrealistic since in actual societies this kind of process rarely takes place. However, as (Roberts, 1977) notes, «the point is not whether choices in the public domain are made through a voting mechanism but whether choice procedures mirror some voting mechanism».

The literature on this area is still very inconclusive on the connection between progressive taxation and voting. Foley (1967), Romer (1975, 1977),

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and Roberts (1977) analyze the outcome of a majority-rule voting scheme in which the proposed tax policies must be *linear functions* of income. Snyder and Kramer (1988) study the existence of progressivity of income taxation as a voting equilibrium in an economy with two sectors «a legal, taxable sector, and an underground, untaxable sector». But they only admit tax functions which are *individually optimal* for some voter. Cukierman and Meltzer (1991) analyze a model in which the tax functions are *quadratic* in income. They provide some sufficient conditions for the median voter most preferred tax function to be a Condorcet winner. They also show that under additional, rather strong conditions, such a tax function is progressive. Roemer (1993) provides simulated equilibria in a model with constituency-representing parties and uncertainty. But the admissible tax functions are also quadratic in income.

Marhuenda and Ortuño-Ortín (1995) analyze a model in which income levels are fixed –so incentive problems are left aside. The set of admissible tax schemes contains all the non-decreasing concave and convex functions (including linear functions) on income that raise just enough revenue to meet an exogenously given revenue target. The main result is that, for income distributions with median below the mean, any concave tax scheme obtains less popular support than any convex tax scheme provided that this one treats the poorest agent no worse than the concave tax scheme.

In this paper we extend the results in Marhuenda and Ortuño-Ortín (1995) in two directions. First, we consider more general elections in which the winning majority is not necessarily 50%. Second, our analysis establishes conditions on the income distribution which guarantee that given two tax policies, say t_1 and t_2, if $t_1(0) \leq t_2(0)$ and $t_1 - t_2$ is convex, then t_1 obtains the appropriate majority of votes. The intuitive contents of these hypotheses is the following. The first one says, of course, that the tax policy t_1 leaves the poorest agent in the economy better off than the policy t_2 does. Whereas, the requirement that $t_1 - t_2$ be convex holds provided the marginal tax rate increases faster with t_1 than with t_2. Thus, one may interpret these conditions as saying than the tax policy t_1 is «more progressive» than t_2.

Thus, even though we do not provide a complete positive model of progressive taxation –such a model cannot consist of just a majority rule mechanism and it should contain more realistic elements as, for example, uncertainty, ideological parties, voting on multidimensional issues, multiparty elections, etc.– our result may help to understand why most democracies have increasing average and marginal tax rates.

Model and Results

The economy consists of a large number of agents who differ in their income. The income distribution is fixed and described by a continuous distribution function $F(x)$ on the interval $[0, 1]$. We identify an agent with his income $x \in [0, 1]$. This could be seen as a rather restrictive assumption, since, in general, the income distribution might depend on the tax scheme. Furthermore, we ignore any tax evasion problems.

We consider two political parties represented by $i \in \{1, 2\}$ who propose two different income tax policies, t_1 and t_2, designed to collect a given amount of revenue $R < \mu$ from the taxpayers, where $\mu = \int_0^1 x \, dF(x)$ denotes mean (and total) income. Both political parties know the income distribution $F(x)$ and their objective is to win the election.

Assumption: The tax policy put forward by each party must satisfy the following requirements.

1. *For each $x \in [0, 1]$, $t(x) \leq x$.*
2. *The tax policy $t(x)$ is continuous and nondecreasing in x.*
3. $\int_0^1 t(x) \, dF(x) = R$

Condition (1) says that tax liabilities cannot exceed income. Observe that we do not require $t(x) \geq 0$ allowing, thus, for possible redistribution of income. The second requirement seems a very natural restriction. Note that we do not require t to be differentiable at all points. Condition (3) requires that the total tax collected must meet the target R.

We will assume that the amount and the composition of the public good has been already decided, so the only political issue to be settled is how to finance it. In this case, given the two proposals, t_i, $i \in \{1, 2\}$, made by the parties, agent x will vote for the one which minimizes his tax payment. That is, given t_1 and t_2 the voting is given by the function $\varphi_{t_1, t_2}: [0, 1] \to \{1, 2\}$

$$\varphi_{t_1, t_2}(x) = \begin{cases} 1 & \text{if } t_1(x) < t_2(x) \\ 2 & \text{if } t_1(x) \geq t_2(x) \end{cases}$$

For simplicity we have assumed that if an agent is indifferent between the two alternatives t_1 and t_2, he will vote for t_2. In our model this will play no role since the set of indifferent agents will have measure zero. Given φ_{t_1, t_2} the votes obtained by party 1 are

$$N(t_1, t_2) = \int_{\{x \in \varphi^{-1}_{t_1, t_2}(1)\}} dF(x)$$

We study conditions under which a party can obtain a given percentage $\sigma \in (0, 1)$ of the electoral votes. Thus, we say that party 1 wins a σ-majority election if $N(t_1, t_2) > \sigma$ and looses it whenever $N(t_1, t_2) < \sigma$. In case $N(t_1, t_2) = \sigma$, then party 1 wins with probability 1/2. Again, in the Proposition below, this last possibility will not be relevant. The implemented tax policy will be the one proposed by the winning party.

Definition: The σ voter is the agent with income x_σ such that

$$F(x_\sigma) = \int_0^{x\sigma} dF(x) = \sigma$$

Proposition: Suppose $x_\sigma < \mu$ and let $t_1 \neq t_2$ be two tax policies satisfying the above assumption and such that $t_1(0) \leq t_2(0)$ and $t_1 - t_2$ is convex. Then $N(t_1, t_2) > \sigma$.

Proof: Let T be defined on [0, 1] by

$$T(x) = t_1(x) - t_2(x)$$

Then, T is a convex function satisfying $T(0) = t_1(0) - t_2(0) \leq 0$. By Jensen's inequality,

$$T(\mu) \leq \int_0^1 T(x)\, dF(x) = \int_0^1 t_1(x)\, dF(x) - \int_0^1 t_2(x)\, dF(x) = 0$$

Since T is convex and $T(0) \leq 0$, then $T(x) \leq 0$ whenever $x \leq \mu$, which finishes the proof. □

The most relevant value of σ when two parties compete to win an election is $\sigma = 1/2$. However, larger values of σ can be considered to accommodate situations in which there is already an *status quo* which can only be changed with the support of a fraction of the population larger than, say, 2/3. The result above shows that a more progressive policy will win, provided the assumption on the distribution of the population stated there holds.

As a particular case, we obtain the following result. When $\sigma = 1/2$, this Corollary is Proposition 2.4 in Marhuenda and Ortuño-Ortín (1995).

Corollary: Suppose $x_\sigma < \mu$ and let $t_1 \neq t_2$ be two tax policies satisfying the above assumptions and such that $t_1(0) \leq t_2(0)$, t_1 is convex and t_2 is concave. Then $N(t_1, t_2) > \sigma$.

In case redistribution of income is not allowed, i.e. for each $x \in [0, 1]$ the permissible tax policy, $t(x)$ has to satisfy $0 \leq t(x) \leq x$, then a convex (concave) function is unambiguously *progressive* (regressive). That is both the marginal and average tax are increasing (decreasing). Hence, the Corollary implies that, in this context, any progressive tax policy wins over any regressive one.

It is important to notice that our analysis provides the only circumstances under which a concave tax policy can beat a convex one. This can happen whenever the poorest segment of the population is better off with the concave tax scheme. That is, a party proposing a concave tax policy which favors the very poor, can win an election when confronted with a convex tax plan.

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Resumen

Esta nota analiza el apoyo democrático obtenido por dos partidos que proponen dos políticas fiscales cualitativamente diferentes. Se demuestra que si la renta del votante mediano es menor que la renta media, entonces gana la propuesta fiscal más progresiva. También se extiende este resultado al caso de elecciones en las que la mayoría necesaria para ganar no tiene por qué ser el 50%.

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