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ENDOGENOUS PARTY FORMATION AND THE INEQUALITY-REDISTRIBUTION NEXUS

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Endogenous Party Formation and the Inequality–Redistribution Nexus

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Abstract

A number of reasons have been suggested to be the causes of the weak link between inequality and redistribution. The aim of the present paper is to investigate a new one, based on the endogeneity of party formation and the lack of representation in indirect democracies. Creation and maintenance of political parties is a costly activity and it is possible that some classes of population cannot afford it and therefore are under-represented. This could help in explaining why the median voter theories seem to fail in predicting the amount of redistribution as dependent on the level of inequality. Moreover, in this paper it is considered the "reverse lobbying": mass-media and other interest groups able to shift the voters' perceptions of the actual policies can obtain specific policies/expenditures from politicians in exchange for their activity.

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1 Introduction

Since the beginning of the 1990's, economic literature has focused on the relationship between inequality and growth in an innovative fashion, namely, through the political economy. Seminal papers in this field[1] have detected a simple linkage through which inequality is harmful for growth. It can be roughly described as follows. The more unequal is the ex-ante income distribution of an economy, the poorer is the median voter with respect to the mean income of the distribution. In turn, the further is the median voter from the mean, the more willing he is to bring about a strong redistribution via fiscal system. Provided political system is democratic, this leads to a higher tax rate on capital, which is a strong disincentive for investments, the engine for growth. Meltzer and Richard (1981), a decade in advance, had anticipated these models, finding very similar results.

Empirical evidence,[2] however, has pointed out that this mechanism has some weaknesses: on the one side, it seems to be true not only in democracies, but also in dictatorships (that is, in situations in which the median voter in principle does not have the opportunity to determine – neither directly nor indirectly – the level of redistribution). On the other side, even among democracies, the level of redistribution is not significantly correlated to the level of inequality. Therefore, other directions have been explored for understanding the linkage between inequality and growth and for integrating the politico-economic mechanism with other, more realistic features. The most popular, as reviewed by Perotti (1996), are socio-political instability (Alesina and Perotti, 1996) and borrowing constraints, in particular in presence of non-convex investment (since the seminal work by Galor and Zeira (1993)).

Two questions could therefore arise at this point: given that in all the economies income distribution is right-skewed and median income is lower than mean income, why do not we observe more redistribution? And why, according to many studies,[3] do we observe more redistribution in more equal countries and less redistribution in more unequal ones, or very different amounts of redistribution in similarly unequal countries?

Once recognized that a puzzling situation does exist, a number of solutions have been proposed. The first, more intuitive and extensively analyzed is that the poor can anticipate the effects of a (too) strong redistribution and its disincentive on the efficiency of the whole system. Trickle-down effects can therefore have a role in the process of redistribution.

[1] Bertola (1993), Perotti (1993), Alesina and Rodrik (1994), Persson and Tabellini (1994) are the most frequently quoted.

[2] Among others, Alesina and Rodrik (1994), Perotti (1996), Milanovic (2000), Barro (2000), Brandolini and Smeeding (2007).

[3] Among which Bénabou (2000), Milanovic (2000), Schwabish et al. (2004), Atkinson and Brandolini (2006), Brandolini and Smeeding (2007)

Second, many studies have pointed out that *de facto* political power is quite different from *de iure* political rights. Referring to the theories of rent-seeking, lobbying, groups of pressure and influence, Becker (1983), Acemoglu and Robinson (2000, 2001, 2006), Besley and Coate (1998), and others have argued that there are no significant differences between democracies and dictatorships because both systems are subject to some extent to these distortions. Of course, different countries are differently affected, but *de facto* political power is usually very far from being symmetric and homogeneous across individuals (Rosenstone and Hansen (1993), Bénabou (2000)).

A third interesting solution, developed by Saint-Paul and Verdier (1993), follows the idea of indivisibility/non-convexity of investment by Galor and Zeira (1993). In short, they introduce an incentive for the rich people to redistribute income, since it could help the poor escaping poverty traps, increasing the investment productivity of the whole economy and, therefore, also benefiting the rich. A next step was undertaken by Bourguignon and Verdier (2000), who merged the asymmetry of political power (linking it to the educational level) to the indivisibility of educational investment. The resulting model, therefore, considers both aspects and seems quite successful in explaining what is actually going on, even if it does not provide any empirical support. Moreover, it provides a convincing source of endogeneity of political power and redistribution.

The last factor that can play a role in these dynamics is social mobility. The probability of upward (downward) mobility is an incentive for the poor (rich) to keep the level of redistribution lower (higher) than what predicted by other models that do not consider this aspect (Bénabou, 1997; Bénabou and Ok, 2001). However, for this reason to be convincing, we need to assume that redistribution decisions are "sticky", in the sense that they cannot be changed frequently, and in particular, that the time horizon of the income mobility process is shorter than the one of redistribution decision.

The aim of the present work is to analyze a further aspect that, at the best of my knowledge, has never been investigated before: is it possible that there is uncomplete political representation at the origin of the bias between the policies preferred by the majority of the voters and the ones that are in facts implemented at the end of the political process? What is at the origin of this uncompleteness?

In order to answer these questions, the paper develops a model in which self-interested agents try to maximize their utility from the political process. Voters, political active citizens and interest groups interact in a two policies space where imperfectly informed individuals cast their votes according to the distance between their own preferred policies and the perceived policies announced by the parties.

Section 2 describes the model and the behavior of agents, namely individuals, groups, parties and lobbies, Section 3 shows the political outcome under different income distributions and how the representation of classes in the political framework can be affected by the factors described in the model, and section 4 concludes.

2 The model

The aim of this section is to present the theoretical model in details. Subsections 2.1 and 2.2 describe population and voters behavior: homogeneous groups of individuals have continuous preferences over both the policy instruments: the tax rate and the share of general redistribution, with respect to policies targeted in favor of lobbies and interest groups. Individuals vote according to their own preferences and to the perception of the policies announced by parties. Subsection 2.3 focuses on the parties. Since party creation and functioning is costly, the creation of a party is a decision that involves both an *incentive* constraint and a *budget* constraint. Once the decision of setting up a party has been taken, then the party must decide which policies to announce and how much support to ask from lobbies in order to maximize its probability of winning. Finally, lobbies behavior is analyzed in subsection 2.4. In this model lobbies are characterized by the possibility of changing individuals' perception of announced policies and exploit this feature by "selling" support to the parties in exchange for specific policies. The more support the parties need, the higher is the share of targeted redistribution with respect to general one.

2.1 Population and groups

The population is described by a density function $f(y)$, where y represents income. Function support y is bounded between 0 and a maximum value y_{max}. Mean income $\bar{y}$ is assumed to be no lower than the median y_m. Every income distribution $f(y)$ admits the associated cumulative function $F(y)$, that represents the share of population with income lower than y.

Population is divided in a finite exogenous number G of groups that represents the level of aggregation of individuals and preferences. The higher the number of groups, the more homogeneous the characteristics of individuals within every group. Population is divided in groups according to the level of income, in G equal intervals. If we denote maximum income by y_{max}, every group $g = 1, 2 \dots G$ is composed by all individuals with income included between $\frac{g-1}{G} y_{max}$ and $\frac{g}{G} y_{max}$ and the share of population belonging to it is $n_g = F\left(\frac{g}{G} y_{max}\right) - F\left(\frac{g-1}{G} y_{max}\right)$. For the sake of simplicity, we can assume that – given a relatively high number of groups – individuals are identical within every group, and their income is the arithmetic mean of group individuals: $\bar{y}_g = \left(\frac{g-1}{G} y_{max} + \frac{g}{G} y_{max}\right)/2 = \frac{2g-1}{2G} y_{max}$. Figure 1 represents a triangular income distribution and its division in G groups.

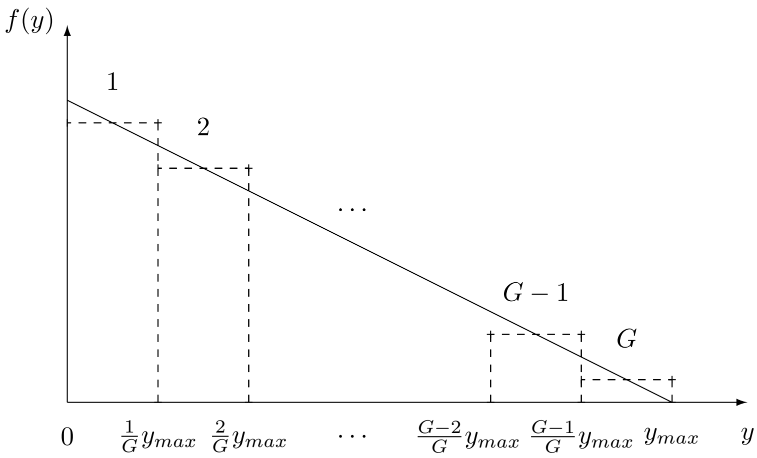

Figure 1: A triangular function is divided in G groups of equal dimension (one G^{th} of the total income). Dashed lines represent the resulting distribution under the hypothesis of individuals' homogeneity within every group.

Resources available for a group are approximated by the total number of individuals in the group multiplied by their average income. In case of distributions with constant slope – such as the one represented in figure 1 or a uniform distribution – the approximation fits perfectly, whereas it performs poorly in case of sharp changes in slope.[4] In general, total resources of group g are given by:

$$y_g = n_g \bar{y}_g = \left[F\left(\frac{g}{G} y_{max}\right) - F\left(\frac{g-1}{G} y_{max}\right)\right] \frac{2g-1}{2G} y_{max} \tag{1}$$

2.2 Policy space and individual preferences

Policy space is bi-dimensional. One instrument is the tax rate, that determines the level of resources available for redistribution in the economy; the second is the share of resources that political parties divert from general redistribution and use for "specific policies".[5]

In what follows I will analyze the policy preferences for either groups of individuals and lobbyists separately, as far as the latter get utility also from specific policies whereas the former do not.

[4]For instance, in the case of a χ^2 distribution, the approximation fits well in the increasing and decreasing part, poorly around the mode.

[5]The term "specific policies" is a generalization of the "specific goods" introduced by Aaron and McGuire (1970, p. 908) and described as "goods or services produced by the governments, but which otherwise are similar to private goods privately produced".

2.2.1 Individuals optimal policies

The fiscal system is represented by a linear income tax framework, in which a homogeneous tax rate τ is levied from all incomes and is the only source of income for the public sector. The government can use the proceeds of this tax for three different purposes: a share $\gamma \in [0,1]$ is used for redistribution, either i) for providing an amount of public goods (an exogenous share $\alpha \in [0,1]$) or ii) for redistributing a lump-sum monetary subsidy to the whole population $(1-\alpha)$; the remaining part, $1-\gamma$, is devoted to iii) sustaining specific interests by providing private goods to lobbies members. Individual utility is supposed such that public goods are perfect substitute for income, so that it is possible to compare a unit of income with a unit of public goods. Moreover, an efficiency term is added: according to a vast literature,[6] total income can decrease as a consequence of (too) high distortions due to fiscal system, and this in turns affects the amount of resources available for redistribution.

Summing up, every individual i faces the following problem:

$$\max_{\tau,\gamma} \tilde{y}_i = (1-\tau)\, y_i + \alpha R + (1-\alpha)\, \frac{R}{n} \quad \text{Individual income} \tag{2}$$

$$\sum_i \tau y_i = \tau n \bar{y}(\tau) = R + M \quad \text{Government budget constraint} \tag{3}$$

$$R = \gamma \sum_i \tau y_i \quad \text{Redistribution share} \tag{4}$$

$$M = (1-\gamma) \sum_i \tau y_i \quad \text{Specific policies share} \tag{5}$$

$$\bar{y}(\tau) = (1-\tau)\, \bar{y} \quad \text{Efficiency term} \tag{6}$$

Assume for simplicity, without loosing in generality, that $\alpha = 1$, so that the government uses all the tax proceeds to produce a public good.[7] Optimization of problem 2 therefore collapses into:

$$\max_{\tau,\gamma} \tilde{y}_i = (1-\tau)\, y_i + \gamma n \tau (1-\tau)\, \bar{y} \tag{7}$$

$$\Rightarrow \tau_i^* = \frac{1}{2} - \frac{y_i}{2\gamma n \bar{y}} \tag{8}$$

$$\Rightarrow \gamma_i^* = 1 \tag{9}$$

Looking at the solution 8, a number of observations can be noticed. First of all, the individual preferred tax rate is strictly decreasing in the level of

[6] Among the impressive number of papers, it is useful here to refer to Atkinson and Stiglitz (1980), Meltzer and Richard (1981) and a recent review by Harms and Zink (2003)

[7] Notice that the same results of the present section applies for any $\alpha \in [0,1]$. The simplification is only due to notation and exposure clearness.

personal income and increasing in the level of total income.[8] Second, τ_i^* is increasing in the share γ of tax proceeds devoted to general redistribution. Indeed, the extreme case of $\gamma = 0$ results in a $\tau_i^* = 0, \forall i$, meaning that if all the public resources are used to finance specific interests, individuals have no incentive to pay taxes, independently of their income. Finally, for certain values of α, γ and y_i, it could be the case that preferred tax rate is negative. In this case, such individuals would like to levy a lump-sum tax instead of a linear income one. Leaving aside in this model all the incentives to redistribution reviewed by a vast branch of the literature, we should not surprise for this result: richer rational individuals have a stronger preferences toward regressive systems and prefer lump-sum taxes rather than linear income taxes. What is important in this model, however, is that preferences for redistribution are monotonic (and decreasing) with respect to income.

With respect to γ, it clearly emerges from 7 that disposable income is increasing in its level independently of any other parameter and therefore the corner solution $\gamma = 1$ is the share of tax proceeds individuals prefer to be used for general redistribution.

2.2.2 Lobbyists optimal policies

The only difference between individuals and lobbyists is that the latter get utility also from the specific policies. In order to retrieve lobbyists preferred policies, it is enough to substitute equation 2 with the following:

$$\tilde{y}_l = (1-\tau)\, y_l + \alpha R + (1-\alpha)\frac{R}{n} + \frac{M}{n_l} \qquad \text{Lobbyist income} \tag{10}$$

where n_l is the number of lobbyists who share (in the same proportion) the funds for specific transfer and that we assume to be negligible with respect to the total population. Even if this assumption can seem restrictive, it simply implies that the share of lobbies members is not so high to *directly* influence the electoral result. Other equations of the previous problem (3 to 6) remain unchanged, so that lobbyist l solves the following (still assuming $\alpha = 1$):

$$\max_{\tau,\gamma} \tilde{y}_l = (1-\tau)\, y_l + \gamma n \tau (1-\tau)\, \bar{y} + (1-\gamma)\, n\tau (1-\tau)\frac{n}{n_l}\bar{y} \tag{11}$$

$$\Rightarrow \tau_l^* = \frac{1}{2} - \frac{n_l y_l}{2n\bar{y}\,(\gamma n_l + 1 - \gamma)} \to \frac{1}{2} \text{ if } \frac{n_l}{n} \to 0 \tag{12}$$

$$\Rightarrow \gamma_l^* = 0 \text{ if } \frac{n_l}{n} \to 0 \tag{13}$$

[8] The relation between preferred taxation and total income does not hold in the case of $\alpha = 0$. However, in this extreme case, the analogous relation applies to mean income.

These solutions highlight some interesting aspects:[9] First of all, as in the previous case, the preferred tax rate is monotonically decreasing with income; second, opposite to the previous case, the preferred tax rate is decreasing in the share γ, so that the preferred share of general redistribution is the corner solution $\gamma_l^* = 0$. Indeed, every unit of public resources spent for targeted policies gives to lobbyists more utility than a unit of general redistribution. These results mean that lobbyists benefit from a higher level of redistribution as long as they can extract specific policies from the total amount of public resources.

2.2.3 Implications

What emerges from the previous sections is that individuals have a complete set of preferences over both policies, and they are assumed to vote according to these preferences for the party that credibly announces the set of policies closer to their optimal ones. The issue is that citizens cannot perfectly observe the value of the parameter γ. This fact has two important consequences: first of all, individuals can cast their votes only according to the preferences over the tax rate and this in turn – we will see in the subsequent sections – has important implications for the final political outcome. Moreover, since individuals can observe only taxes and transfers, the fact that a share of resources is taken away from general redistribution can distort the preferences of individuals according to equation 8, and this leads individuals to ask for less redistribution even if what they really would like is a lower share of specific policies.

On the other side, lobbyists also have a complete set of preferences over both policies, but their number is (assumed to be) too small to influence the political outcome. Electoral results are only determined by the votes of individuals not belonging to any lobby, however – as will be described better in the following – lobbies can exert a strong influence on the political competition and gain their revenues from the political process.

2.2.4 Voting function

In section 2.2.1 we established that preferences for the policy instrument τ are double-bounded, continuous and unambiguously determined by the level

[9]Solutions 12 and 13 hold under the assumption stated previously that $\frac{n_l}{n} \to 0$. Strictly speaking, it would be sufficient the milder condition that $n_l < \frac{n}{\alpha(n-1)+1}$, relating the number of lobbyists to the shares of public goods vs transfer redistribution. In particular, the higher is the share of resources devoted to public goods (α), the lower must be n_l. The two extreme cases are very illustrative: if only lump-sum redistribution is provided ($\alpha = 0$), then the condition holds for any n_l; if only public goods are provided ($\alpha = 1$), then the condition is never satisfied, and we end up in a model in which joining a lobby does not give any utility gain. Even if it could be an interesting result that providing more public goods prevents lobbies to be created and to influence the political process, it is not the scope of the present paper and I will not go through further details.

of income. Individual voting behavior, however, does not depend exclusively on the parties' announced policies, but also on the voters' perception of the parties' announcements. This is one of the crucial peculiarities of the model and makes central the role of lobbies. Indeed, it is common knowledge in the literature (starting from the seminal Hotelling-Downs model (Downs, 1957)) the prediction that – in case of a single policy space – all the parties announce the policy preferred by the median voter, being any other position on the policy line doomed to loose. These models assume that voters cast their ballots by minimizing a loss-function, that is intuitively increasing in the distance between the individual preferred policy and the announced one, and minimum if there is coincidence between announced and preferred policies.

In this model, however, individual behavior takes also into account the fact that announcements perception could be biased by the activity of lobbies. Their activity is in fact targeted to modify voters beliefs and direct their ballots toward policies different from their optimal ones. Voters' loss function, under these hypotheses, can be represented as in figure 2 and written as:

$$\text{Voter } i \text{ votes for party } j \text{ if } V_{ij} \leq V_{ik}, \forall k \neq j \tag{14}$$

where

$$V_{ij} = V_{ij}\left(g\left(\tau_i^* - \tau_j^*\right) - s_j\right) \tag{15}$$

and

$$g\left(\tau_i^* - \tau_j^*\right) = g\left(\tau_j^* - \tau_i^*\right) \tag{16}$$

$$V'_{\tau_i^*-\tau_j^*} > 0, V''_{\tau_i^*-\tau_j^*} > 0, V'_{s_j} < 0, V''_{s_j} = 0, V''_{\tau_i^*-\tau_j^*,s_j} = 0 \tag{17}$$

being s_j the amount of support that party j receives from lobbies and V the voter's loss function.

A number of characteristics are implicit in the previous formulation: first of all, the loss of the voter for a policy different from her optimal one is symmetric and independent on the specific value of the policy (16); moreover, the loss is increasing in the distance between policies (17a) at an increasing rate (17b); on the other side, the loss function is decreasing in the amount of support in favor of a party (17c) at a constant rate (17d). Finally, it is assumed that there are no cross-effects between the two components of the loss function (17e).

2.3 Parties behavior

Once analyzed the preferences of individuals, we can describe the other actors interacting in the model: parties and lobbies. These two entities represent different interests in the population and their goals are not convergent. Parties are groups of individuals with homogeneous preferences

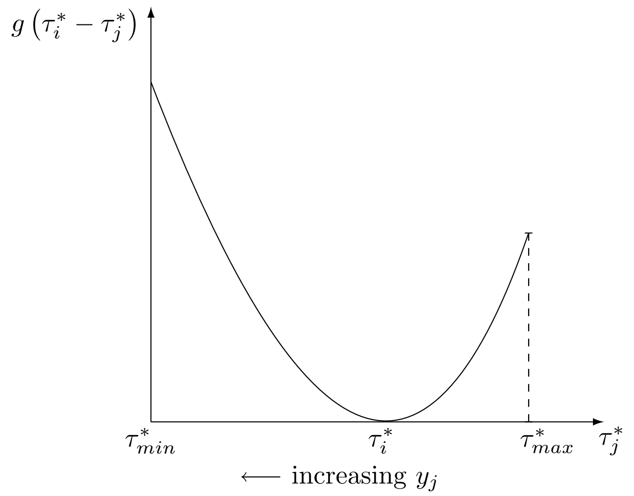

Figure 2: The "standard" part ($g\left(\tau_i^* - \tau_j^*\right)$) of the voter i loss function is represented in the figure. It is increasing with the distance from the voter preferred policy τ_i^*, convex and symmetric. It coincides with the loss function V_{ij} if $s = 0$.

over the policies who want to run for office and get satisfaction from political activity; lobbies are groups of individuals with heterogeneous incomes and preferences over the policies who, in contrast, share the same preferences for a specific public policy – be it via-cash transfers, public expenditures, private goods allocation and so on – that benefits all of them, and for this reason they constitute a lobby. A crucial characteristic these groups must have is that they can effectively influence the voters' perception of parties' announced policies.

In section 2.1 the division of population in G groups was analyzed in detail. Since individuals belonging to every group are homogeneous with respect to income, they share the same preferences over the tax rate τ. Every group is a potential party and must take three decisions: i) whether or not to create a party; if they constitute a party, ii) which policy to announce and iii) how much electoral support to ask from lobbies. These three decisions will be analyzed in what follows.

2.3.1 Party creation

The decision of a group on whether to set up a party or not depends in the present model mainly on two factors: the cost of creating a party and the benefits that members can enjoy.

On the one side, very relevant for the present model, there are costs associated to political activity. It is possible to make different assumptions on the nature and characteristics of these costs. A simpler version can assume that there is only a fixed cost, related to the creation and maintenance of infrastructures, organizational expenses, propagandistic activities and so on. Moreover, it can be assumed that there is also a cost related to the number of members. Free-riding and coordination costs can be intuitively thought as increasing with the size of the organization and the membership. Of course, different hypotheses can be made on the shape of these variable costs, mainly on whether they are convex or concave. Since the shape of the cost function does not affect significantly the results of the model, I assume a generic cost function $C(n_j) = k + \delta n_j^{\beta}$.

On the other side, there are benefits from political activity. We can realistically identify the three following sources of benefits for a party member: i) a monetary transfer related to her political activity, in terms of wage or reimbursement; ii) an informal series of benefits, in terms of social prestige or personal utility deriving from political activity and, even more, from holding the office; iii) finally, every party member enjoys the benefit associated with the implementation of the optimal policy, in case the party gets the office. While the first two elements are specific of the party members, the last one is a source of welfare for any voter.

Given costs and benefits related to political activity, every group should satisfy an incentive constraint and a budget constraint in order to set up a party: the first is that it must be *profitable* for a group to compete in the political arena, the second is that a group should *afford* to do it.

Incentive constraint must be analyzed with respect to every group member. A generic individual faces benefits and costs described above. While personal costs are known and equal to $C(n_j)/n_j$, benefits are not only unknown, but their "psychological" part – the one related to the satisfaction and gratification from political activity – depends on personal heterogeneous preferences. If we call these benefits $E(w_i)$, then the incentive constraint is satisfied for all the persons for which $E(w_i) \geq C(n_j)/n_j$. In other words, it means that, even if an individual does not win the office, she enjoys some benefit that makes it profitable for her to enter the political competition. As an example, it is realistic to assume that also minority delegates receive a monetary transfer, or that they can get some informal/unofficial/psychological benefit from their activity. If these benefits are sufficiently high that $E(w_i) > C(n_j)/n_j$, then those individuals self-select as political active individuals. Self-selection resides in the feature that individuals more willing to engage in active politics find it also advantageous. For the sake of simplicity, we can assume that this condition is true for a constant share of population across the groups. Whatever the share, the resulting distribution of "political active" individuals is a scaled replication of the original distribution in section 2.1 and all its characteristics apply also to the population of political active individuals.

Unlike the incentive constraint, budget constraint can be analyzed at the aggregate level, and is readily measurable: costs associated with party creation and functioning cannot be higher than the total resources available to the (political active) members of the group. This means that

$$n_j \bar{y}_j \geq C(n_j) \tag{18}$$

where n_j is the number of members of party j, $\bar{y}_j$ is their mean income. This means that there are mainly two ways for satisfying the budget constraint: either a group has a large number of members or the members, even if they are not many, are rich enough to finance the party.

2.3.2 Optimal announced policy

Once a group has decided to set up a party, it is necessary to establish which political position the party will adopt. In the present section my aim is to show that – given the assumptions of the model – every party *can* and *must* credibly commit to a specific policy, which happens to be the one preferred by their members. This result is driven by the previous assumptions and does not require any additional simplification.

Every member of party j strictly prefers the policy $\tau_j^* = \arg\max u(\tau)$. By definition, any other policy gives her a lower utility and therefore the member is ready to join and finance a party only if it announces exactly that policy. On the other side, it is the best position also for the party: if it sets a different policy, then it does not receive funds either from "its" members or from other groups, since these either already have a party or cannot afford to constitute one, and in both cases they are not willing to finance a different party with different preferences.

The present section could raise in the reader a well-founded suspicion: given the widely established results of the median voter theorem and the impossibility for a party to freely set the policies, only one party should be set up, that is the party closer to the median voter position, or even coincident, if the group of the median voter can afford to set up a party. This indeed is what would happen, if the parties could not rely on the support from lobbies. Next section is devoted to describe the role of support and determine the optimal amount every party asks from them.

2.3.3 Parties demand for electoral support

The third and last decision a party needs to take is the amount of support to ask from lobbies. The support from these groups is the only way available to parties for changing their position over the policy space.

Assume that a generic number of groups, $j = 1, 2 \ldots J \leq G$, have decided to form a party. Each party, whatever its preference, must decide the amount of support to buy from lobbies. We have already noticed that the best position a party can reach in the (one-)policy space is the median voter's one. But we have also found in section 2.3.2 that each party is stick to the policy preferred by their members, which otherwise would not "invest" in party creation. In this situation, the only way for the party to reduce the distance between the two positions is to buy the amount of support that minimizes the loss function (15) for the median voter m:

$$V_{mj} = V_{mj}\left(g\left(\tau_m^* - \tau_j^*\right) - s_j\right) \tag{19}$$

It is quite intuitive the result that – apart in the unrealistic and uninteresting case of the presence of a single party – all the parties will ask exactly the amount of support that allows them to reach the position of the median voter. Any other amount of support would be suboptimal: a lower amount is suboptimal because another party could obtain the majority of votes simply moving an infinitesimal step closer to the median voter, while a higher amount cannot bring them closer to a point already reached.[10] Indeed, minimization of equation 19 constrained by the non-negativity of V_{mj} is straightforward:

$$V_{mj} = 0 \Rightarrow s_j = g\left(\tau_m^* - \tau_j^*\right), \forall j \in J \tag{20}$$

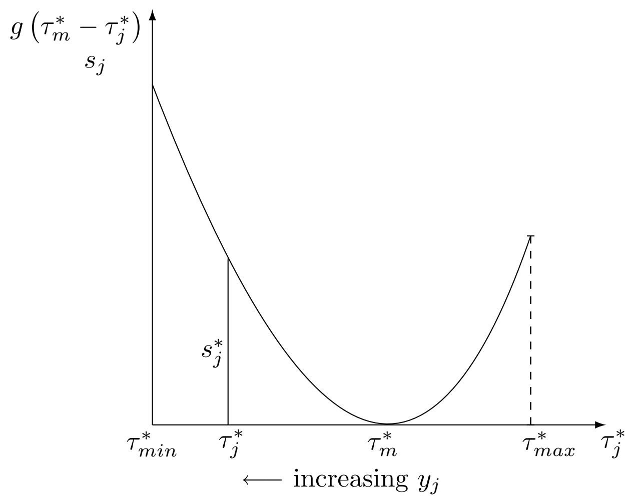

Figure 3: The convex curve represents the function $g\left(\tau_m^* - \tau_j^*\right)$. In order for $V_{mj} = 0$, it is needed that $s_j = g(\tau_m^* - \tau_j^*)$. In the picture we can read s_j as the vertical distance between the horizontal axis and the function g.

Picture 3 shows the optimal level of support that a generic party j should ask to lobbies in order to minimize the loss function of the median voter. Intuitively, parties further from the median voter need a higher amount of lobbying in order to convince the median income earner to vote for it.

[10]In other words, the best lobbies can do is to present a policy as if it were the optimal one for the median voter.

2.4 Lobbies behavior

The crucial feature of lobbies is their ability to change voters' perception of announced policies. Mass-media are the most intuitive groups that can efficaciously reach this goal (see, among others, recent contributions by Chan and Suen (2003), Besley and Prat (2006), Corneo (2006)), but a greater number of groups can do the same, even if probably less efficiently. Examples of such groups are religious organizations (Layman, 1997), trade unions, sectoral industrial organizations, criminal associations, military groups and so on. In what follows we will describe the features of these organizations and groups of pressure by taking into account also their heterogeneity in the effectiveness of their activity.

Lobbyists' preferences – analyzed in section 2.2.2 – point out that they prefer the higher possible amount of funds devoted to specific policies, $1-\gamma$. This share of resources can be directly bargained between the lobbies and the parties, since it is the "price" that every lobby sets for the good it produces, namely the influence on the voters perception of the parties. Next section is devoted to analyze this crucial part of the model.

2.4.1 Individual and aggregate lobbies equilibrium

Assume that there is a market for support. Lobbies behave as firms producing the output s, sold to parties in exchange of a "price" $(1-\gamma)$, using a generic input x at cost q. The heterogeneity of lobbies (whose sources are specified above in this section) is represented in the production function:

$$s_l = \sqrt{\eta_l x} \tag{21}$$

where the support s_l is produced through the input x, increased by an efficiency term, η_l, lobby-specific. Since this argument is not crucial in the model, it is a sufficient approximation to assume that all heterogeneity in terms of input x and its price q is summarized by the efficiency term η. Of course, the higher is η the more efficient is the lobby in producing support.

Every lobby maximizes the profits from its support activity, that is:

$$\begin{gathered} \max_{s_l} (1-\gamma)\, s_l - qx \\ \text{s.t. } s_l = \sqrt{\eta_l x} \end{gathered} \tag{22}$$

$$\Rightarrow s_l^* = \frac{\eta_l}{2}\frac{(1-\gamma)}{q} \tag{23}$$

Total supply is simply the sum of all the lobbies' supplies:

$$S_s = \sum_l s_l^* = \frac{\bar{\eta}L}{2}\frac{(1-\gamma)}{q} \tag{24}$$

where $\bar{\eta}$ is the mean value and therefore $\sum_l \eta_l = \bar{\eta}L$.

Demand for support is perfectly inelastic, since we found that, in order to have the possibility of winning, every party should buy a specific amount of support. Individual demand is therefore $s_j^* = g\left(\tau_m^* - \tau_j^*\right)$ (equation 20 above) and aggregate demand is:

$$D_s = s^* = \sum_j s_j^* = \sum_j g\left(\tau_m^* - \tau_j^*\right) = Jg\left(\overline{\tau_m^* - \tau_j^*}\right) \tag{25}$$

meaning that the further the parties are from the median voter preferences, the higher the amount of support they need from lobbies. On the contrary, we cannot say that a lower number of parties implies a lower amount of support: this happens only if the reduction leaves unaffected the distance of parties from the median voter preferences. In the following, this point will be made clearer and analyzed in detail.

Market equilibrium is therefore:

$$\begin{cases} s^* = Jg\left(\overline{\tau_m^* - \tau_j^*}\right) \\ (1-\gamma)^* = \dfrac{2s^*q}{\bar{\eta}L} = \dfrac{2q}{\bar{\eta}}\dfrac{J}{L}g\left(\overline{\tau_m^* - \tau_j^*}\right) \end{cases} \tag{26}$$

where the quantity is determined only by the amount of demand for support, while the price is determined jointly by the amount of support demanded and by the number of lobbies that supply this particular good.

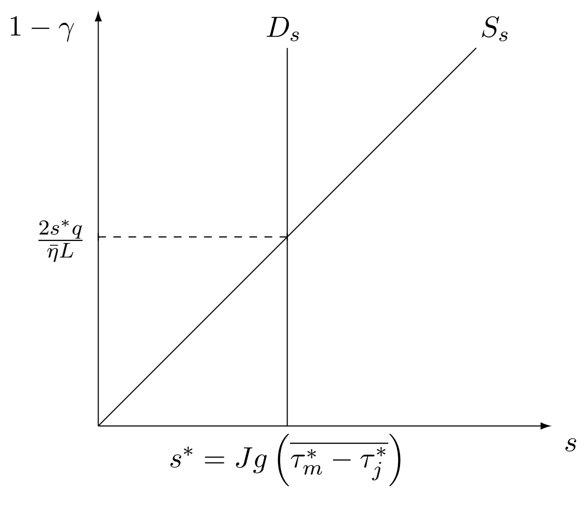

Figure 4: Lobbies' support market

Once found the market price for the support, we can determine the quantities produced by every single lobby and relative profits, that are different inasmuch as different are productivities. Indeed,

$$s_l^* = \frac{\eta_l}{2}\frac{(1-\gamma)}{q} = \frac{\eta_l}{2q}\frac{2q}{\bar{\eta}}\frac{J}{L}g\left(\overline{\tau_m^* - \tau_j^*}\right) = \frac{\eta_l}{\bar{\eta}}\frac{s^*}{L} \tag{27}$$

and

$$\begin{aligned}\pi_l^* &= (1-\gamma)\, s_l - q\left(\frac{s_l^2}{\eta_l}\right) = \\ &= \frac{2s^* q}{\bar{\eta}L}\frac{\eta_l s^*}{\bar{\eta}L} - \frac{q}{\eta_l}\frac{\eta_l^2 s^{*2}}{\bar{\eta}^2 L^2} = \\ &= q\frac{\eta_l}{\bar{\eta}^2}\frac{J^2}{L^2}g\left(\overline{\tau_m^* - \tau_j^*}\right) \end{aligned} \tag{28}$$

Let's now analyze in details the implications of this part of the model. First of all, the amount of resources devoted to the lobbies is increasing in the number of parties and in the difference between the positions of the parties and the preferences of the median voter. However, it must be remarked that the joint effect is not trivial: when the number of parties changes, then the average difference between preferences also changes, and the total effect may be ambiguous. For instance, if extreme parties (namely, parties with $\tau_m^* - \tau_j^*$ higher than the mean) are created, then the "price" of support increases, but if moderate parties (parties with $\tau_m^* - \tau_j^*$ lower than the mean) are created, than the effect is ambiguous.

Second, regarding productivity, intuitive results are that, since lobbies compete among themselves, the higher is average productivity, the lower are prices. This result could seem counter-intuitive, but it mainly derives from the assumption of no strategic behavior of lobbying groups. If we allowed lobbies to interact, then it could be possible for them to extract a higher amount of resources from public goods. However, it makes the model much more complicated without increasing significantly its insights.

Third, lobbies' profits are positive and – as much as their benefits – depend positively on the number of parties and on their distance from the median voter. The mechanism is the following: the further a party is from the median voter position, the higher is the amount of support it needs from lobbies. Since demand for support is perfectly inelastic – in this model there are no substitutes for lobbies' support – the higher demand triggers an increase in prices, that is the amount of specific policies expenditures/subsidies. *Ceteris paribus*, the increase in prices due to shifts of demand reflects in an increase in profits.

Finally, single lobby profits depend positively on its productivity[11] and negatively on the number of lobbies, given a certain amount of average

[11] To be precise, this is true only for the lobbies with productivity $\eta_l^2 < \sum_{m \neq l} \eta_m^2$, that is, only for lobbies whose productivity is lower than the sum of all other lobbies' productivities. We can assume this is always true, but even if it were not, this would not have any impact on the model

productivity. However, again, if more lobbies enter the market, the effects on others' profits depend also on the change in average productivity. Moreover, if the average productivity increases, but single lobby's does not, then lobby profits decrease.

3 Income distribution and political output

The present part of the paper is devoted to analyze the crucial aspect of the model, namely how the income distribution can affect: i) the number of parties actually set up and the (wealth) characteristics of their members, ii) consequently, the amount of lobbying and the share of resources diverted from general redistribution in order to remunerate lobbies' activities, iii) the set of possible redistribution levels, resulting from considering jointly the previous two characteristics of the political-economic framework. It is important to notice and remark at this point that, differently from the vast majority of the literature, this solution does not predict the "winner" of the electoral process. Indeed, the focus of the paper is the identification of the set of possible winners, or, stated differently, the identification of parties that could never hold the office because they cannot be even created. What I describe in this section is the set of parties that can be effectively created and that, buying a party-specific amount of support, share the same (apparent) position on the policy line and therefore have the same probability of winning.[12]

3.1 Solutions

Equation 18 in section 2.3.1 defines the condition under which a group can afford to set up a party. In the same section, the costs faced by a group that decides to create a party are described as increasing in the party membership:

$$C(n_j) = k + \delta n_j^{\beta}, \beta > 0 \tag{29}$$

However, since the solutions do not qualitatively change for specific values of β, we set for convenience $\beta = 1$. On the other side, section 2.1 describes the membership of every group and the total amount of resources available to them. We report the two equations hereafter:

$$n_g = F\left(\frac{g}{G}y_{max}\right) - F\left(\frac{g-1}{G}y_{max}\right) \tag{30}$$

$$y_g = n_g\bar{y}_g = \left[F\left(\frac{g}{G}y_{max}\right) - F\left(\frac{g-1}{G}y_{max}\right)\right]\frac{2g-1}{2G}y_{max} \tag{31}$$

[12] By now, I rule out the faculty of creating coalition governments. However, it should not affect the results and the implications on redistribution very much, since it could change the probability of parties to hold the office, but not the possibility for a group to set up a party.

According to equation 18, the condition for a generic group g to be able to satisfy the budget constraint and therefore to set up a party is:

$$g^* : n_{g^*}\bar{y}_{g^*} \geq k + \delta n_{g^*} \tag{32}$$

$$\begin{aligned} \Rightarrow g^* : \left[F\left(\frac{g^*}{G}y_{max}\right) - F\left(\frac{g^*-1}{G}y_{max}\right)\right]\frac{2g^*-1}{2G}y_{max} \geq \\ k + \delta\left[F\left(\frac{g^*-1}{G}y_{max}\right) - F\left(\frac{g^*}{G}y_{max}\right)\right] \end{aligned} \tag{33}$$

Depending on the distribution of income and the possible sets of variables, in principle there are six possible solutions for the condition 33:[13]

1. $g^* = 1 \ldots G$
2. $g^* = \bar{\bar{g}} \ldots G$
3. $g^* = 1 \ldots \bar{g}$
4. $g^* = \bar{g} \ldots \bar{\bar{g}}$
5. $g^* = 1 \ldots \bar{g}, \bar{\bar{g}} \ldots G$
6. $g^* = \emptyset$

where g are all the integers between 1 and G and $\bar{g} < \bar{\bar{g}}$. The two kinds of distributions considered in this paper, uniform and triangular, can generate in principle all the previous equilibria apart from 5., that can be generated by more polarized income distribution functions, such as decreasing Beta functions.

The well known uniform distribution (see appendix A.1 for details) represents a simple benchmark, very useful for its tractability, but very far from being realistic. Figure 5 represents costs and resources for every group g (ordered on the x axis from the poorer to the richer). The first thing that emerges clearly is that the cost function (C) is flat. Indeed, given that the costs depend on the number of members, and given that in the uniform distribution the membership is the same irrespective of income, the cost faced by all the groups is the same. On the other side, resources increase linearly, as far as the mean income of the groups increases. In this case, it is easy to grasp from the picture (the complete analytical description is reported in appendix A.1) that all the groups richer than group $\bar{g}$ will create a party. Moreover, for particular values of the parameters, it could be the case either that all the groups can set up a party, or that none of them can afford to do it.

[13] The listed solutions refer to single peaked or monotonically decreasing income distributions, encompassing all the realistic income distributions.

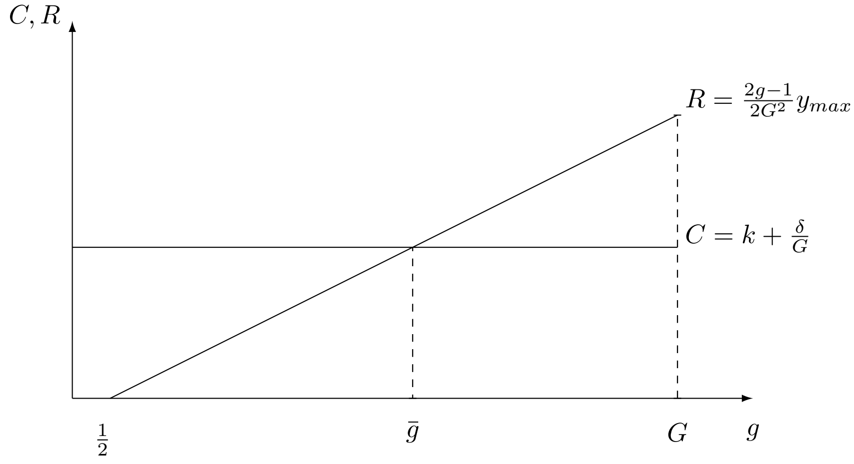

Figure 5: Costs function is invariant across groups, while resources are increasing at a constant rate $\frac{1}{G^2}$. Every group richer than $\bar{g}$ sets-up a party.

The triangular distribution (figure 6) is the only skewed and limited distribution for which it is possible to find a closed form solution. With respect to the uniform distribution, it is less tractable (see appendix A.2 for the full analytical treatment), but more realistic. From figure 7, it emerges that, in this case, resources are bell-shaped with respect to the mean income of group members. Indeed, for the first half of the groups (that is, more than half of population) the total resources are increasing, since the increase in the income offsets the decrease in the number of members. For groups richer than the mean, instead, the total effect is reverted, and the negative effect of decreasing membership is stronger than the positive effect of increasing income. The cost function is negatively sloped since it depends linearly on the group membership. As noticed above and in appendix A.3, the cost function is decreasing for any value of $\beta > 0$ in equation 29, without affecting significantly the solutions. In the present case, all the parties included in the interval $[\bar{g}, \bar{\bar{g}}]$ create a party and particular values of the parameter, that is, different shapes of income distribution, can generate all the equilibria listed above in the present section, apart from 5.

An even more realistic triangular distribution is the one represented in figure 8, that generates the equilibria shown in figure 9. However, because of its scarce tractability, it is very difficult to develop the full analytical approach. The graphic solution, however, suggests that the behavior of the thresholds $\bar{g}$ and $\bar{\bar{g}}$ could be similar to the previous case.

Once detected the characteristics of the solutions, namely the extremes of the set of groups that can afford to create a party, the key question is: how are these thresholds affected by changes in the characteristics of

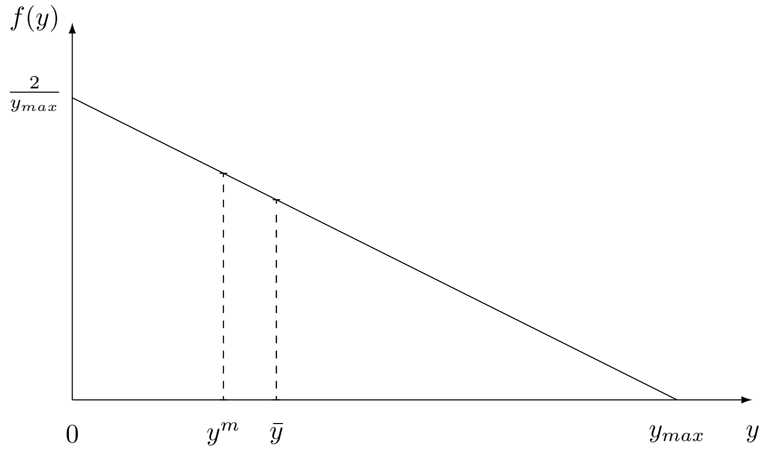

Figure 6: A triangular distribution is decreasing with income and the median is always lower than the mean. An increase of maximum income lowers the intercept and shifts rightward both the mean and median income, increasing their difference.

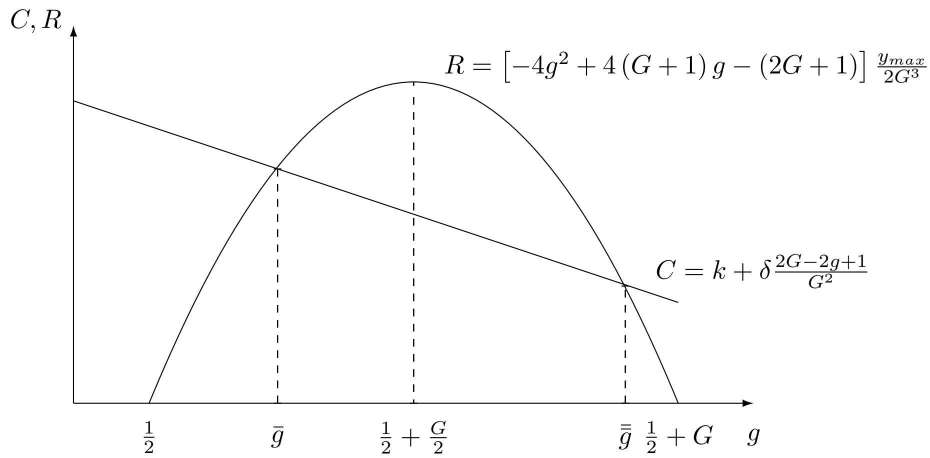

Figure 7: Cost function has a constant negative slope of $-\frac{2\delta}{G^2}$. Resources increases with income and decreases with the number of group members: for low levels of income, the first effect is stronger and total resources increase, while for high levels of income, the latter effect dominates and resources decreases.

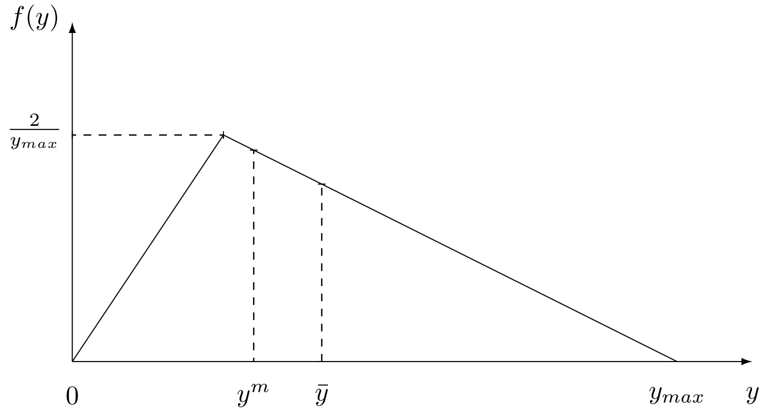

Figure 8: The generic triangular distribution is first increasing then decreasing and the median is always lower than the mean.

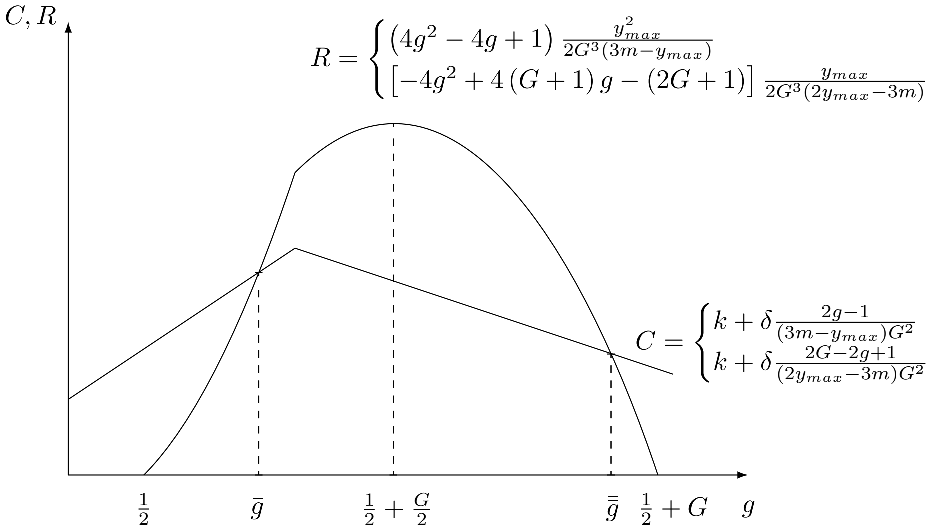

Figure 9: Costs are proportional to the groups membership, so that they are first increasing then decreasing, with the maximum at the mode of the distribution. Resources depends both on group membership and on members' income, therefore they are convex up to the mode of distribution, concave after. However, they are increasing up to the point in which the (positive) effect of income is greater than the (negative) effect of decreasing membership.

the political-economic framework? Tables 1 and 2 answer the question by showing the effects of a change in the parameters on the thresholds and, consequently, on the set of possible amounts of redistribution and lobbying.

Uniform distribution			
Variable	$\bar{g}$	Redistribution	Lobbying
Fixed costs k	$+$	$-$	$-/?$
Variable costs δ	$+$	$-$	$-/?$
Groups homogeneity G	$+$	$-$	$-/?$
Total wealth y_{max}	$-$	$+$	$+/?$
Inequality $y_{max}\|_{\frac{y_{max}}{G}=\bar{h}}$	$+$	$-$	$-/?$

Table 1: Uniform distribution. All signs refer to an increase of the variable in the first column. The column "Lobbying" shows two possible cases: when the "median party" is created and when it is not. In the latter case, ambiguity is due to the opposite effects of the number of parties effectively created and their distance to the median voter (equation 26).

Triangular distribution				
Variable	$\bar{g}$	$\bar{\bar{g}}$	Redistribution	Lobbying
Fixed costs k	$+$	$-$	$-$	$-$
Variable costs δ	$+$	$-$	$-$	$-$
Groups homogeneity G	$+$	$+$	$-$	$+$
Total wealth y_{max}	$-$	$+$	$+$	$+$
Inequality $y_{max}\|_{\frac{y_{max}}{G}=\bar{h}}$	$+$	$+$	$-$	$+$

Table 2: Triangular distribution. Analogously to table 1, all signs refers to an increase of the variable in the first column. Opposite to the case of a uniform distribution, the amount of lobbying in uniquely determined and never ambiguous.

3.2 Comments

The present section is entirely devoted to the description of the analytical findings listed in the previous section. Interested reader can find all the analytical details in appendices A.1 and A.2, while hereafter I will analyze the results of the model, trying to support the conclusions with anecdotal and empirical evidence.

3.2.1 Fixed and variable costs

First of all, we can notice that the effects of fixed and variable costs are qualitatively the same: according to intuition, an increase of either fixed or variable costs makes it more difficult for any group to create a party. Graphically, it corresponds to an upward shift of the cost curves, being the resources unaffected. Of course, such a change lowers the probability that the median income individual can set up a party, but – if she can – then the expected amount of lobbying is lower. A primary consequence is that countries that gives richer electoral support or subsidies to parties should experience a higher number of parties with respect to other countries, *ceteris paribus.* Of course, there are other factors that determine the number of parties in a system much more directly than administration costs, mainly the electoral rules, so that, in real world, it is very difficult to disentangle the effects of state subsidies on the number of parties, as well assessed by Pierre et al. (2000). However, an anecdotal support for the importance of political reimbursement comes from very far in the past: since the sixth century b.C., in the ancient Athens democracy, the participant to assemblies received an amount of money equivalent to a daily salary, in order to encourage the participation of poorer people in the political activities of the State. The reverse of the medal is represented by the campaign and electoral expenditures that candidates and parties need to support. There are political and social systems, the clearest example is represented by United States, in which campaign expenditures are so high that only candidates able to attract fundings from a very wide group of supporters can run for the office, and there are no public reimbursements large enough to fill this gap.

What we refer to in the model is therefore a kind of algebraic sum of all these factors, claiming that the lighter is the financial weight borne by the parties, the more likely it is to have a "full" representation of all the income classes, and therefore a redistribution level more similar to the one preferred by the median voter.

3.2.2 Group homogeneity

Group homogeneity is the amplitude of the income interval included in every group. The higher is the number G of groups, the more homogeneous are the incomes belonging to every interval, the lower is the membership of every group. Therefore, an increase in the homogeneity of the groups tends to lower both the resources available and the costs that a group has to face. The global effect is negative for poorer groups, but positive for richer ones, for which the positive effect of cost reduction offsets the negative effect on group's resources. The level of group homogeneity can be thought to be strictly related to the electoral system: plurality voting (or winner-takes-all) systems give a clear incentive to groups to merge together and usually originates a bipolar political framework, in which voters can choose only between two big parties. However, in such polities, it is common the use of primary elections, in which different candidates compete for the leadership. The present model can be applied to these first-step elections as well, where the number and the characteristics of candidates for the leadership, as well as the effects on the redistribution and lobbying, are influenced and determined by the ex-ante income distribution, electoral and campaign expenditures and so on.

On the other side, proportional representation systems give the opposite incentive, to a proliferation of little parties, each one representing interests of a little share of population. Leaving aside considerations about institutional efficiency of different systems, the theoretical results of the present model predict a more "spread" representation in case of less homogeneous groups. Remember, however, the assumption that all the individuals within every group are supposed to be equal in terms of income. This assumption is realistic as far as the number of *potential* parties is sufficiently large. The arise of two-parties systems, therefore, can be assessed either, less realistically, to the presence of two very large homogeneous groups, namely the "rich" and the "poor", or, maybe more realistically, to the aggregation in coalitions of different – but similar – groups, due to the electoral system. In this latter case, the model can be still applied, provided that every group has a positive probability to get the leadership within every coalition.

3.2.3 Total income

The level of economic development of the system plays an important role in the determination of the political framework and output. *Ceteris paribus*, richer countries polities could generate systems very different from less developed economies. Analytical results of the model claim that the richer a country is – given the level of inequality – the more widely spread is the probability of setting up a party and, therefore, of implementing the policies preferred by the median voter. Even if the statement could seem trivial with respect to western established democracies, this could help to understand what happens in developing countries.

The model simply states that, given an amount of political costs,[14] in richer countries all the classes can more easily satisfy the budget constraint, and therefore there is a more complete representation. However, given the particular characteristics of the income distribution considered in the model, this result can be driven by two different sources: the pure effect of the increase of income and the side effect of the consequent widening of the groups (appendices provide more technical details). However, it is not unrealistic to assume that, following a significant increase of wealth for the population, the "nominal" size of every group in terms of income should increase as well, in order to maintain the same "real" homogeneity.

There are two different points of view for comparing this theoretical conclusion with factual and anecdotal evidence. The first is by looking at different stages of a single countries growth process, the second is by looking

[14]The model assumes for simplicity that the costs are independent of the level of income, however what follows is true just assuming that costs are not fully correlated with income.

at different economies, with comparable institutions. Considering the political and economic development path of many western countries, political activity has been considered as an elite prerogative for centuries, as far as a rich oligarchy could keep the power. Very roughly speaking – and without any claim of being rigorous – once the positive effects of industrial revolution raised the income of a considerable class of the population above the subsistence levels, these individuals started to be involved in the political activity and to require political rights. Indeed, economic development and political grants went hand-in-hand until the first half of the twentieth century, when universal suffrage was conceded in all the western democracies.

Nowadays, in many developing countries – independently of the official government system – democracy is not fully developed. Whenever the great majority of the population is (*de facto*) unable to enjoy political rights, because of deep poverty, poor schooling levels or other low-income related conditions, the political power is unevenly spread across population, and only rich elites can participate to the political activity, caring mainly about their own economic interests and implementing very little redistribution. Notice that the process is independent of ex-ante income distribution: according both to the model and to intuition, it would be enough to increase the level of income of the whole population (even if the increase were unbalanced toward richer classes) to allow middle- or lower-classes to satisfy the political constraint and start participating in the polity.

3.2.4 Income inequality

From the theoretical point of view, income inequality clearly affects the possibility of groups to set up a party. In particular, when inequality increases, it is more difficult for poorer groups to constitute a party, while it is easier for richer ones. It is very intuitive, indeed, that a resource transfer from poorer classes to richer ones, *ceteris paribus*, makes more difficult to satisfy the budget constraint for the first, and easier for the latter. An important consequence of this result is that two countries with the same institutions and the same level of income could experience very different redistributive policies just because of the different ex-ante income distribution. Therefore, opposite to the median voter theorem, the more ex-ante *equal* a country is, the more redistribution it will implement. Of course, this is not a necessary result, but what is sure is that, holding constant the institutional framework, the probability for the median income earner to be able to set up a party decreases with income inequality, while the same probability for the top income earners increases.

Moreover, a second important consideration regards the policies. In more unequal economies, not only it is less probable for poor classes to get the office, but the difference between rich and poor's preferred policies is greater. Since the preferred policies for redistribution depend crucially on incomes, in very equal countries the difference between preferences of top- and bottom-classes of the distribution is much lower than in very unequal countries.

Lobbying is also affected by changes in income distribution. An increase of ex-ante inequality, for instance, increases the number of richer parties and decreases the number of poorer parties. This shift, jointly to the fact that median income is lower than the mean, ensures that the "distance" between the policies of the parties and the ones preferred by the median voter widens, causing an increase in the demand for support and – therefore – an increase in the amount of resources devoted to specific policies.

A further anecdotal support for this thesis comes from the observation of the real world and from the analysis of polarized distributions. It is not possible to solve analytically the model for polarized distributions, such as Beta, however the intuition is the same. Given a very polarized distribution, what happens is that the middle class (middle-income earners) is composed by few individuals and cannot satisfy the budget constraint. Richer individuals can rely on their very high incomes, while poorer classes are very numerous groups, and therefore could be able to satisfy the budget constraint as well. Both the clusters are very far from the median voter, and therefore need lobbying support, that could come in many cases from "illegal" institutions. Not by chance, it is very frequent for very unequal and polarized countries (typically, in South-American and Sub-Saharian Africa) to experience periods of democracy that degenerate into military and/or populist dictatorships, that arise whenever one of the two competing cluster of parties decides to look for lobbying support in institution that do not preserve democracy (such as military groups or very powerful criminal organizations). The link between inequality and political stability is quite well established, and the present model accords coherently with it.

The arguments are very similar also when looking at non-polarized distributions. Countries like Northern-European democracies experience low level of ex-ante redistribution and implement a large amount of redistribution through a widely spread political representations. On the other extreme, United States have the more unequal income among the developed countries, but both the two main parties, generally speaking, seem to be oriented to richer preferences and strongly rely on lobbying in order to look for support of lower classes of people. Indeed, as confirmed by many empirical studies (Milanovic, 2000; Brandolini and Smeeding, 2007), the resulting level of redistribution is one of the lowest among western democracies, in strong contrast to the median voter theorem.

4 Conclusion

The present political economy model considers jointly different elements that play an important role in the determination of the amount of redistribution. The introduction of a multi-party framework, the assumption of a cost function for political activity and the presence of lobbies generate a framework in which the creation of the party is not exogenous, but depends on the characteristics of the political and economic system. The process can be summarized as follows. In more unequal countries, because of the costs of political activity, only groups richer than a certain threshold can afford to constitute a party and run for offices, while many classes of population cannot be represented in the polity. Since the policy preferences are related to income, the policies preferred by members of constituted parties are different from the ones preferred by poorer classes. In turn, since the political competitors are on average richer than the median voter, they need a strong support from lobbies in order to reach the median voter "position" on the political space, diverting resources from general redistribution to targeted policies. Whatever the electoral rules, only constituted parties can win the office, and therefore it is very likely (or even sure, if the median voter groups cannot afford to set up a party) that a party richer than the median voter is elected and can implement its own optimal policy, that is a level of redistribution lower than that preferred by more than half of population. The more unequal a country is, the stronger are the effects described above. Moreover, the process described above can generate also virtuous and vicious circles, since ex-ante redistribution in a given period is intimately related to the ex-post redistribution in the previous period.

Anecdotal evidence can be provided for supporting the theoretical results of the model, looking at the differences between developed western democracies with different levels of income inequality, or at the characteristics of many developing countries. Moreover, the model can encompass cases of failure of democracy and help to understand the relation between politicians and lobbyists.

Of course, it is very difficult to quantitatively determine the role of the political channel, as it is described in this model, on the final level of redistribution, since it is the result of a large number of interacting factors, not only economic, but also political and sociological, many of which are very difficult to be even measured. However, the model provides a new point of view for looking at one of the most debated aspects of political economy, and further theoretical and empirical investigations in this direction could be probably very useful on shading light on this controversial issue.

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A Appendices

A.1 Uniform distribution function

A.1.1 Characteristics

$$f(y) = \frac{1}{y_{max}}, y \in [0, y_{max}] \tag{34}$$

$$F(y) = \frac{y}{y_{max}}, y \in [0, y_{max}] \tag{35}$$

$$\bar{y} = y^m = \frac{y_{max}}{2} \tag{36}$$

$$Var\,(y) = \frac{y_{max}^2}{12} \tag{37}$$

$$n_g = \left[F\left(\frac{g}{G}y_{max}\right) - F\left(\frac{g-1}{G}y_{max}\right)\right] = \frac{g}{G} - \frac{g-1}{G} = \frac{1}{G} \tag{38}$$

$$\bar{y}_g = \left(\frac{g-1}{G}y_{max} + \frac{g}{G}y_{max}\right)/2 = \frac{2g-1}{2G}y_{max} \tag{39}$$

$$C = k + \delta n_g = k + \delta\frac{1}{G} \tag{40}$$

$$R = n_g\bar{y}_g = \frac{2g-1}{2G^2}y_{max} \tag{41}$$

Solution $g^* : n_g\bar{y}_g \geq k + \delta n_g$ is therefore the set of groups:

$$g^* \geq \frac{1}{2} + \frac{G^2 k}{y_{max}} + \frac{G\delta}{y_{max}} \tag{42}$$

A.1.2 Derivatives with respect to fixed costs

$$\frac{\partial R}{\partial k} = \frac{\partial}{\partial k}\left[\frac{2g-1}{2G^2}y_{max}\right] = 0 \tag{43}$$

$$\frac{\partial C}{\partial k} = \frac{\partial}{\partial k}\left[k + \delta\frac{1}{G}\right] = 1 \tag{44}$$

$$\Rightarrow \frac{\partial R}{\partial k} < \frac{\partial C}{\partial k}, \forall g \tag{45}$$

$$\text{or} \tag{46}$$

$$\frac{\partial \bar{g}}{\partial k} = \frac{G^2}{y_{max}} > 0 \tag{47}$$

A.1.3 Derivatives with respect to variable costs

$$\frac{\partial R}{\partial \delta} = \frac{\partial}{\partial \delta}\left[\frac{2g-1}{2G^2}y_{max}\right] = 0 \tag{48}$$

$$\frac{\partial C}{\partial \delta} = \frac{\partial}{\partial \delta}\left[k + \delta \frac{1}{G}\right] = \frac{1}{G} \tag{49}$$

$$\Rightarrow \frac{\partial R}{\partial \delta} < \frac{\partial C}{\partial \delta}, \forall g \tag{50}$$

$$\text{or} \tag{51}$$

$$\frac{\partial \bar{g}}{\partial \delta} = \frac{G}{y_{max}} > 0 \tag{52}$$

A.1.4 Derivatives with respect to groups homogeneity

$$\frac{\partial R}{\partial G} = \frac{\partial}{\partial G}\left[\frac{2g-1}{2G^2} y_{max}\right] = -\frac{(2g-1)\, y_{max}}{2G^3} \tag{53}$$

$$\frac{\partial C}{\partial G} = \frac{\partial}{\partial G}\left[k + \delta \frac{1}{G}\right] = -\frac{\delta}{G^2} \tag{54}$$

$$\Rightarrow \frac{\partial R}{\partial G} < \frac{\partial C}{\partial G}, \forall g > \frac{1}{2} + \frac{\delta G}{2 y_{max}} \tag{55}$$

$$\text{or} \tag{56}$$

$$\frac{\partial \bar{g}}{\partial G} = \frac{2Gk}{y_{max}} + \frac{\delta}{y_{max}} > 0 \tag{57}$$

A.1.5 Derivatives with respect to income

$$\frac{\partial R}{\partial y_{max}} = \frac{\partial}{\partial y_{max}}\left[\frac{2g-1}{2G^2} y_{max}\right] = \frac{(2g-1)}{2G^2} = \frac{R}{y_{max}} \tag{58}$$

$$\frac{\partial C}{\partial y_{max}} = \frac{\partial}{\partial G}\left[k + \delta \frac{1}{G}\right] = 0 \tag{59}$$

$$\Rightarrow \frac{\partial R}{\partial y_{max}} > \frac{\partial C}{\partial y_{max}}, \forall g \tag{60}$$

$$\text{or} \tag{61}$$

$$\frac{\partial \bar{g}}{\partial y_{max}} = -\frac{G^2 k}{y_{max}^2} - \frac{G\delta}{y_{max}^2} < 0 \tag{62}$$

A.1.6 Derivatives with respect to income inequality

$$\left.\frac{\partial R}{\partial y_{max}}\right|_{\frac{G}{y_{max}}=h} = \frac{\partial}{\partial y_{max}}\left[\frac{2g-1}{2G^2} y_{max}\right] = -\frac{(2g-1)}{2h^2 y_{max}^2} \tag{63}$$

$$\left.\frac{\partial C}{\partial y_{max}}\right|_{\frac{G}{y_{max}}=h} = \frac{\partial}{\partial y_{max}}\left[k + \delta \frac{1}{G}\right] = -\frac{\delta}{h y_{max}^2} \tag{64}$$

$$\Rightarrow \frac{\partial R}{\partial y_{max}} > \frac{\partial C}{\partial y_{max}}, \forall g < \frac{1}{2} + \frac{2\delta G}{y_{max}} \tag{65}$$

$$\text{or} \tag{66}$$

$$\left.\frac{\partial \bar{g}}{\partial y_{max}}\right|_{\frac{G}{y_{max}}=h} = kh^2 > 0 \tag{67}$$

It is worthy to notice – from derivatives relative to group homogeneity and income inequality – the appropriateness of the assumption that $y_{max} \gg \delta$. Indeed, we observe in both cases that $\bar{g}$ shifts rightward for sure, while the analogous conditions over the derivatives of R and C hold only if the ratio δ / y_{max} is close to 0. Of course, this is not a formal "prove", but it is a confirmation of the suitableness of this mild assumption.

A.2 Triangular function (with mode at 0)

In the present section, I consider a triangular distribution with mode at 0, represented in picture 6 in the text. After a summary of its characteristics, I will compute analytically the sign of derivatives for groups' resources and costs and I will compare them in order to detect the effects of variables on the faculty of groups to set up a party. Remember that some of the following results rely on the assumption – discussed in the text – that $y_{max} \gg \delta$.

A.2.1 Characteristics

$$f(y) = \frac{2\left(y_{max} - y\right)}{y_{max}^2}, y \in [0, y_{max}] \tag{68}$$

$$F(y) = 1 - \frac{\left(y_{max} - y\right)^2}{y_{max}^2} = \frac{2y}{y_{max}} - \frac{y^2}{y_{max}^2}, y \in [0, y_{max}] \tag{69}$$

$$\bar{y} = \frac{y_{max}}{3} \tag{70}$$

$$y^m = y_{max} - \frac{y_{max}}{\sqrt{2}} < \bar{y} \ \forall y \tag{71}$$

$$Var\left(y\right) = \frac{y_{max}^2}{18} \tag{72}$$

$$\begin{aligned} n_g &= \left[F\left(\frac{g}{G} y_{max}\right) - F\left(\frac{g-1}{G} y_{max}\right)\right] = \\ &= \frac{2g}{G} - \frac{g^2}{G^2} - \frac{2g-2}{G} + \frac{g^2 - 2g + 1}{G^2} = \frac{2G - 2g + 1}{G^2} \end{aligned} \tag{73}$$

$$\bar{y}_g = \left(\frac{g-1}{G} y_{max} + \frac{g}{G} y_{max}\right)/2 = \frac{2g-1}{2G} y_{max} \tag{74}$$

$$C = k + \delta n_g = k + \delta \frac{2G - 2g + 1}{G^2} \tag{75}$$

$$R = n_g \bar{y}_g = \left[-4g^2 + 4\left(G+1\right)g - \left(2G+1\right)\right] \frac{y_{max}}{2G^3} \tag{76}$$

A.2.2 Derivatives with respect to fixed costs

$$\frac{\partial R}{\partial k} = \frac{\partial}{\partial k}\left[\left[-4g^2 + 4\left(G+1\right)g - \left(2G+1\right)\right] \frac{y_{max}}{2G^3}\right] = 0 \tag{77}$$

$$\frac{\partial C}{\partial k} = \frac{\partial}{\partial k}\left[k + \delta\frac{2G - 2g + 1}{G^2}\right] = 1 \tag{78}$$

$$\Rightarrow \frac{\partial R}{\partial k} < \frac{\partial C}{\partial k}, \forall g \tag{79}$$

A.2.3 Derivatives with respect to variable costs

$$\frac{\partial R}{\partial \delta} = \frac{\partial}{\partial \delta}\left[\left[-4g^2 + 4\left(G+1\right)g - \left(2G+1\right)\right]\frac{y_{max}}{2G^3}\right] = 0 \tag{80}$$

$$\frac{\partial C}{\partial \delta} = \frac{\partial}{\partial \delta}\left[k + \delta\frac{2G - 2g + 1}{G^2}\right] = \frac{2G - 2g + 1}{G^2} \tag{81}$$

$$\Rightarrow \frac{\partial R}{\partial \delta} < \frac{\partial C}{\partial \delta}, \forall g \tag{82}$$

A.2.4 Derivatives with respect to groups homogeneity

$$\frac{\partial R}{\partial G} = \frac{\partial}{\partial G}\left[\left[-4g^2 + 4\left(G+1\right)g - \left(2G+1\right)\right]\frac{y_{max}}{2G^3}\right] = \tag{83}$$

$$= \frac{\left(6g - 4G - 3\right)\left(2g - 1\right)y_{max}}{2G^4} \tag{84}$$

$$\frac{\partial C}{\partial G} = \frac{\partial}{\partial G}\left[k + \delta\frac{2G - 2g + 1}{G^2}\right] = \tag{85}$$

$$= \frac{\left(2G - 2g - 1\right)\delta}{2G^3} \tag{86}$$

$$\Rightarrow \frac{\partial R}{\partial G} > \frac{\partial C}{\partial G}, \forall g > \frac{1}{2} + \frac{2G}{3} \tag{87}$$

A.2.5 Derivatives with respect to income

$$\frac{\partial R}{\partial y_{max}} = \frac{\partial}{\partial y_{max}}\left[\left[-4g^2 + 4\left(G+1\right)g - \left(2G+1\right)\right]\frac{y_{max}}{2G^3}\right] = \tag{88}$$

$$= \left[-4g^2 + 4\left(G+1\right)g - \left(2G+1\right)\right]\frac{1}{2G^3} = \frac{R}{y_{max}} \tag{89}$$

$$\frac{\partial C}{\partial y_{max}} = \frac{\partial}{\partial G}\left[k + \delta\frac{2G - 2g + 1}{G^2}\right] = 0 \tag{90}$$

$$\Rightarrow \frac{\partial R}{\partial y_{max}} > \frac{\partial C}{\partial y_{max}}, \forall g \tag{91}$$

A.2.6 Derivatives with respect to income inequality

$$\left.\frac{\partial R}{\partial y_{max}}\right|_{\frac{G}{y_{max}}=h} = \frac{\partial}{\partial y_{max}}\left[\left[-4g^2 + 4\left(hy_{max}+1\right)g - \left(2hy_{max}+1\right)\right]\frac{y_{max}}{2h^3y_{max}^3}\right] = \tag{92}$$

$$= \frac{\left(2g - hy_{max} - 1\right)\left(2g - 1\right)}{h^3y_{max}^3} \tag{93}$$

$$\left.\frac{\partial C}{\partial y_{max}}\right|_{\frac{G}{y_{max}}=h} = \frac{\partial}{\partial y_{max}}\left[k+\delta\frac{2hy_{max}-2g+1}{h^2y_{max}^2}\right] = \tag{94}$$

$$= \frac{2\delta\left(2g-hy_{max}-1\right)}{h^2y_{max}^3} \tag{95}$$

$$\Rightarrow \frac{\partial R}{\partial y_{max}} > \frac{\partial C}{\partial y_{max}}, \forall g > \frac{G+1}{2} \tag{96}$$

A.3 Decreasing cost functions

The generic cost function can be written as:

$$C = k + \delta n_g^{\beta}, \beta > 0 \tag{97}$$

In the case of a triangular function, $n_g = \left(\frac{2G-2g+1}{G^2}\right)$, then:

$$C = k + \delta\left(\frac{2G-2g+1}{G^2}\right)^{\beta} \tag{98}$$

The derivative of the cost function with respect to the groups is:

$$\frac{\partial C}{\partial g} = \beta\delta\left(\frac{2G-2g+1}{G^2}\right)^{\beta-1}\left(-\frac{2}{G^2}\right) \tag{99}$$

that is negative for any value of $\beta > 0$. Indeed, given the particular shape of income distribution, the cost function is always decreasing for richer groups.