ENDOGENOUS PARTY FORMATION AND THE EFFECT OF INCOME DISTRIBUTION ON POLICY

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A B S T R A C T

We develop a model of spatial political competition with ideological parties and uncertainty. The political issue is the income tax rate and the amount of a public good. The ideology of each party is determine endogenously. We show that the tax rate does not coincide with the ideal policy of the median voter. Moreover, the tax rate is not increasing in the difference between the mean income and the median income.

Keywords: Party formation, redistribution, growth.

1. Introduction

The relationship between income distribution and redistributive taxation has become an important element in many recent papers on political economy. For example, the current literature on income distribution and growth (see[1], [22]) postulates that more unequal societies will have more redistribution and this will affect economic growth. In particular, when redistribution is obtained through distortionary taxation inequality is detrimental to growth.

This paper deals exclusively with the first link of that argument–namely, on the connection between income distribution and redistribution– and will not study the effects of redistribution on growth. Our conclusion, however, will have implications for the debate on inequality and economic growth, because we will show that the relationship commonly thought to hold in a democracy between income distribution and redistribution lacks a solid foundation.

Redistributive policies in democratic societies should emerge from a political process which reflects the preferences of the population. Most papers in this literature adopt the spatial political competition model introduced by Downs [9]. In this model, it is assumed that there are two candidates (or political parties) who (simultaneously) propose policies. Citizens vote on these proposals and the

one obtaining a majority is implemented. Candidates do not care about policies per se, but only about winning the election. This approach leads, under certain conditions on voters' preferences, to the well-known median voter theorem: the two candidates propose the same policy, the ideal policy of the median voter. Thus, the median voter becomes the decisive citizen. Allan Meltzer and Scott Richard [16],[17] use this model to show that inequality leads to more redistribution. Alesina and Rodrick [1] and Persson and Tabellini [22] obtain similar conclusions in a dynamic model. The basic idea is that the citizen with the median income (or of the median type in the case income is assumed to be endogenous) is decisive and her incentive for redistribution is increasing in the gap between the median and the mean income. Thus, if inequality is measured by the ratio of mean to median income, what is more accurately called skewness of the income distribution, more inequality leads to more redistribution.

The empirical evidence, however, finds no significant effect of income skewness on redistribution (the standard reference is Perotti[21]. See Benabou [4] for a survey of the literature and Rodriguez [24] and Partridge [19] for specific evidence for the United States). We believe that the reason for the inconsistency between the received theory and the empirical evidence is due to the way the political process is represented. In particular, we shall show that, in a more sophisticated

model of the political process, the claim that decreasing skewness of the income distribution necessarily leads to decreasing tax rates is false.

The existing literature on redistribution provides alternative theories to the median voter approach. For example, Grossman [13] and Benhabib and Rustichini [5] present models dealing with the security of property rights in which inequality increases the incentives for poor people to engage in rent-seeking activities. The literature on interest groups, see for example Austen [3] and Grossman and Helpman[12], provides models in which the rich have more access to the political power than the poor. This might be due, for example, to a differential capacity to influence policy makers. It is also sometimes assumed that the rich have higher participation rates in elections. In these models it is no longer true that more skewness implies more redistribution. However, these alternative approaches to the standard median voter approach either do not take elections and votes as the main determinants of policy or rely on some type of imperfection in democratic institutions. Our analysis, on the contrary, will emulate Downs's approach in postulating a two-party system with a one-dimensional policy issue (the tax rate), in which all citizens have equal influence (their vote). Parties put forward proposals and the one obtaining more votes is implemented. We depart, however, from Downs in assuming that our parties care about policy (not just about winning

elections), i.e. we consider ideological parties. This view of political competition has been adopted in many recent papers (see for example Wittman [32], Alesina and Rosenthal [2], Roemer [28], [27],[25], Chang [7] and Osborne [18] for a survey).

The model we propose shall differ in two ways from the one just described: we shall assume, first, that the candidates are replaced by *parties*, each of whose goal is to maximize the expected welfare of its members (in a sense to made precise below), and second, that the parties are *uncertain* about the exact distribution of voter types. Only by deviating in these two ways from the classical model will we generate a political equilibrium in which both parties do not play the median ideal policy in equilibrium.

To close our model, we will require a theory of whom parties represent. We propose an endogenous theory of party formation, following the literature on "voting with your feet" (see Caplin and Nalebuff [6]). We assume, with no argument, that only two parties will form, but we determine the preferences of those parties endogenously, as follows. There shall be a cut-off income level, σ: members of the Left party shall consist in an unbiased sample of all citizens whose income is less than σ, and members of the Right party shall consist in an unbiased sample of all citizens whose income is greater than σ. We shall propose below a method of determining a party's preferences over policies, as an aggregation of the prefer-

ences of its members. Given the preferences of parties, a unique Nash equilibrium in the game of political competition will exist. We now determine the value of σ by stipulating that the party formation process is itself in equilibrium if and only if every member of each party prefers the policy her party puts forth (in Nash equilibrium) to the policy put forth by the other party. Thus, if a citizen should prefer the policy put forth by the opposition party, she should vote with her feet by decamping to the other party. The party formation process equilibrates when no one decamps.

In our model, the value of σ will depend on the whole distribution of income, not just on its median and mean. A fortiori, knowing the skewness of the income distribution is insufficient for determining the tax rate forthcoming from the political process. In particular, we shall show that, in non-singular cases, decreasing skewness of the income distribution may be associated with *increasing* tax rates, contra Persson and Tabellini [22].

2. The model

The society consists of a continuum of citizens. A citizen is characterized by her (pre-tax) income level w. Income is distributed according to the probability distribution function $F(w)$. We assume that F is differentiable and strictly increasing.

All individuals have identical preferences over disposable income m and public good G; these preferences are represented by the utility function

$$u(m, G) = m + kG^a, \quad k > 0, 0 < a < 1. \tag{2.1}$$

In particular, citizens supply labor inelastically.

The public good is financed through a proportional income tax rate τ. We assume that the government budget is always balanced. Setting the price of the public good equal to one, the amount of public good at the tax rate τ is

$$\begin{aligned}
G &= \tau \int_0^\infty w \, dF(w) \tag{2.2} \\
&= \tau \mu
\end{aligned}$$

where μ is the mean income and $\tau \in [0, 1]$.

Thus a citizen with (pre-tax) income level w has the von Neumann-Morgenstern indirect utility function

$$v(\tau; w) = (1 - \tau)w + k(\tau\mu)^a \tag{2.3}$$

and her ideal tax rate is

$$\tau(w) = \left(\frac{w}{ak}\right)^{\frac{1}{a-1}} \mu^{-\frac{a}{a-1}} \tag{2.4}$$

Notice that poorer agents prefer higher tax rates. Higher values of τ are more redistributive policies.

There are two political parties. Party l represents the agents with income levels below σ i.e., agents in the set $L(\sigma) \equiv \{w : w < \sigma\}$, and party r represents the agents in the set $R(\sigma) \equiv \{w : w > \sigma\}$. We call σ the *separating income level* or *separating type*. At this point σ is exogenously given, but later on we will endogenize it. We suppose that the members of party l (r) form an unbiased sample of the set $L(\sigma)$ $(R(\sigma))$. Thus we also say that $L(\sigma)$ $(R(\sigma))$ is the set of individuals members of party l (r). We see a party as an institution that aggregates the preferences of its members. It follows that the preferences (ideology) of the parties will depend on the sets $L(\sigma)$ and $R(\sigma)$. We will assume that a party maximizes the average welfare of its members[1]. In our model this assumption will imply that the preferences of a party coincide with the preferences of its *mean* member. There are, of course, other sensible ways to model the way a party aggregates preferences. For example, if parties are democratic institutions one might suppose that the ideology of a party should coincide with the preferences of its *median* member. Our results, however, would also hold under this alternative

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[1]This is just a simplifying assumption. In a more realistic model one might assume that each party cares about the welfare of all the individuals. However, a party should put a lower weight on the welfare of individuals "represented" by the other party than on the welfare of its own people. If the difference on weights is big enough the results would be similar to the ones provided in this paper.

way to model party ideology. Thus we assume that the preferences of parties are given by the von Neumann-Morgenstern utility functions

$$v_l(\tau) = \int_{L(\sigma)} \left((1 - \tau)w + k(\tau\mu)^a \right) dF(w) \tag{2.5}$$

and

$$v_r(\tau) = \int_{R(\sigma)} \left((1 - \tau)w + k(\tau\mu)^a \right) dF(w) \tag{2.6}$$

Let $W_l(\sigma) = \frac{\int_{L(\sigma)} w dF(w)}{F(\sigma)}$ and $W_r(\sigma) = \frac{\int_{R(\sigma)} w dF(w)}{1 - F(\sigma)}$. Then, after dropping a constant, we can write

$$v_l(\tau) = (1 - \tau)W_l(\sigma) + k(\tau\mu)^a \tag{2.7}$$

and

$$v_r(\tau) = (1 - \tau)W_r(\sigma) + k(\tau\mu)^a \tag{2.8}$$

Thus party i has a utility function that coincides with the utility function of the member of the party with income level $W_i(\sigma)$, i.e. of the individual with the mean income level in that party.

A <u>policy</u> consists of a tax rate τ and a level of public good G. Given that the budget constraint (2.2) must be satisfied we can see a policy just as a value of the income tax rate τ. Parties announce their policies simultaneously. Each

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individual votes for one of the two proposed policies. The policy that receives more than 50% of the votes wins and is implemented. Let x (y) be the policy proposed by party r (l). An agent with income level w prefers policy x to y, where $x < y$, iff $v(x; w) > v(y; w)$, or equivalently iff

$$w > k\mu^a \left(\frac{y^a - x^a}{y - x} \right) \equiv w(x, y) \qquad (2.9)$$

The fraction of agents in favor of policy y is then given by $F(w(x, y))$. In a model without uncertainty whenever $F(w(x, y))$ is greater (less) than 0.5 party l (r) wins and the tax rate $\tau = y$ $(\tau = x)$ is implemented. One can show that in this case the unique Nash equilibrium of the game played by the two parties with preferences given by (2.7) and (2.8) would be formed by the policies (x, y) such that

$$x = y = \tau_m$$

where τ_m is the ideal tax rate for an agent with the median income level in the whole population, i.e. with income level m such that $F(m) = 0.5$.

In this paper, however, we assume that given policies x and y, the outcome of an election is uncertain. This assumption is also found in many recent papers on political spatial competition (see the survey in Osborne [18]). Here we assume

that the probability that policy x wins is given by

$$p(x, y) = \frac{F\left(w(x, y)\right) + \epsilon - \frac{1}{2}}{2\epsilon}$$

where $\epsilon > 0$. Our analytical results will be quite robust to alternative ways of modeling uncertainty. The only essential assumption for our results to hold is that the probability that policy x wins, keeping y fixed, is decreasing in the distance $(y - x)$ (and a similar condition for y)– clearly, a natural assumption.

Now the expected utility functions for the parties are

$$\Pi_l(x, y) = p(x, y)\, v_l(x) \,+\, (1 - p(x, y))\, v_l(y) \tag{2.10}$$

and

$$\Pi_r(x, y) = p(x, y)\, v_r(x) \,+\, (1 - p(x, y))\, v_r(y) \tag{2.11}$$

Let $(x(\sigma), y(\sigma))$ be a Nash equilibrium of the game played by the two parties when the pay-off functions are given by (2.10) and (2.11). We will say that $(x(\sigma), y(\sigma))$ is an *equilibrium of the political contest*. It can be shown (see Roemer [26], Theorem 4.1) that $x(\sigma) \neq y(\sigma)$, so that the outcome now is different from the one given in the model without uncertainty. However, our critique of the extended use of the median voter theorem in macroeconomics cannot be based on just this result. First, it might be the case that for reasonable parameters of the

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problem, $x(\sigma)$ and $y(\sigma)$ are very close to τ_m. We will face this question in the next section. Second, our theory is not yet complete, because the separating income level, σ, is thus far exogenously given.. Thus, our next task is to endogenize σ or, in other words, to propose a party formation process.

Definition 2.1. $\{R(\sigma), L(\sigma), \sigma\}$ *is an average-member Nash equilibrium (AMNE) iff the equilibrium of the political contest, $(x(\sigma), y(\sigma))$ satisfies*

$$w\left(x(\sigma), y(\sigma)\right) = \sigma \tag{2.12}$$

To motivate this definition suppose that (2.12) is not satisfied and that

$$w(x(\sigma), y(\sigma)) > \sigma \tag{2.13}$$

Inequality (2.13) implies that some members of party r, namely all citizens with income in the interval $[\sigma, w\left(x(\sigma), y(\sigma)\right))$, prefer the policy proposed by party l to the one proposed by r. We claim that this type of situation cannot be stable. In other words, at equilibrium a party recruits its members only from the set of people who vote for it. A value of σ is stable if, at the Nash equilibrium of the political contest played by the two parties determined by it, all members of a party vote for the policy proposed by their party.

Our definition of an equilibrium of the party formation process is related to the equilibrium concepts found in Caplin and Nalebuff [6] and in the literature of

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"voting by feet" (see for example Westhoff [31], Epple et.al. [10] and Epple and Romer [11]).

We do not here provide a proof of the general existence of AMNEs , but will calculate these equilibria in the simulations that follow.

Note that the policies associated with an AMNE constitute a political-contest equilibrium and therefore we have, in particular, $x(\sigma) \neq y(\sigma)$. However, at this level of generality it is difficult to obtain further general properties of the AMNE. Thus, for example, we are not able to analyze the relationship between equilibrium tax rates and income distribution. In particular, we cannot yet answer the main question we raise: is there a significant relationship between equilibrium taxation and the skewness of the income distribution?

3. Simulations

In this section we report some simulations that answer some of the questions raised in section 1. The objective of this exercise is twofold. First, we want to study the magnitude of the difference between the expected tax rate in our model and the ideal tax of the median voter. Second, we investigate the relationship between taxation and skewness of the income distribution that holds in our model. The strategy will be to compare the equilibrium tax rate for different (realistic) income

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distributions, all of which possess the same mean and median. If the equilibrium average tax levels are not the same for all such distributions, we can conclude that the skewness of the income distribution is not a good indicator of the degree of redistribution in the economy. To facilitate this exercise we will work with income distributions belonging to the Burr-Singh-Maddala family of distribution functions.This family of functions has been used to estimate income distributions in several countries (see Sargan [29], Singh-Maddala [30], Cronin([8]), McDonald-Ransom([15])). We adopt it here since it has three degrees of freedom, which allows us to change the shape of the distribution keeping the mean and median values constant. Thus the income distribution is given by

$$F(w; \alpha, \beta, \gamma) = 1 - \frac{1}{(1 + \alpha w^\beta)^\gamma}$$

and the corresponding density function is

$$f(w; \alpha, \beta, \gamma) = \frac{\alpha \beta \gamma w^{\beta-1}}{(1 + \alpha w^\beta)^{\gamma+1}} \ .$$

The mean[2], median, and the Gini coefficient are respectively

$$\mu = \frac{\Gamma \left(1 + \frac{1}{\beta}\right) \Gamma \left(\gamma - \frac{1}{\beta}\right)}{\Gamma \left(\gamma\right) \alpha^{\frac{1}{\beta}}} \ ,$$

$$m = \left(\frac{2^{\frac{1}{\gamma}} - 1}{\alpha}\right)^{\frac{1}{\beta}} \ ,$$

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[2]Note that for the mean to be well defined, we need to have $\gamma\beta > 1$.

and

$$Gini = 1 - \frac{\Gamma\left(\gamma\right)\Gamma\left(2\gamma - \frac{1}{\beta}\right)}{\Gamma\left(2\gamma\right)\Gamma\left(\gamma - \frac{1}{\beta}\right)} \ .$$

Table 1 presents a series of AMNEs where $k = 4.5$, $a = \frac{1}{2}$ and $\epsilon = 0.20$. Each row of the table is an AMNE for a different choice of the parameters (α, β, γ). Indeed, we have chosen a series of values of (α, β, γ) to maintain $(\mu, m) = (40, 30)$, but to vary the Gini coefficient: this is possible because we are using a three-parameter family of density functions. The columns of the table are self-explanatory; $E(t)$ denotes the expected tax rate $p(x, y)x + (1 - p(x, y))y$.

We now motivate this simulation. In the political-economy literature, there is a popular view that, as the skewness of the income distribution, measured as the ratio $\frac{\mu}{m}$, increases, tax rates should increase. (See, for instance, Persson and Tabellini [22].) This conclusion is based on the Downs model of political equilibrium, that the equilibrium tax rate will be the ideal tax rate of the median voter. But Table 1 shows that, with AMNE, this conclusion is false. For the table displays a sequence of economies with constant skewness in which expected tax rates decrease (read the table from the bottom to the top). Since the equilibriumis continuous in the parameters (α, β, γ), we could now perturb those parameters slightly to produce a sequence of economies with *increasing* skewness in which expected tax rates (still) decrease.

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The key fact here is that the Downs equilibrium depends on only one characteristic of the distribution of income -its median. But AMNE equilibrium depends on the whole distribution. Downsian politics will not distinguish between different societes that possess the same median income, but ideological party competition will, in general, distinguish between any two societies, as long as their income distributions are not the same.

Table 1:

Gini	σ	x	y	$p(x,y)$	$E(t)$
0.434653	28.75	0.383653	0.139902	0.443255	0.24
0.444351	28.25	0.408851	0.138002	0.428176	0.24
0.449082	27.75	0.424958	0.137461	0.418763	0.25
0.451864	27.75	0.433305	0.13672	0.415342	0.25
0.453692	27.25	0.442597	0.136976	0.409473	0.26
0.454984	27.25	0.446924	0.136637	0.407854	0.26
0.455945	27.25	0.450236	0.136385	0.406638	0.26
0.456688	27.25	0.452854	0.136191	0.405691	0.26
0.457279	27.25	0.454974	0.136037	0.404932	0.26
0.45776	27.25	0.456726	0.135912	0.404311	0.26

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4. Conclusions

We have tried to show that modelling politics in a more realistic way than Downs's brings new insights about the relationship between redistribution and inequality. This is not a superfluous theoretical exercise for there is by now much empirical evidence against the implications of the median-voter approach to redistribution. We propose that a more nuanced view of the nature of democratic political competition is needed. In such an approach, the level of redistribution depends on the whole shape of the income distribution, not just its skewness.

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