

TEXTO PARA DISCUSSÃO

No. 483

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# Inefficient Lobbying, Populism and Oligarchy\*

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February 18, 2004

## Abstract

This paper analyses the efficiency consequences of lobbying in a production economy with imperfect commitment. We first show that the Pareto efficiency result found for truthful equilibria of common agency games in static exchange economies no longer holds under these more general conditions. We construct a model of pressure groups where the set of efficient truthful common-agency equilibria has measure zero. Equilibria are generally inefficient as a direct result of the existence of groups with conflicting interests, which allocate real resources to lobbying. If lobbies representing "the poor" and "the rich" have identical organizational capacities, we show that these equilibria are biased towards the poor, who have a comparative advantage in politics, rather than in production. If the pressure groups differ in their organizational capacity, both pro-rich (oligarchic) and pro-poor (populist) equilibria may arise, all of which are inefficient with respect to the constrained optimum.

## 1 Introduction

Lobbies and pressure groups are everywhere, and everywhere they employ productive resources - time and money - in the pursuit of influence over government decisions. There is widespread historical and economic evidence that such rent-seeking activities have had (and continue to have) real impact on policy-making. Farm lobbies have successfully sought to maintain high levels of protection for domestic production in a number of places, including the European

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\*We are grateful to Alberto Alesina, Abhijit Banerjee, Francesco Caselli, Quoc-Anh Do, Elhanan Helpman, Richard Holden, Humberto Moreira, and Andre Sant'Anna for their helpful comments, as well as to seminar participants at the Harvard Macro lunch, the World Bank, the Catholic University of Rio de Janeiro (PUC-Rio), and the V Meeting of the Political Economy Group of LACEA. The usual disclaimer on remaining errors applies. Financial support for this research has been provided by Faperj.

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Union, Japan and, more recently, in the United States. In federal countries, like the United States, India or Brazil, regional and state representatives often lobby central governments to attract public spending to their states. Unions pressure governments to introduce protection against imports which compete against domestically-produced goods, or to raise minimum wages. Richer folks lobby against inheritance tax increases. Poor folks lobby against benefit cuts.

In this paper, we seek to investigate the economic consequences of lobbying, both in terms of economic efficiency and of distribution. Do the actions of pressure groups - expending real economic resources in order to influence policy decisions - affect the efficiency properties of economic equilibria? Do they affect

the distribution of income or wealth in the economy? If so, how do they affect them? Do the rich and powerful always gain from lobbying, at the expense of the poor and under-represented? Then how do we explain populist regimes, such as the *Peronista* governments in Argentina (1946-1955; 1973-76); Salvador Allende's rule in Chile (1970-73) or Alan García's in Peru (1985-1990), during which unions and other organized pressure groups representing 'the poor' appeared to have much greater influence over government policies than representatives of the business elite?<sup>1</sup> The historical evidence suggests that strikes, street demonstrations and other time- and resource-consuming activities were successfully used by popular pressure groups to affect government decisions, in between elections, in a number of populist regimes.<sup>2</sup> On the other hand, in other countries - or even in the same countries at other times - other equilibria have arisen in which the influence of lobbies representing the interests of the rich have seemed to dominate. Can economic theory shed any light on the mechanisms through which non-electoral, pressure-group politics affects economic efficiency and the distribution of wealth?

The importance of lobbying as an economic activity has of course long been recognized.<sup>3</sup> However, the conclusion that lobbying was inefficient, which characterized the original literature on rent-seeking, derived from its treatment of the contributions made by lobbies to government agents as deadweight loss.<sup>4</sup> Once the government is explicitly recognized as an agent in its own right, with its own preferences and resources, economic analysis of pressure group politics changes. The most fruitful theoretical approach to lobbies when the government

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<sup>1</sup>Some political scientists have in fact *defined* populism as "... a set of economic policies designed to achieve specific political goals, [namely] (1) mobilizing support within organized labor and lower middle-class groups; (2) obtaining complementary backing from domestically oriented business; and (3) politically isolating the rural oligarchy... and large-scale domestic industrial elites. " (Kaufman and Stallings, 1991, p.16.) This definition immediately brings to mind the idea of pressure group competition.

<sup>2</sup>One example was union pressure for adjustments to nominal wages in Argentina, which had been fixed by a government decree (the 'National Compromise Act ') in June 1973. In early 1974, however, "the government gave in to union pressures and decided to adjust wages before the scheduled date [...] The decision to modify the adjustment scheme would prove a major cause in the subsequent collapse of the program. " (Sturzenegger, 1991, p.99).

<sup>3</sup>A seminal early treatment can be found in Krueger (1974).

<sup>4</sup>See, for instance, Rodriguez (1999), which follows this rent-seeking literature.

is viewed as a real economic agent is that of common agency.<sup>5</sup> In the common agency framework, if principals behave truthfully (in the sense of revealing their true preferences, and hence paying as contributions to the agent all they are possibly willing to give in exchange for the agent's decision), then it has been shown (by Bernheim and Whinston, 1986, and with greater generality by Dixit, Grossman and Helpman, 1997, henceforth cited as DGH) that the equilibrium of the common agency game is Pareto efficient. Moreover, the adoption of truthful strategies is shown to be optimal from the principals' standpoint, in a well-defined sense. This key result appears in most of the politico-economic models that apply the common agency approach<sup>6</sup>, and even models that obtain inefficiency results do so by abandoning the notion of truthful behavior (e.g. Besley and Coate, 2001).<sup>7</sup>

This paper argues that this efficiency result depends crucially on two features of the game considered by DGH: the (implicit) pure exchange nature of the economy; and the existence of perfect commitment (i.e. the fact that all contracts can be costlessly enforced). We show that when a productive activity is explicitly modeled - and its consequences fully accounted for, especially in terms of a distinction between the resources available before and after production takes place - the efficiency of truthful equilibria requires some mechanism by which principals could perfectly commit to announced contribution schedules, or a perfect credit market which allowed principals to have access to resources that would otherwise only be available to them in the future. When this is not the case, the resulting allocation is generally inefficient, as political and productive activities compete for resources.

We apply this general result to a specific model, in which two pressure groups, defined by their positions in the initial wealth distribution ("rich" and "poor") make political contributions seeking to influence the composition of government expenditures. Allocation decisions depend on three factors: group sizes, their organizational ability, and their comparative advantages. The interplay between these three factors is shown to allow for a rich gamut of possible outcomes. If organizational or coordination capacity within the two groups is

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<sup>5</sup>A *common agency* problem is one in which several principals, with different and possibly conflicting interests, try to influence the decisions of a single agent. Unlike most principal-agent setups, common agency games present a non-trivial efficiency issue even under perfect information, as they raise the question of whether an efficient allocation of resources can be achieved when the several principals act in a noncooperative way.

<sup>6</sup>For instance, DGH (1997) and Dixit (1996), on tax rate decisions, or Grossman and Helpman (1994, 1995a, 1995b), on trade tariffs.

<sup>7</sup>"Bernheim and Whinston (1986), Grossman and Helpman (1994), and DGH (1997) have all argued that we should expect equilibria with truthful contribution schedules to be played. At the end of the day, however, they do not offer an account of the decision making process which guarantees convergence to these equilibria" (Besley and Coate, 2001, p. 79, our abbreviation). We feel that those authors' arguments on why to expect truthful behavior are persuasive: the fact that truthful contribution schedules are always a best response (which implies the existence of truthful equilibria), the fact that they are the only coalition-proof equilibria, and the fact that they might be focal in the set of equilibria due to the very fact that they might lead to efficiency.

identical, the equilibrium turns out to be pro-poor, or populist (in which the composition of government spending is biased towards the poorer group, relative to the efficient composition). If organizational capacity is allowed to differ, say by group size, then equilibria can be either populist or, instead, they can be pro-rich (or oligarchic), in which the reverse inefficiency occurs. Both populist regimes and oligarchies are inefficient, because of the distortionary effect of lobbying on public policy. More specifically, the political equilibrium turns out to be biased precisely towards those who have a comparative advantage in the political activity, i.e. those who are relatively less efficient in production.<sup>8</sup>

The comparative statics of the model are also quite rich. Increases in the incidence of poverty, for instance, will make an oligarchic equilibrium even less efficient, but will have an ambiguous effect on a populist equilibrium. If the marginal product of public capital is sufficiently high, and organizational ability among the poor is sensitive to group size, the populist equilibrium may become more efficient. These various outcomes are possible because we allow for two effects which are usually ignored in the literature. The first of them, which we dub the "efficiency effect", is due to the fact that the policy variable has a direct productive impact, which means that changes in the wealth distribution also change the efficient composition of public expenditure, hence the optimal decision on the policy variable. The second effect, which we label the "coordination effect", is due to the impact of wealth distribution on the size of the groups and their ability to coordinate as such, as in the well-known Olsonian view of pressure groups (Olson, 1965), which affects the political equilibrium.

Our results are also related to those in Loury (1981), Galor and Zeira (1993), Banerjee and Newman (1993) and Aghion and Bolton (1997), in the sense that the initial distribution of wealth affects the efficiency properties of the long-run equilibrium of the economy. As in those papers, imperfect commitment (which may arise from credit market imperfections) plays a crucial role, albeit here in an entirely different context: a non-electoral political process. We therefore find an additional inefficiency, directly linked to the political process, beyond the one that results from the market imperfections themselves. In this sense, wealth distribution can have an even larger impact on efficiency, as it sets in motion the conflict between pressure groups. In an example in the spirit of Galor and Zeira (1993) or Ferreira (2001), the inefficiency arises not only because a poor individual might not be able to afford a private education that he or she would otherwise pursue, but also because government expenditures on public education might themselves be distorted as a result of the lobbying activity.

In common with the literature on wealth distribution and political economy (Bertola, 1993; Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Bénabou, 2000), we find that wealth inequality can lead to inefficient equilibria, due to

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<sup>8</sup>This resembles the result from the classic model of competition among pressure groups by Becker (1983), in which the equilibrium depends on relative political productivity between groups. But that model does not include production explicitly, so it does not address the issue of political productivity relative to efficiency in production per se. It also contrasts with the model by Acemoglu, Aghion and Zilibotti (2002), in which lobbying under credit constraints benefits those who have more resources.

the existence of conflicting preferences over public policy. In contrast with most of it, however, in our model inefficiency does not arise from distortions inherent to the nature of redistribution (such as a tax on capital holdings). Instead, it arises from the very *nature of the political process*. Whereas those authors emphasize the inefficiencies caused by tax choices arising from electoral outcomes, we consider inefficient spending decisions, as a result of lobbying from interested pressure groups.<sup>9</sup>

Other papers that are related to ours are Esteban and Ray (2000) and Do (2002), which also look at wealth distribution and political competition over government decisions. The former uses a signalling game approach that is not suitable to model lobbying by pressure groups, which is what we focus on here. In addition, the results emerge from the imperfect information setup, whereas our results hold even under perfect information. The latter paper also analyzes pressure group interaction under credit market imperfections, but unlike ours it focuses on the endogenous emergence of barriers to entry in regulated industries, rather than on the allocation of government spending. Moreover, neither of them is interested in the analysis of populist as opposed to oligarchic outcomes. Finally, our paper also relates to the literature studying oligarchies versus populism, of which Bourguignon and Verdier (2000) and Acemoglu (2003) are examples. These papers, however, do not study the effects of a political process based on lobbying, which are our main focus.

The paper is structured as follows. Section 2 discusses how the efficiency result in common agency games changes when a productive activity is considered explicitly. Section 3 presents a model of interaction of pressure groups, defined along the wealth distribution, trying to influence the composition of government expenditures. Section 4 concludes.

## 2 Efficiency properties of truthful equilibria of common agency games in a production economy

In this section we will briefly discuss the efficiency properties of truthful equilibria of common agency games, once a productive activity is explicitly modeled, and its consequences fully accounted for. A formal discussion can be found in Appendix A.

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<sup>9</sup>The need to move beyond voting processes in order to understand the economic effects of politics was emphasized by Atkinson (1997, p. 316), "[it seems] important to see how far the findings depend on whether the outcome is governed by the preferences of the median voter, or by the ideology or preferences of political parties, or by political pressure from different interest groups (...). There has been relatively little research by economists which has set side by side different possible explanations of income redistribution".

The common agency framework - as laid out by Bernheim and Whinston (1986) and DGH (1997), for instance - is one in which many principals (say, pressure groups) try to influence the choice of some vector of actions chosen by the principal (which we take to be a government, or policy-maker), which have an impact on their utilities. They do so by making payments to the principal, conditional on the action chosen. The key result in this literature, established by the aforementioned authors, states that, if principals offer a *truthful* payment schedule, the resulting subgame perfect equilibrium (named *truthful Nash equilibrium*) is Pareto efficient.<sup>10</sup>

The intuition for this result is quite clear (DGH, 1997): competition between the principals enables the agent to extract all of the surplus in the game, and it will therefore be in her best interest to maximize that surplus. This is accomplished by an efficient allocation efficiency. Moreover, it can also be shown that such truthful behavior is optimal for agents, in the sense that the set of best responses for any choice of strategies by other players contains a truthful contribution schedule. In fact, although agents end up with the same utility they would achieve if no payments were made at all, they are trapped in a sort of prisoners' dilemma: every principal would be better off if no principal contributed, but if no one else contributes, then it is individually optimal to do so (DGH, 1997, p. 767).

These results, however, do rely on commitment between the principals - who commit to the contribution schedules - and the agent - who commits to the action vector she chooses. This reliance is not particularly troublesome if we think of both actions being taken simultaneously, in the sense that the agent implements the action with one hand, while collecting contributions from the principals with the other. Things change, however, if we consider a production economy.

The key feature of a production economy, in the present context, lies in the distinction between available resources before and after the productive activity is undertaken. If capital markets do not work perfectly, so that resources which will become available after production cannot be made available in advance, then principals may not be able to rely on those resources to pay contributions. More specifically, suppose the policy choice by the agent concerns a vector of inputs, each one to be used in production by one principal. Then resources made available by production cannot be used to pay for contributions simultaneously to the implementation of the policy vector, which by definition comes before production. In this case, if there is no other means by which commitment of the principals - with respect to the announced contribution schedule *after the agent's action is implemented* - can be achieved, then the efficiency result discussed above need not apply, as the agent will not accept contributions promised for delivery after production in any subgame perfect equilibrium. In other words, the set of feasible contributions in equilibrium reduces to a strict

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<sup>10</sup>A *truthful* payment schedule, also known as *compensating* payment schedule (see Grossman & Helpman, 2001) is one in which principals reveal their true preferences over the agent's actions and pay contributions accordingly, that is pay their compensating variation with respect to a given utility level.

subset in comparison to the case in which commitment is perfect, and the resulting allocation needs no longer be efficient with respect to the set of allocations that could possibly be achieved in this production economy.<sup>11</sup>

What is really crucial to the argument above is the impossibility of having access to produced resources before engaging in the productive activity. In this sense, *the existence of perfect credit markets could play the role of perfect commitment*, in that it would allow for the anticipation of future resources. The inefficiency of truthful equilibria of the common agency game could thus be associated with some kind of credit-market imperfection. It should be noted, however, that perfect credit markets require perfect commitment between borrowers and lenders, in the sense of perfect enforcement of contracts. This reveals the very nature of the inefficiency under analysis: it is linked to some institutional problem which gives rise to a contract enforcement failure, either within credit markets or between principals and agent. In other words, this inefficiency essentially results from a problem of incomplete contracts.<sup>12</sup>

Finally, we should stress that this discussion on efficiency applies to the allocation of resources among the players taking part in the game, as stressed for instance by Grossman and Helpman (1994a). If there are other individuals in the economy who are not part of the common agency game, there can (and, in general, will) be inefficient outcomes for the economy as a whole, where these individuals end up being "exploited" by those players in detriment of efficiency.

In this section we discussed why truthful equilibria in generalized common agency games without perfect commitment need not be efficient. A formal argument is made in Appendix A. In the next section, we use an example of such a game, where truthful equilibria are indeed generally Pareto inefficient, to shed light on the mechanisms through which pressure group politics affects economic outcomes. In particular, we are concerned with how lobbying and pressure groups may lead to either oligarchic or populist equilibria.

### 3 Rich and poor pressure groups; populist and oligarchic equilibria

Having discussed the possibility of inefficiency in a common agency game that is generalized to encompass the existence of production, let us now make use of this framework to investigate the impact of distribution on efficiency when the political process is modeled as an interaction of pressure groups trying to affect the composition of government expenditures.

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<sup>11</sup>The maintained assumption here is that the relevant set for efficiency analysis is the one which embodies the technological production possibilities of the economy. The implication is that an equilibrium reached subject to the feasibility constraints implicit in the constrained set of possible equilibrium contributions need not be Pareto efficient in that larger set. This efficiency assessment is analogous to stating that a general equilibrium with a missing market is no longer Pareto efficient (as compared to one with complete markets).

<sup>12</sup>It is possible that commitment devices might emerge in a context in which the game is repeated. As with the standard Folk theorem, their existence would require some upper bound on discount rates.



## 3.1 The model

### 3.1.1 Individuals and Production

We model an economy that exists for a single period, and consists of a continuum of private individuals forming a population of size one, and of a separate agent, called 'the government', whose attributes are discussed below. The individuals in the continuum are identical, except for their initial wealth, which is distributed as follows: a proportion  $p$  of the population has initial wealth  $\underline{w}$ , while the remaining  $1 - p$  is endowed with  $\bar{w}$ , where  $0 < \underline{w} < \bar{w}$ , as in Bourguignon and Verdier (2000) or Acemoglu and Robinson (2000). There is a single good, which can be either consumed or invested, in either of three types of capital.  $k$  denotes private capital, which can be accumulated by individual agents.  $g$  and  $s$  denote two different kinds of publicly-provided capital, which can only be produced by the government. The objective function of the government agent, which we will present below, implies that it is amenable to private contributions, that can influence its allocation choice between  $g$  and  $s$ . It will thus be rational for private agents to make contributions, contingent on the government's actions:  $C(g, s)$ .

Private production occurs by means of atomistic projects with inelastic and unit labor supply, according to the following production function:

$$\Psi(k, g, s) = \begin{cases} A(g + \alpha s)^a k^{1-a}, & k > k^* \\ Bs^a k^{1-a}, & \text{otherwise} \end{cases} \quad (1)$$

where  $g$  and  $s$  denote the government per capita expenditures on the two different kinds of publicly-provided private goods<sup>13</sup>,  $0 < \alpha < 1$ ,  $0 < a < 1$ ,  $A\alpha^a > B$  (which means that, given the option, individuals will prefer to use the first technology). Capital markets are assumed to be non-existent. The presence of the exogenous threshold  $k^*$  represents a nonconvexity of the production set, and as a result gives rise to the possibility of two classes, which will be called "rich" and "poor", defined by initial wealth distribution: agents who have the possibility of investing at least  $k^*$  will have access to a more productive technology, while those who have not will have to settle for a less efficient one. Since there are no capital markets, investment is limited by initial wealth.

Since each individual lives for a single period and derives utility only from his own consumption, his objective will be to maximize disposable income, which will be totally consumed. Therefore the utility function of a rich (poor) individual can be written simply as  $u_R(k_R, g, s) = \Psi_R(k_R, g, s)$  ( $u_P(k_P, g, s) = \Psi_P(k_P, g, s)$ ), as given by (1).

The specification in (1) implies that the publicly-provided goods play a fundamental role in private production (as in Barro, 1990).  $g$  and  $s$  can thus be seen as two kinds of "public capital", with differentiated impacts on production: while  $g$  is useful only to the rich,  $s$  is more beneficial to the poor (given

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<sup>13</sup>The analysis would not be qualitatively changed if we consider public goods instead of publicly-provided private goods (in which case  $g$  and  $s$  would stand for total government expenditure in each type of good). The analytical expressions that we derive below would be slightly different.

the assumption on  $\alpha$ ). This gives rise to a conflict of interests between classes within the model, and is meant to stand for the fact that there are many types of expenditure which are appropriated exclusively (or predominantly) by the richest strata in society, while other types are more useful to the poor, even though they can also be used by the rich (Ferreira, 1995). Public healthcare expenditures may exemplify the latter, while subsidies to tertiary education in developing countries could illustrate the former.<sup>14</sup> What is important is that the existence of these two types of expenditures means that the decision on the composition of total government expenditures has distributional consequences.

The government finances the production of  $g$  and  $s$  through taxation. It is assumed that the government's taxation technology is such that it can only raise funds through a linear wealth tax at the beginning of the period. The government is subject to a balanced budget constraint:

$$\tau [(1 - p)\bar{w} + p\underline{w}] = (1 - p)g + s$$

where  $\tau$  is an exogenously given tax rate on initial wealth.<sup>15</sup> This restriction implies that  $s$  may be expressed as a function of  $g$ ,

### 3.1.2 Political process

First we assume that the two classes actually exist - those individuals with initial wealth  $\underline{w}$  are the poor, and those endowed with  $\bar{w}$  are the rich.<sup>16</sup> Moreover, they are articulated as pressure groups, each trying to influence the government's policy decision concerning the choice between the two aforementioned types of expenditure, by means of political contributions. Each group promises to pay some amount to the government, depending on the policy choice ( $\mathbf{a} = \{g, s\}$ ). These contributions actually stand for a plethora of real-life practices, such as money (or time) devoted to campaign contributions, or pure bribery, among many others, as in Grossman and Helpman (1994). We also assume that individuals can only influence government behavior through this channel if they are part of an organized pressure group: each individual perceives himself as too small to influence policy decisions on their own (Grossman and Helpman, 1994). As before, we assume that there cannot be perfect commitment to the announced contribution schedules: there is no way by which either the rich or the poor can credibly commit to meet their announced political contributions after the government has implemented its decision. As we have seen, this implies that contributions must be paid *before* production, hence resources available for productive investment must be net of such payments. To summarize the time structure of the model, we can represent life in this one period economy in the timeline depicted in Figure 1.

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<sup>14</sup>We will later consider the polar case in which  $\alpha = 0$ , possibly representing expenditures targeted exclusively to the poor.

<sup>15</sup>Note that political contributions do not enter the budget constraint. One should think of them as going to a party fund, or simply being shifted towards private consumption of the government agent.

<sup>16</sup>This amounts to assuming  $\underline{w} < k^*$  and  $\bar{w} > k^* + C_R(g^0)$ , where  $C_R(g^0)$  is the equilibrium contribution of a rich individual, as will soon be defined.

[FIGURE 1 HERE]

Following Grossman and Helpman (1994) and DGH (1997), we assume that the government's objective function is a convex combination (with weight  $x$ ) of the contributions it receives and of a social welfare function. This can either be interpreted as allowing for some 'benevolence' on the part of the government agent, or simply to capture the fact that actual political processes are not limited to the interaction of pressure groups, and may also include more "democratic" channels, which make the government care about the welfare of the people.

To allow for different organization (or coordination) capacities across the two groups of agents, without explicitly modeling their formation, we attach weights to each group's contribution in the government's utility function, representing a given group's relative ease of organization - and thus greater lobbying effectiveness - by a greater weight. In fact, the usual argument in that discussion states that smaller and less disperse groups have a higher probability of actually being formed, due to transaction costs and to the problem of free-riding, and this could be represented by letting these weights depend on each group's size. Within the present context, where the group of the poor (rich) has size  $p$  ( $1 - p$ ), we can define these weights as  $\lambda_P(p)$  and  $\lambda_R(p)$ , where  $\lambda_P(p) < 0$  and  $\lambda_R(p) > 0$ , in order to capture this idea.<sup>17</sup>

All these features may be expressed, drawing upon Grossman and Helpman (1994), by modeling a government that maximizes the following objective function:

$$G = x [\lambda_R(p)(1 - p)C_R(g) + \lambda_P(p)pC_P(g)] + (1 - x) [(1 - p)\Psi_R(g, C_R(g)) + p\Psi_P(g, C_P(g))] \quad (2)$$

where  $C_j(g)$  is the political contribution from an individual member of group  $j$  as a function of the composition of government expenditures,<sup>18</sup> which we shall assume to be continuously differentiable, and  $x \in [0, 1]$  is the weight attached to contributions *vis-à-vis* social welfare (considering for simplicity a Benthamite welfare function in which every individual has the same weight<sup>19</sup>). The individual's utility - which is identical to its post-production disposable income - is written in (2), with a slight abuse of notation, as  $\Psi_j(g, C_j(g))$ , since  $k_j = (1 - \tau)w_j - C_j(g)$ .

Assuming perfect information, the problem is therefore written exactly as a generalized common agency game - where pressure groups are the principals, and the government is the agent - and its solution may be obtained as such.

<sup>17</sup>This an admittedly very reduced-form attempt to allow for differentiated coordination capacities across different coalitions, which may impact on their effectiveness as pressure groups. The classic reference is Olson (1965), and Becker (1983) is another instance of application of this insight.

<sup>18</sup>To write  $C_j(g)$ , we use the fact that the government's budget constraint allows us to write  $s$  as a function of  $g$ .

<sup>19</sup>It should be pointed out here that such assumption implies that there is no social inequality-aversion.

## 3.2 Results

### 3.2.1 Efficiency of truthful equilibria

As with the standard common agency game discussed in DGH (1997), this game comports a multiplicity of subgame perfect Nash equilibria. We follow Bernheim and Whinston (1986), Grossman and Helpman (1994) and DGH in restricting our attention to truthful symmetric Nash equilibria only, since truthful contribution schedules are always a best-response strategy and are the only coalition-proof equilibria of these games. In this subsection we therefore turn to the efficiency properties of truthful Nash equilibria within this model.

First let us characterize in Proposition 1 the constrained efficient allocation in this economy<sup>20</sup>, which will serve as a benchmark for comparisons with the political equilibrium allocation.

**Proposition 1** *A Pareto-efficient allocation  $\{k_R^*, k_P^*, g^*, s^*\}$  must have*

$$\frac{k_R^*}{g^* + \alpha s^*} = \left[ \frac{p}{1 - \alpha(1-p)} \frac{B}{A} \right]^{\frac{1}{1-\alpha}} \frac{k_P^*}{s^*}. \quad (3)$$

*Proof: See Appendix B.*

The efficiency condition established in Proposition 1 follows directly from the first-order condition of the problem faced by a hypothetical social planner who wished to maximize a Benthamite social welfare function (corresponding to total output) in this economy, by choice of public expenditure, subject to the government budget constraint. The expressions  $\frac{k_R^*}{g^* + \alpha s^*}$  and  $\frac{k_P^*}{s^*}$  represent what may be called the private-public capital ratios of the rich and the poor, respectively. In other words: how many units of private capital are invested per unit of public capital obtained by a given individual. Proposition 1 says that those ratios must be related in a precise manner in order to obtain an efficient allocation. The term  $\frac{p}{1 - \alpha(1-p)}$  is equal to  $\frac{p(1-p)}{(1-p)[1 - \alpha(1-p)]}$ , which is exactly the ratio between the marginal cost to the group of the poor of an increase in the rich-specific type of expenditure  $g$  (i.e. a change of the composition of government expenditures) and its marginal benefit to the group of rich. The term  $\frac{B}{A}$  gives a measure of the productive efficiency of the poor relative to that of the rich. Therefore an efficient allocation must equate one group's marginal cost to the other's marginal benefit, taking into account their relative efficiency on production.

On the other hand, a truthful political equilibrium may be characterized as follows:

**Proposition 2** *(i) A feasible allocation  $\{k_R^0, k_P^0, g^0, s^0\}$  is a truthful equilibrium only if*

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<sup>20</sup>What we are calling an "efficient allocation" takes as given the fact that there are some individuals that are restrained in their productive possibilities, to a worse technology, given the absence of credit markets in which they could possibly have access to  $k^*$ . We could otherwise consider the outcome with perfect credit markets as being the efficient one, and our present notion of efficiency would be a second best. More on this will come later.

$$\frac{k_R^0}{g^0 + \alpha s^0} = \frac{\lambda_P(p)}{\lambda_R(p)} \frac{p}{1 - \alpha(1-p)} \frac{k_P^0}{s^0} \quad (4)$$

(i) Such allocation is almost always Pareto-inefficient.

*Proof:* See Appendix B.

The intuition behind equation (4) is analogous to the one behind equation (3): a political equilibrium equates marginal costs and benefits, only now the groups' relative efficiency in lobbying is taken into account. The first part of Proposition 2 is obtained by imposing the requirements that the equilibrium allocation be optimal for the government, given the principals' contribution schedules, and optimal for each of the groups (principals), given the government's feasibility and rationality constraints. The second part, where the inefficiency of the political equilibrium is established (except by coincidence) relies on the fact that the ratio of private-public capital ratios within each group in (4) will only be equal to that in (3) for specific arbitrary values of the exogenous parameters  $\lambda_P(p)$  and  $\lambda_R(p)$ . See the proof.

Additionally, this inefficiency result does not depend on the introduction of the articulation power functions  $\lambda_P(p)$  and  $\lambda_R(p)$  in the model. Quite the contrary, it is only by allowing for the possibility that they differ across the two groups that it becomes possible (with probability measure zero in the parameter space) that the political equilibrium attains constrained efficiency. This point is made formally in the following corollary:

**Corollary 3** *If both groups have the same articulation power ( $\lambda_P(p) = \lambda_R(p)$ ), then a truthful equilibrium allocation is always inefficient.*

*Proof:* See Appendix.

This is an example of the inefficiency of generalized common agency games without perfect commitment, discussed in Section 2 and formally established in Appendix A.<sup>21</sup> It shows that the restriction on the Pareto-efficiency of truthful equilibria that is imposed by the absence of perfect commitment can actually be binding.

It is worth emphasizing that the inefficiency under analysis is *not* the one related to the absence of credit markets and the productive nonconvexity, as is usual in the literature. Indeed, what we call an efficient allocation in Proposition 1 already embodies the fact that some agents are constrained to a less productive technology: it is a constrained optimum, or second-best. The equilibrium allocation described in Proposition 2 is therefore not even the constrained optimum: there is an additional inefficiency *linked to the political process*.

We therefore have two levels of inefficiency: the first one generated by the existence of individuals who are constrained to a worse technology, the second one deriving from the fact that not even the constrained optimum is attained,

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<sup>21</sup>It is easy to check that introducing perfect commitment in our model actually leads to an efficient allocation if  $\lambda_P(p) = \lambda_R(p)$ , which is a mere application of the result due to DGH (1997), but can also be verified by an argument identical to the one used in the proof of Proposition 2. The result with perfect commitment may be inefficient if we consider  $\lambda_P(p) \neq \lambda_R(p)$ , but that would be trivial in that such inefficient would be generated simply by "corrupt" government behavior.

because of the political inefficiency. This second level is the distinctive feature of this model: the point is that not only is there an inefficiency due to the fact that the poor cannot afford to pay for the level of private education that would make them more productive, for instance, but there is also another inefficiency due to the fact that the government will not provide them with the optimal level of public education.

Let us consider the nature of this inefficiency further. Note that it can be measured by the absolute value of  $\theta \equiv \left[ \frac{p}{1-\alpha(1-p)} \frac{B}{A} \right]^{\frac{1}{1-\alpha}} - \frac{\lambda_P(p)}{\lambda_R(p)} \frac{p}{1-\alpha(1-p)}$ , which is exactly the difference between the private-public capital ratio of the rich (relative to that of the poor) in the efficient allocation and in the political equilibrium. Let us also define the political equilibrium as "pro-poor" (or "populist") if  $\theta < 0$ , and as "pro-rich" (or "oligarchic") if  $\theta > 0$ . These definitions refer to the fact that in the former case, public spending deviates from the constrained optimum by allocating more units of public capital per unit of private capital to the poor than would be efficient, while such advantage belongs to the rich in the latter case. They are presented graphically in Figure 2, where O stands for oligarchic and P for populist.

[FIGURE 2 HERE]

It is interesting to note that if  $\lambda_P(p) = \lambda_R(p)$ , i.e. both groups have the same articulation power, then we have a populist equilibrium. To put it another way, if the poor can organize themselves as effectively as the rich, the allocation of public expenditures generated by the political equilibrium will be more beneficial to them than the efficient one. This result may at first appear surprising, as it means that a political system in which the government's decision-making is influenced by channeling economic resources to the government turns out to be relatively beneficial to the poor. Let us consider it more closely.

The result is driven by the comparative advantages of each group:  $\lambda_P(p)$  and  $\lambda_R(p)$  represent each group's "political productivity", i.e. their effectiveness in lobbying the government. Since the rich have an absolute advantage in production (by assumption in (1)), identical political productivities imply that the rich have a comparative advantage in production, while the poor have a comparative advantage in politics. Each group will tend to "specialize" (partially, rather than completely, due to decreasing returns to both types of capital) in the activity in which it has comparative advantage.<sup>22</sup> The poor thus specialize in lobbying, shifting the political equilibrium towards them. Note that the Inada conditions satisfied by the Cobb-Douglas production function, by ensuring that the marginal product of public capital tends to infinity as the availability of private capital approaches zero, ensure that the poor do value access to public capital, even when they are severely constrained (i.e. extremely poor). In those circumstances, even though they may have little to contribute in absolute terms,

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<sup>22</sup>This can be seen in (4) by checking that  $\lambda_j(p)$  is inversely related to the capital that is privately invested by members of group  $j$ , and is therefore directly related to their political contribution.

their contribution will be strictly positive and will be higher in relative terms than that of the rich. With identical organizational capacities ( $\lambda$ s), the comparative advantage of the poor in politics implies that the equilibrium ratio will be lower than the Pareto-optimal ratio, no matter how small  $k_p$  may be, as long as it is strictly positive. The key idea is that the populist or oligarchic nature of the equilibrium here is defined in terms of public expenditure per unit of private expenditure: for instance, it is possible that in a populist equilibrium the rich obtain more public expenditure in absolute terms than the poor.

This result is consistent with the historical evidence from episodes such as Peronism in Argentina, Getúlio Vargas's government in Brazil (1951-1954), and Alan García's government in Peru (1985-1990), when unions and other popular organizations exercised their democratic right to demonstrate and pressure the government for the adoption of specific policies, even long before elections. Some such policies, such as fixing real wages above market-clearing levels, were unlikely to lead to greater economic efficiency. They were, in addition, contrary to the interests of capitalists. They were adopted as the result of political pressure, which often required considerable investment of time and resources on the part of lobbyists.

Consider once again the example of Argentina's National Compromise Act of 1973, which was mentioned in the introduction. After President Peron's government responded to union pressures by granting increases in 'administered' wages in March 1974, while upholding the freeze on other prices, "illegal price increases and black markets began to proliferate." (Sturzenegger, 1991, p.99). As part of its support for the government's policy, the Argentine Trades Union Congress (*Confederación General del Trabajo*) formed "sectorial commissions in order to control the adherence to the price and supply policy and therefore contribute to avoiding speculation and abuse..." (*La Nación*, 28 March 1974, in Sturzenegger, op. cit.). The point is that organized (and time-consuming) political action by groups drawn from the lower part of the income distribution (such as urban factory workers) have, on a number of occasions, succeeded in determining economic policy outcomes.<sup>23</sup> Such outcomes were generally biased in favor of those poorer groups, and were often economically inefficient.

While our model is thus consistent with instances in which the "poor" dominate the political process, leading to government policies that are biased against the rich, it is also perfectly consistent with outcomes in which the absolute advantage of the rich in lobbying is so large that - even though the poor still "specialize" in lobbying - the political equilibrium is pro-rich. This requires that  $\lambda_P(p) < \lambda_R(p)$ ,<sup>24</sup> which may arise in practice when the rich are a smaller and less dispersed group than the poor. As a general point, the political equilibrium

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<sup>23</sup>In Latin America, it was often the case that the poorest groups in society (say, rural workers) were not actually represented in the pressure groups underpinning populist regimes (say, mostly urban workers). As long as these latter pressure groups found themselves in political competition with a richer group (say, traditional elites and factory owners), our results remain relevant. Our model could be trivially modified to accommodate an underclass which was poorer than  $\underline{w}$ , provided it did not participate in the game.

<sup>24</sup>This is a necessary, but not sufficient, condition. The stronger, sufficient condition is that  $\theta > 0$ .

will favor the group that has comparative advantage in the political activity, in other words, those who are relatively less efficient in production.<sup>25</sup>

It should also be stressed that what is being meant by an efficient allocation does take into account the role of the government as a player: resources used as political contributions are not being considered a deadweight loss, as is usual in the literature on rent-seeking.<sup>26</sup> The inefficiency that arises in our model is due to the fact that lobbying distorts two key decisions: both the private investment decision of the principals *and* the composition of government expenditures. If there were perfect commitment, it would be possible to separate production from politics and what would prevail would be perfectly analogous to the outcome of the common agency game without production. Without commitment, the two cannot be disentangled, and resource allocation ends up being distorted. Moreover, such inefficiency is not a mere consequence of "corrupt" government behavior: perfect commitment allows for an efficient outcome despite the fact that the government still receives contributions and derives utility from them.

It may also be noted that this political inefficiency does not depend on the weight that the government attaches to political contributions *vis-à-vis* social welfare - as long as this weight remains strictly positive - which can be seen from the fact that  $x$  does not appear in either (3) or (4). This remark reinforces the observation that the inefficiency stems from the mere existence of lobbying, in the absence of perfect commitment or credit markets. In this sense, it does not depend on how "democratic" the political process turns out to be.<sup>27</sup>

As a final note on our results, let us point out that they remain valid when government spending on the kind of public capital which is preferred by the poor ( $s$ ), is perfectly targeted to them ( $\alpha = 0$ ). One could interpret  $\alpha$  as a "leakage rate" of the spending on  $s$  to the non-poor. It is easy to show that the in the political equilibrium with zero leakage, the following must hold:

$$\frac{k_R^0}{g^0} = \frac{\lambda_P(p)}{\lambda_R(p)} \frac{k_P^0}{s^0} \quad (4)$$

while the efficient allocation would have required that:

$$\frac{k_R^*}{g^*} = \left[ \frac{B}{A} \right]^{\frac{1}{1-a}} \frac{k_P^*}{s^*}. \quad (3')$$

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<sup>25</sup>This is in contrast with a different explanation for inefficient lobbying under credit constraints: it could be the case that the political equilibrium is biased towards those who have more resources to pay political contributions, which might not be those with the highest-return projects. This is what happens, for instance, in the paper by Acemoglu, Aghion and Zilibotti (2002), where "richer agents can pay greater bribes and [thus] have a greater influence on policy" (p. 37).

<sup>26</sup>To use the terminology of Esteban and Ray (2000), our model features "allocational losses". But if one is willing to think of political contributions as being socially wasteful, our model also features the conventional "conflictual losses" that are typical of rent-seeking models, for equilibrium contributions must be positive - if they were zero the government would be maximizing social welfare.

<sup>27</sup>Formally, this result stems from the envelope theorem: when the government considers the impact of a change in the composition of expenditures, the effect on the agents' welfare - the "democratic" component - vanishes because of the first-order condition for agents' optimization. This is clearly a consequence of the concept of truthful equilibrium.



This shows that our result does not depend on the additive component of the production function (1), but solely on the existence of a political decision on the composition of government expenditures between two kinds of public capital: one which is preferred by the rich, and another which is preferred by the poor.

### 3.2.2 Comparative Statics: inequality, poverty and efficiency

Having characterized the inefficiency of the political equilibrium, let us now examine the impact of changes in the wealth distribution on the equilibrium. The distribution of wealth in this economy is fully described by three parameters: one of the wealth levels (say,  $\underline{w}$ );  $p$ , the proportion of the population which is poor (or equivalently the relative size of the two groups), and  $d \equiv \bar{w} - \underline{w}$ , which can be thought of as a measure of inequality. In this subsection, we discuss some comparative statics, concerning the effects of changes in  $d$  or  $p$  on  $\theta$ , which measures the extent of oligarchic inefficiency of the equilibrium.

Starting with the former, it may seem at first that inequality has no impact on the magnitude of the inefficiency, as  $\theta$  is not functionally dependent on  $d$ . This conclusion, however, depends crucially on the exact nature of the change in  $d$ , given the nonconvexity of the production set. A decrease in inequality that gives the poor access to the more productive technology, without leading the rich to become poor, takes the economy automatically to the efficient allocation, for any conflict of interests vanishes. All agents would then prefer that the government produce only the  $g$ -capital good. Conversely, if the transfer between rich and poor makes everyone poor, so that for example  $k^* > \bar{w} > \underline{w}$ , then conflict also disappears, with everyone preferring the government to produce  $s$ . The effect of changes in inequality on inefficiency is discontinuous: a marginal change can have a large impact if it happens to fit one of the above cases. This discontinuity, which arises from the nonconvexity in the production set, is a feature that our model shares with many imperfect-capital-market models which also rely on such a nonconvexity (Galor and Zeira, 1993; Banerjee and Newman, 1993).

On the other hand, a significant change in inequality could have no effect whatsoever, provided that the resulting wealth distribution still consisted of two groups, each using a different technology, and each thus preferring the government to produce a different kind of public good. Our model, like Banerjee and Duflo (2003), is one in which *inequality will only lead to inefficiency insofar as it leads to the formation of groups with conflicting interests*, for it is the political interaction of such groups that generates a distorted allocation. This link does not stem from any inherently inefficient property of the redistribution activity per se - as it did in Alesina and Rodrik (1994) or Persson and Tabellini (1994). Inefficiency arises from the fact that lobbying power is not necessarily proportional to productive capacity (because principals can not perfectly commit to use their output to pay contributions). The lobbying process thus gives rise to an allocational decision by the (self-interested) government which is not necessarily socially optimal. Since the government's output is an input

into private production, total output is generally sub-optimal. Inequality leads to inefficiency, so long as there is disagreement within society as to the desired composition of government output.

We now turn to the impacts of changes in the relative size of the groups, which is captured by the parameter  $p$ . To this purpose, we will first state the following:

**Lemma 4** *The effect of an increase in the proportion of poor people in the economy on  $\theta$  can be divided into:*

- (i) *an efficiency-effect,  $\frac{1}{1-\alpha} \left[ \frac{p}{1-\alpha(1-p)} \right]^{\frac{\alpha}{1-\alpha}} \left( \frac{B}{A} \right)^{\frac{1}{1-\alpha}} \frac{1-\alpha}{[1-\alpha(1-p)]^2} > 0$ ;*
- (ii) *and a political effect, with two components:*
  - (i) *a participation-effect,  $-\frac{\lambda_P(p)}{\lambda_R(p)} \frac{1-\alpha}{[1-\alpha(1-p)]^2} < 0$ ;*
  - (ii) *b coordination-effect,  $-\frac{p}{1-\alpha(1-p)} \left[ \frac{\lambda_P'(p)}{\lambda_R(p)} - \frac{\lambda_P(p)}{\lambda_R(p)^2} \lambda_R'(p) \right] > 0$ .*

*Proof: See Appendix.*

The first effect embodies the impact of an increase in the proportion of the poor on the efficient allocation: as the size of a given group increases, efficiency requires more public capital to be directed toward that group. In that sense, it shifts the efficient "target" allocation in favor of the poor. The second effect refers to the influence on the political equilibrium allocation: the participation effect comes from the fact that an increase in a group's size leads, ceteris paribus, to a larger influence on the political process, as a result of the larger number of individuals. Thus, as it is defined, it always favors the poor. The coordination effect reflects the diminishing ease of coordination that comes with greater size, which tends to reduce the group's political power. Thus, as it is defined, it always favors the rich.

What each of these effects will mean in terms of efficiency will vary, depending on the nature of the equilibrium from which we are departing: whether populist or oligarchic. This is due first of all to the fact that  $\theta$  is a "signed" measure of inefficiency.  $\theta > 0$  indicates a pro-rich bias, while  $\theta < 0$  indicates a pro-poor bias. Since an efficient allocation is attained only when  $\theta = 0$ , an increase in  $\theta$  improves efficiency if the economy is in a populist equilibrium, and reduces it if the economy is in an oligarchic equilibrium. Thus both the efficiency and the coordination effects, which are positive, reduce inefficiency in a populist equilibrium: the efficiency effect moves the target closer to the pro-poor equilibrium, and the coordination effect reduces the populist bias of the equilibrium, also moving it toward the efficient target. Analogously, they increase inefficiency in an oligarchic equilibrium. The participation effect, which is negative, goes always in the opposite direction. This discussion is depicted in Figure 3, for the populist case, and Figure 4, for the oligarchic case: in both cases, efficiency is improved when the two lines are moved towards each other.

**[FIGURES 3 & 4 HERE]**

But the effect of  $p$  on  $\theta$  will also vary because the relative magnitude of the three effects will vary. The key to understanding this last remark lies on

a comparison between the efficiency and participation effects. The former, as explained above, measures how much more favorable to the poor the *efficient* allocation must become as  $p$  increases, and the latter measures how much more favorable to the poor the *equilibrium* allocation becomes. As such, the efficiency effect grows as the poor become more efficient in the productive activity relative to the rich, and the participation effect grows as they become relatively more efficient in lobbying. An oligarchic equilibrium is precisely a situation in which the relative productivity of the poor is greater in production than in lobbying, which means that the efficiency effect will prevail over the participation effect. Conversely, the latter will tend to dominate in a populist equilibrium, which is a situation in which the poor are relatively more productive in lobbying.<sup>28</sup>

As the coordination effect goes in the same direction of the efficiency effect, in an oligarchic equilibrium an increase in the number of poor people shifts the 'target' efficient allocation by more than it shifts the political power of the poor. Thus inefficiency inevitably increases as the equilibrium becomes even more biased towards the rich. In a populist equilibrium, on the other hand, the dominance of the participation effect will also increase the distance between the two allocations, so that inefficiency also increases as the equilibrium becomes even more biased towards the poor - provided that the increasing difficulty in coordination of the poor does not end up causing the overall effect to go in the opposite way.

The following proposition formalizes the above discussion, and therefore summarizes the qualitative results of an increase in the proportion of the poor on economic efficiency:

**Proposition 5** *An increase in the proportion of poor people in the economy will:*

- (i) *increase the inefficiency of the political equilibrium, if it is pro-rich;*
- (ii) *have an ambiguous effect on the inefficiency of the political equilibrium, if it is pro-poor: it will increase it only if private capital is productive enough (relatively to public capital) and if the groups' ease of coordination is not too sensitive to their size.*

*Proof: See Appendix B.*

This result once again sheds light on the importance of the political process in intermediating the effects of changes in the wealth distribution on economic

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<sup>28</sup>This dominance of the participation-effect will be verified provided that public capital is not too productive. This must be the case because in the efficient allocation the cost-benefit ratio will appear in a convex manner, while it appears linearly in the political equilibrium. This will give an extra-strength to the efficiency-effect that may counteract that tendency. That difference will appear because in the efficient outcome the decisions over public capital are separate from those over private capital, and the marginal productivity of the latter is a convex function of the public-private capital ratio; in the political outcome those decisions are entangled, which leads to a linear behavior because of the linearity of the technology on both types of capital taken together. If public capital is not too productive, such extra-strength will not be enough to overshadow that tendency. Intuitively, the more important public capital is, the more it will have to vary in order to keep efficiency in response to a change in  $p$ , hence the greater will be the efficiency-effect.

performance. The model is characterized by a remarkable wealth of possible interactions between distribution and efficiency, which comes from the fact that the former affects both the efficient and the equilibrium allocations.

As established in Proposition 3, if the political equilibrium is oligarchic, then an increase in the proportion of the poor on efficiency is guaranteed to lead to even more inefficiency.<sup>29</sup> This outcome is similar to the typical result of the literature relating distribution and efficiency by means of capital-market imperfections (e.g. Galor and Zeira, 1993; Banerjee and Newman, 1993): the greater the proportion of individuals subject to productive constraints due to their initial wealth, the less efficient is the economy. However, here this is closely related to the political process, and that is why it is not a general result in our model. If the economy departs from a populist equilibrium, an increase in the proportion of the poor may well lead to greater efficiency, thanks to the coordination-effect: if the group's ability to coordinate decreases too rapidly with its size, an increase in the proportion of poor may end up leading to greater efficiency, for it may cause the equilibrium to be less biased towards the poor.

As a general point, the model allows for a distinction between three different aspects of a political process based on the interaction of pressure groups trying to influence the composition of government expenditures: the productive characteristics of each group, its proportional size, and its ease of coordination. The literature on the political economy of redistribution and its links to economic performance usually takes into account only the second of those aspects, the one we call participation effect: the "population" weight of a group within the political system is the essential mechanism linking distribution and efficiency. For instance, we can say that models such as those in Alesina and Rodrik (1994) or Persson and Tabellini (1994) are analogous to our populist equilibria, in which the participation-effect tends to increase inefficiency; while models such as Bénabou (2000) allow for the oligarchic case, in which there is less redistribution in equilibrium than what would be efficient, and in this case the participation-effect runs in the opposite direction.

The two remaining effects, on the other hand, are directly related to our assumptions concerning the political system and the nature of the redistributive variable. The efficiency-effect comes precisely from the fact that the composition of government expenditures plays an essential role in production, besides being related to wealth distribution. The coordination-effect is obviously linked to the fact that the political process considers the existence of pressure groups. As both of these effects have opposite signs to that of the participation-effect, the model allows from results which are unusual in the literature: an increase in the number of supporters of a populist regime might actually destabilize it, leading to greater efficiency.

Anyway, as far as either the effects of inequality or those of the relative size of the groups are concerned, the links between wealth distribution and efficiency

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<sup>29</sup>This is somewhat similar to what happens in Bénabou (2000), where the existence of wealth-bias within the political process is a necessary condition to many of the most important results obtained.

in our model are clearly related to the proportion of individuals subject to productive restrictions. In this sense, if we think of the level of capital that separates the rich from the poor,  $k^*$ , as an absolute threshold - rather than being relative to the mean or median of the distribution - we can think of it as an absolute poverty line. Then the feature of the distribution that is actually relevant for efficiency is the poverty incidence index (also known as  $P(0)$ ) (Foster, Greer and Thorbecke, 1984), which is exactly the proportion of poor in the economy. Thinking of  $k^*$  as a poverty line, the parameter  $p$  in the model is nothing but  $P(0)$ . This is a subtlety which is often left implicit in the capital-market imperfection literature: inequality matters for economic performance, which is how it is usually put, but only as long as it affects  $P(0)$ . When this point is made explicitly, as in Esteban and Ray (2000), it often motivates a discussion on the different effects of inequality in "rich" and "poor" economies.

This discussion is easily - and in our view sensibly - avoided within our framework, by appealing to the concept of poverty as the lack of a minimum set of "capabilities", as in Sen (1983). If access to the better technology is thought of as a pre-requisite to effective participation in one's community, which is a capability central to Sen's approach, then the production set non-convexity threshold may be seen as a natural poverty line for this economy. The threshold between the two technologies in the context of our model may be thought of, still following Sen (1983), as being absolute in the space of capabilities - for it represents the access to the relevant capability in an absolute manner -, while being relative (in time and in space) in the space of commodities. In this sense, what matters is the degree of poverty in the economy, but in terms of a relative poverty line (in the space of commodities, which is where poverty lines are usually drawn). The model can then be applied to economies with distinct degrees of development. Having access to a more productive technology may mean being able to afford a bullock to pull a plough in one context, while in another it may mean being able to acquire the level of education that allows one to master computer programming. Which one is the relevant allegory will depend on the context, but the overall idea still applies.

## 4 Conclusions

In this paper, we show that truthful Nash equilibria in generalized common agency games need not be Pareto-efficient in production economies with imperfect commitment mechanisms. If contracts are not fully enforceable and credit markets are not perfect, resources which might become available to principals after production takes place can not be drawn upon when these principals choose their contribution schedules. This implies stricter constraints on the possible subgame-perfect-equilibrium strategy set, implying that the Pareto-efficient equilibrium which could otherwise be attained in SPE need no longer be attainable.

We use this general result in a model of lobbying by rich and poor coalitions, over the composition of public spending. The model was motivated by the fact that median-voter (and other electoral politics) models do not shed much light on political processes which take place in between elections, through which agents organize themselves into pressure groups and expend real economic resources in attempts to influence government policy.

In this model, poor and rich agents use publicly provided goods as inputs into production, but have conflicting preferences over them. The poor prefer one kind of public input, while the rich prefer another. A government budget constraint implies that gains to one group will imply losses to the other. Given this conflict of interests, it is optimal for each group to use some of their initial endowment for lobbying the government. Inefficiency arises because a group's ability to lobby (or "political productivity") is generally not identical to their ability to produce (or "economic productivity"), and the political equilibrium will be biased precisely towards those who have comparative advantage in lobbying (i.e. relatively less efficient in production). Indeed, if the rich group is rich precisely because it is more economically efficient, the poor have a comparative advantage in politics, which may well lead to a pro-poor bias in government policy. We associated such an outcome with populist regimes, where public spending is inefficiently targeted to protect the interests of popular majorities.

Populism is not the only possible equilibrium, however. If a group's size makes it harder to organize effectively and introduces costs of coordination, as in Olson (1965), then it is possible that the rich have an absolute advantage on both production and politics, but have a comparative advantage in politics. In that case the political equilibrium will remain inefficient, but the bias in the composition of public expenditure will benefit the rich. We associated these outcomes with oligarchic regimes, where too little is spent on public goods and services which might enhance the productivity of the impoverished majority (such as basic health care and primary education), but there is plentiful government spending on services valued by the rich (such as publicly subsidized brain-surgery and public universities).

Our model of populism and oligarchies illustrates yet another mechanism through which the distribution of wealth affects economic efficiency. We identify three channels through which changes in inequality or poverty affect efficiency: first, the efficient allocation itself depends on the distribution (the "efficiency effect"); second, distribution affects the population weights of each coalition, with two separate, and likely opposing, effects: a larger group has greater lobbying resources (the "participation effect"), but may be harder to coordinate and organize (the "coordination effect"). The various possibilities of interaction between these three effects implies a rich set of possible political outcomes from, say, an increase in the incidence of poverty. It will always be the case, however, that if poverty rises in an oligarchy, economic efficiency will suffer.

Finally, it is also possible to extend this model to settings in which political coalitions are not formed strictly along wealth lines. We sketch such an extension in Appendix C, by relaxing the assumption that the pressure groups differ in wealth. So long as these groups are formed by people who use different

technologies which require different input mixes from the government, all the basic results of the model carry through: the inefficiency of the political equilibrium, its bias towards those who have comparative advantage in lobbying rather than production, and the comparative statics results. For instance, the groups could consist of "farmers" versus "manufacturers", or agents from different regions within a country. Such an extension might shed light on such issues as protection for agriculture in developed countries, or regional inequalities in government spending in large federal nations. One prediction from this extension is that one would observe industries which are active in countries that do not have a comparative advantage in their products - such as farmers in Europe, the steel industry in the United States, or computer manufacturers in Brazil - because the groups which benefit from them (e.g. their owners or workers), having low economic productivity, would tend to allocate more resources towards political activities. This political comparative advantage would lead them to succeed in lobbying the government for protection or subsidies.

## 5 Appendix A

In this Appendix we discuss a little more in-depth the possibility of inefficiency of truthful equilibria in common agency games in economies with production.

Let us start with the common agency problem exactly as defined by DGH (1997), within a context of perfect information. After all, the question being addressed is whether an efficient allocation can be achieved in a common agency set-up, abstracting from informational problems. Let there be a (finite) set  $L$  of principals - pressure groups, for instance - in which every principal  $i \in L$  has continuous preferences denoted by  $U_i(\mathbf{a}, c_i)$ , where  $\mathbf{a}$  is the vector chosen by the agent - e.g. the policy-maker. Principals wish to influence this choice, and  $c_i$  is a scalar that stands for the payment made with that purpose by principal  $i$  to the agent. It is assumed that  $U^i$  is decreasing in  $c_i$ . The agent has continuous preferences  $G(\mathbf{a}, \mathbf{c})$ , where  $\mathbf{c}$  is the payment vector, and  $G$  is assumed to be increasing in each component of  $\mathbf{c}$ . In words, the agent enjoys being paid, while the principals do not like to make contributions. Principal  $i$  chooses a payment schedule  $C_i(\mathbf{a}) \in C_i$ , which maps every possible action  $\mathbf{a} \in A$  into a contribution to the agent. Sets  $C_i$  and  $A$  represent institutional and feasibility constraints on possible choices, and it is assumed that  $C_i \in C_i$  implies that  $C_i(\mathbf{a}) \geq 0$  for every  $\mathbf{a} \in A$ , and also that if  $C_i \in C_i$  then any  $C_i^*$ , such that  $C_i^*(\mathbf{a}) \geq 0$  and  $C_i(\mathbf{a}) \geq C_i^*(\mathbf{a})$  for every  $\mathbf{a} \in A$ , also belongs to  $C_i$ . That simply means that payments must be nonnegative, and that any (nonnegative) payment smaller than some feasible payment must also be feasible. The analysis then focuses on a two-stage game: in the second stage, the agent chooses the optimal action given the payment functions chosen by each principal, which were defined noncooperatively in the first stage, taking account of the agent's eventual response.

The fundamental result of the common agency literature, due to Bernheim

and Whinston (1986) and generalized by Proposition 4 in DGH (1997, p. 761), establishes the Pareto efficiency of truthful Nash equilibria, i.e. equilibria in which every principal offers a truthful payment schedule relative to some utility level (essentially meaning that principals will give the compensating variation to the agent, provided that such payment is feasible). It will be helpful to go through the argument that underlies its proof<sup>30</sup>: Assume there were a policy vector  $\mathbf{a}^*$  and a payment vector  $\mathbf{c}^*$  that Pareto-dominated the truthful equilibrium pair of  $\{\mathbf{a}^0, \mathbf{C}^0\}$  (with respect to utility levels  $u_i^0$ ). As principal  $i$  must be at least as well off as in equilibrium, and once payments reduce its utility, it must be the case that  $c_i^* \leq C_i^T(\mathbf{a}^*, u_i^0)$ , for this is by assumption a truthful schedule. Hence the agent cannot strictly prefer  $\mathbf{a}^*$  and  $\mathbf{c}^*$  to the equilibrium values, following a revealed preference logic: once  $\mathbf{a}^*$  and  $\{C_i^T(\mathbf{a}^*, u_i^0)\}_{i \in L}$  were available, yet he chose  $\{\mathbf{a}^0, \mathbf{C}^0\}$ , then he must not prefer the former to the latter. Given that  $c_i^* \leq C_i^T(\mathbf{a}^*, u_i^0)$ , it follows that he also does not prefer  $\mathbf{a}^*$  and  $\mathbf{c}^*$  to the former, for his utility is increasing in each principal's payment. It must therefore be true that the strict inequality that is required to characterize Pareto-dominance is valid for some principal  $i$ : some of the principals must strictly prefer  $\mathbf{a}^*$  and  $c_i^*$  to the equilibrium values. This would mean, however, that such principal would not be optimizing in equilibrium: he could have offered  $c_i^*$  in exchange for  $\mathbf{a}^*$ , and the agent would have accepted, for he would still be receiving the truthful contributions  $C_j^T(\mathbf{a}^*, u_j^0)$  from every other principal  $j$  (and  $C_j^T(\mathbf{a}^*, u_j^0) \geq c_j^*$ , as was seen above). This means that  $\{\mathbf{a}^0, \mathbf{C}^0\}$  was not an equilibrium, and this contradiction establishes the Pareto efficiency of truthful equilibria.

Let us now assume that the common agency game takes place in a production economy: the agent's choice affects the principals' production function,  $\Psi_i$ , and individual utilities depend on this function's (scalar) output. The production technology also uses as an input the resources directly invested by each principal, which will be denoted  $k_i$ . Therefore our setup may be summed up as follows: each principal has continuous preferences  $U_i[\Psi_i(\mathbf{a}, k_i), c_i]$ , which is increasing in  $\Psi_i$  and decreasing in  $c_i$ .  $\Psi_i$  is increasing in  $k_i$  and satisfies the Inada conditions; the agent has continuous preferences  $G[\mathbf{a}, \mathbf{c}; \Psi(\mathbf{a}, \mathbf{k})]$ , where  $\Psi$  is the vector of production outputs and  $\mathbf{k}$  is the vector of  $k_i$ . The main point to bear in mind is that the existence of a productive activity stresses the importance of *time* in the common agency game: resource availability after production is not the same as before it takes place. Under imperfect commitment, it is the availability of resources before production which determines the feasibility constraints for individual principals.

In order to capture this point, it is convenient to rewrite the common agency problem in a generalized framework, as a *three-stage game*, rather than the two stages in which it is usually modeled. More specifically, we shall consider that: at stage one, principals announce payment schedules  $C_i(\mathbf{a}) \in C_i$ , just as usual. At the second stage, the agent chooses a policy vector  $\mathbf{a} \in A$ , and the principals decide how much they will pay simultaneously with the implementation of the

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<sup>30</sup>The heuristic argument is provided by DGH (1997). In order to find a formal proof, however, one must refer to Dixit, Grossman and Helpman (1999).



chosen policy,  $c_i^s$ . Finally, at the third stage, principals decide how much will be paid at the end of the game,  $c_i^d$ . In other words, it is possible to pay part of the contribution immediately, while postponing some of it, at each principal's discretion, therefore potentially deferring effective payments. Production takes place between the second and third stages.

Let us assume, for the sake of simplicity, that each principal's utility depends only on own consumption, which turns out to be output minus the contribution paid at the end of the game. Assume also that credit markets are missing entirely from this economy, so that principals can not have access to resources beyond their initial wealth. Individual output then depends on the action chosen by the agent and on the resources invested by the principal, which consists of total resources available at the start of the game,  $w_i$ , minus second-stage payments<sup>31</sup>. Consumption takes place only at the end of the game, and it is also assumed that there is no discounting. This allows us to formally define the strategic form of the *generalized common agency game* as follows:

**Definition 6** *The strategic form of the generalized common agency game is  $\Gamma \equiv \{N, (S_i)_{i \in N}, (u_i)_{i \in N}\}$  such that*

(i)  $N = L \cup \{j\}$ , (set of players, where  $L$  is the set of principals and  $j$  refers to the agent)

(ii)  $u_i = U_i[\Psi_i(\mathbf{a}, w_i - c_i^s) - c_i^d], i \in L, u_i = G[\mathbf{a}, \mathbf{c}^s + \mathbf{c}^d; \Psi(\mathbf{a}, \mathbf{w} - \mathbf{c}^s)], i = j$ , (payoffs)

(iii)  $S_i = \tilde{C}_i \times \tilde{C}_i \times \tilde{C}'_i, i \in L, S_i = \tilde{A}, i = j$  (where  $\tilde{C}_i$  is the space of functions  $f : A \rightarrow C_i, \tilde{C}'_i$  is the space of functions  $g : A \times \tilde{C}_i \rightarrow C_i$  such that  $g(\mathbf{a}, c_i) + c_i \in C_i$ , and  $\tilde{A}$  is the space of functions  $h : C \rightarrow A$ ), (strategy spaces).

Let us first assume that there is *perfect commitment by the principals*, meaning that each principal can somehow commit to the announced payment schedule in a credible manner. It may be formally stated by imposing  $c_i^s + c_i^d = C_i(\mathbf{a})$  for every possible  $\mathbf{a}$  chosen by the agent, which shows that the latter is indifferent between being paid in the second or in the third stage - after all, its utility function implies that the agent cares only about total contributions, at least directly. The point is that the set of possible contributions in equilibrium is conditioned by the possibility of paying *after* production: the maximal possible equilibrium payment by principal  $i$  is its total output in case the agent chooses the action that maximizes such principal's utility and all of the resources initially available are invested in production, or simply  $\bar{C}_i(w_i) \equiv \Psi_i(\bar{a}_i, w_i)$ , where  $\bar{a}_i \equiv \arg \max_{\mathbf{a} \in A} \Psi_i(\mathbf{a}, w_i)$ . Given that payments can be made after production - and also given that the principal's utility is increasing in  $\Psi_i$ , which is increasing in  $k_i$  -, it is optimal for principal  $i$  to invest  $w_i$  on the production function, or equivalently, to set  $c_i^s = 0$  in any subgame-perfect Nash equilibrium. This in turn implies that  $w_i$  may be considered parameters in the utility functions,

<sup>31</sup>It is being assumed here that there is no storage technology allowing resources to be kept by the principals between stages two and three, without being invested. This assumption is not essential to any result, while making the analysis a lot simpler

which can thus be written as  $U_i(\mathbf{a}, c_i)$  and  $G(\mathbf{a}, \mathbf{c})$ : this is precisely how they appear in DGH (1997). It is then possible to directly apply their Proposition 4, and to conclude that *truthful equilibria lead to Pareto-efficient allocations in generalized common agency games with perfect commitment by the principals with respect to announced payment schedules*. In fact, all that production does within a perfect commitment framework is to define the set of possible equilibrium contributions,  $C_i$ .

Let us now consider the case in which there is no such perfect commitment mechanism. In this case, proceeding by backward induction in  $\Gamma$ , a subgame-perfect equilibrium necessarily involves  $c_i^d = 0$ : once the policy chosen by the agent has been implemented, principals have no incentive whatsoever to make any further payment, for it would decrease their utilities. Any promise of a strictly positive  $c_i^d$  would not be credible, and the agent will take account of that by demanding that payments be made simultaneously to policy implementation. This means that all payments must be made *before* production, and that affects the amount of resources available for productive investment in equilibrium, since contributions and investments must both come from initial wealth,  $w_i$ . Formally, we have  $\overline{C}_i(w_i) \equiv w_i$ , which defines a new set of possible equilibrium contributions  $C_i'$ , and the utility functions must be now written as  $U_i[\Psi_i(\mathbf{a}, w_i - c_i^s)]$  and  $G[\mathbf{a}, \mathbf{c}^s; \Psi(\mathbf{a}, \mathbf{w} - \mathbf{c}^s)]$ .

If  $w_i < \Psi_i(\bar{a}_i, w_i)$ , which amounts only to assuming that the production technology available in this economy is more efficient than a simple storage technology, then  $C_i'$  is a proper subset of  $C_i$ . A careful analysis of the aforementioned heuristic argument behind the proof of Proposition 4 of DGH (1997) shows that this suffices to break the validity of the proposition as a general result: it could be the case that there existed  $\mathbf{a}^*$  and  $\mathbf{c}^*$  such that  $C_i^T(\mathbf{a}^*, u_i^0), c_i^* \in C_i$  and  $C_i^T(\mathbf{a}^*, u_i^0), c_i^* \notin C_i'$ , for some  $i \in L$ , so that the revealed preference argument is no longer valid. To put it another way, the absence of perfect commitment reduces the set of payments that are possible in equilibrium: there may be an allocation which Pareto-dominates the constrained equilibrium one and which is feasible in  $C_i$ , but which is not feasible in the restricted set  $C_i'$ .

Moreover, the above discussion shows that it is possible to think of total contributions,  $c_i = c_i^s + c_i^d$ , as being the relevant decision variables, for one of its components will always be zero in equilibrium, regardless of which of the two cases is being analyzed - that is precisely what allows the equilibrium to be characterized just as it is in DGH (1997). One can see then that going from a perfect commitment setup to one in which such commitment is absent will change the utility function  $U_i[\Psi_i(\mathbf{a}, w_i - c_i^s) - c_i^d]$ , and this may also change the result of individual optimization. Therefore *truthful equilibria may not lead to Pareto-efficient allocations in generalized common agency games without perfect commitment*. Once the time-production binomial is taken into account, the absence of perfect commitment (such as might be permitted through a perfect credit market) changes the set of payments that are possible in equilibrium, so that the new set is a strict subset of the other.

As a final comment, we address the question of how important the full account of the consequences of a productive activity is in obtaining those re-

sults. Could one arrive at them by simply introducing the effective timing of payments that was described, which obviously differs from the usual common agency framework? To check for this it suffices to consider the identity function as the production function (which is equivalent to actually ruling out production), assuming for the sake of simplicity that the agent's action is a consumption transfer  $a_i$  to each principal  $i$ . In this case the set of feasible payments obviously remains intact, and utilities (as functions of  $c$ ) are now given by  $U_i(a_i + w_i - c_i)$ . Therefore the principals face the same problem in both situations, and the solutions must be the same. That shows that the presence of a productive activity is actually what gives rise to our result.

## 6 Appendix B

**Proof.** Proposition 1

The choice of  $g$  that maximizes the economy's output, given  $p$  and an amount of private capital for each group,  $k_R^*$  and  $k_P^*$ , is given by solving:

$$\text{Max}_g \left\{ (1-p)A(g + \alpha s)^a k_R^{*1-a} + pBs^a k_P^{*1-a} \right\}.$$

The first-order condition is:

$$a(1-p)A(g^* + \alpha s^*)^{a-1} k_R^{*1-a} [1 - \alpha(1-p)] - pa(1-p)Bs^{*a-1} k_P^{*1-a} = 0 \implies [1 - \alpha(1-p)]A(g^* + \alpha s^*)^{a-1} k_R^{*1-a} = pBs^{*a-1} k_P^{*1-a} \implies$$

$$[1 - \alpha(1-p)]A \left( \frac{k_R^*}{g^* + \alpha s^*} \right)^{1-a} = pB \left( \frac{k_P^*}{s^*} \right)^{1-a} \implies \frac{k_R^*}{g^* + \alpha s^*} = \left[ \frac{p}{1 - \alpha(1-p)} \frac{B}{A} \right]^{\frac{1}{1-a}} \frac{k_P^*}{s^*}.$$

The FOC is sufficient because of the concavity of the production functions.

Once the Pareto-optimality requires that the output be maximized, for there is no disutility of working and only a single period, we have that a Pareto-efficient allocation must satisfy the above equation. ■

**Proof.** Proposition 2

(i) Let us first note that in a political equilibrium we have  $k_R^0 = (1 - \tau)\bar{w} - C_R(g^0)$  and  $k_P^0 = (1 - \tau)\underline{w} - C_P(g^0)$ . We know from Proposition 1 in Dixit, Grossman and Helpman (1997, p. 757) that an equilibrium of the common agency game is characterized by three conditions: (i) feasibility of the contributions, (ii) optimality of the policy vector to the agent within the set of feasible actions, given the principals' payment schedules, and (iii) optimality of policy and payments to every principal, subject to feasibility constraints and to the agent's individual rationality constraint (established by the possibility of ignoring any individual principal). The first condition is satisfied by assumption. If the payment schedule is truthful, the marginal contribution must everywhere exactly equate the marginal benefit derived from a policy change - which must be true, in particular, at the equilibrium. As payment schedules are assumed to be differentiable, condition (iii) requires the following FOCs:

$$\begin{aligned} \frac{d\Psi_P}{dg}(g^0) = 0 &\implies -(1-p)aBs^{0a-1}[(1-\tau)\underline{w} - C_P(g^0)]^{1-a} - (1-a)Bs^{0a}[(1-\tau)\underline{w} - C_P(g^0)]^{-a} \frac{dC_P}{dg}(g^0) = 0 \implies \frac{dC_P}{dg}(g^0) = \\ &= -(1-p) \frac{a}{1-a} \frac{(1-\tau)\underline{w} - C_P(g^0)}{s^0} \end{aligned}$$

$$\begin{aligned} \frac{dV_R}{dg}(g^0) = 0 &\implies a\{1 - \alpha(1 - p)\}A(g^0 + \alpha s^0)^{a-1}[(1 - \tau)\bar{w} - C_R(g^0)]^{1-a} - \\ (1 - a)A(g^0 + \alpha s^0)^a[(1 - \tau)\bar{w} - C_R(g^0)]^a \frac{dC_R}{dg}(g^0) &= 0 \implies \\ \frac{dC_R}{dg}(g^0) &= [1 - \alpha(1 - p)] \frac{a}{1-a} \frac{(1-\tau)\bar{w} - C_R(g^0)}{g^0 + \alpha s^0}. \end{aligned}$$

Condition (ii) requires that the government's objective function be maximized. We can simplify the FOC to this problem by noticing that the second term of this function is proportional to the sum of each group's utility, and the derivative of this sum is zero, as seen above. Then we have:

$$\begin{aligned} \frac{dG}{dg}(g^0) = 0 &\implies x \left[ \lambda_R(p)(1 - p) \frac{dC_R}{dg}(g^0) + \lambda_P(p)p \frac{dC_P}{dg}(g^0) \right] = 0 \implies \lambda_R(p)(1 - p) \\ p \frac{dC_R}{dg}(g^0) &= -\lambda_P(p)p \frac{dC_P}{dg}(g^0). \end{aligned}$$

Using the previous results, we may thus obtain:

$$\begin{aligned} \lambda_R(p)(1 - p)[1 - \alpha(1 - p)] \frac{a}{1-a} \frac{(1-\tau)\bar{w} - C_R(g^0)}{g^0 + \alpha s^0} &= \lambda_P(p)p(1 - p) \frac{a}{1-a} \frac{(1-\tau)w - C_P(g^0)}{s^0} \implies \\ \frac{(1-\tau)\bar{w} - C_R(g^0)}{g^0 + \alpha s^0} &= \frac{\lambda_P(p)}{\lambda_R(p)} \frac{p}{1 - \alpha(1 - p)} \frac{(1-\tau)w - C_P(g^0)}{s^0}. \end{aligned}$$

The sufficiency of this FOC is assured just as in the proof of Proposition 3.

(ii) It is easy to check that  $\left[ \frac{p}{1 - \alpha(1 - p)} \frac{B}{A} \right]^{\frac{1}{1-a}} < \frac{p}{1 - \alpha(1 - p)}$ , because of our parametric assumptions of  $0 < \alpha < 1$  and  $B < A\alpha^a$ , which imply  $B < A$ . Expressions (3) and (4) could therefore be equal only if  $\lambda_R(p)$  and  $\lambda_P(p)$  are exactly such as to compensate for that difference. As they are simply parameters, this could only happen by coincidence: the truthful equilibrium allocation will thus be efficient only for a zero-measure set of parameters. Hence we prove that it is almost always inefficient. ■

**Proof.** Corollary

It is a mere consequence of the fact mentioned in the proof of Proposition 2, that  $\left[ \frac{p}{1 - \alpha(1 - p)} \frac{B}{A} \right]^{\frac{1}{1-a}} < \frac{p}{1 - \alpha(1 - p)}$ . ■

**Proof.** Lemma 1

It is enough to take the partial derivative of  $\theta$  with respect to  $p$ . The first term of  $\theta$ , which corresponds to the parameter associated with the efficient allocation, has a derivative of  $\frac{1}{1-\alpha} \left[ \frac{p}{1-\alpha(1-p)} \right]^{\frac{a}{1-a}} \left( \frac{B}{A} \right)^{\frac{1}{1-a}} \frac{1-\alpha}{[1-\alpha(1-p)]^2} > 0$ , which is the efficiency-effect. The derivative of the second term, associated with the political equilibrium, may be divided in two components, by the rule of product differentiation:  $-\frac{\lambda_P(p)}{\lambda_R(p)} \frac{1-\alpha}{[1-\alpha(1-p)]^2} < 0$ , which comes from differentiating  $\frac{p}{1-\alpha(1-p)}$  (a term that appears in the political equilibrium because of the number of poor and rich contributing to the government and on the social welfare function), and  $-\frac{p}{1-\alpha(1-p)} \left[ \frac{\lambda_P'(p)}{\lambda_R(p)} - \frac{\lambda_P(p)}{\lambda_R(p)^2} \lambda_R'(p) \right] > 0$ , which comes from differentiating  $\frac{\lambda_P(p)}{\lambda_R(p)}$  (a term that represents the political weights associated with each group's ease of coordination). Those are the participation-effect and the coordination-effect, respectively. ■

**Proof.** Proposition 3

(i) From Lemma 1 we know that

$$\frac{\partial \theta}{\partial p} = \left[ \frac{1}{1-\alpha} \left[ \frac{p}{1-\alpha(1-p)} \right]^{\frac{a}{1-a}} \left( \frac{B}{A} \right)^{\frac{1}{1-a}} - \frac{\lambda_P(p)}{\lambda_R(p)} \right] \left[ \frac{1-\alpha}{[1-\alpha(1-p)]^2} \right] -$$

$$\frac{p}{1-\alpha(1-p)} \left[ \frac{\lambda_P'(p)}{\lambda_R(p)} - \frac{\lambda_P(p)}{\lambda_R(p)^2} \lambda_R'(p) \right].$$

The second term of this subtraction is negative, given the assumptions on the sign of the derivatives of  $\lambda_R(p)$  and  $\lambda_P(p)$ . As far as the first term is concerned, we know that the second term in square brackets is positive. In a rich-friendly equilibrium, we have

$$\begin{aligned} \theta > 0 &\implies \left[ \frac{p}{1-\alpha(1-p)} \right]^{\frac{1}{1-a}} \left( \frac{B}{A} \right)^{\frac{1}{1-a}} - \frac{\lambda_P(p)}{\lambda_R(p)} \frac{p}{1-\alpha(1-p)} > 0 \implies \\ \frac{p}{1-\alpha(1-p)} &\left[ \left( \frac{p}{1-\alpha(1-p)} \right)^{\frac{a}{1-a}} \left( \frac{B}{A} \right)^{\frac{1}{1-a}} - \frac{\lambda_P(p)}{\lambda_R(p)} \right] > 0 \implies \\ &\left[ \left( \frac{p}{1-\alpha(1-p)} \right)^{\frac{a}{1-a}} \left( \frac{B}{A} \right)^{\frac{1}{1-a}} - \frac{\lambda_P(p)}{\lambda_R(p)} \right] > 0 \implies \frac{\partial \theta}{\partial p} > 0, \end{aligned}$$

for  $\frac{1}{1-a} > 1$ . Therefore, if  $\theta > 0$ , an increase in  $p$  increases  $\theta$ , which means greater inefficiency.

(ii) The same reasoning presented above implies that

$$\left[ \left( \frac{p}{1-\alpha(1-p)} \right)^{\frac{a}{1-a}} \left( \frac{B}{A} \right)^{\frac{1}{1-a}} - \frac{\lambda_P(p)}{\lambda_R(p)} \right] < 0.$$

As  $\frac{1}{1-a} > 1$ ,  $\frac{\partial \theta}{\partial p} < 0$  (which is equivalent to saying that an increase in  $p$  increases inefficiency) requires that  $a$  not be too high: private capital must be productive enough, relatively to public capital. Moreover, it also requires the second term in  $\frac{\partial \theta}{\partial p}$  to be not too big so as to cause the total effect to be positive. ■

## 7 Appendix C

We now provide a simple model of allocation of government expenditures in a common agency framework that is very similar to the one presented in text, but in which pressure groups are not based on wealth distribution, and no specific functional form is assumed for the production function. The idea is to illustrate the point that our framework can be extended to a wider array of situations.

Suppose we have an economy just like the one described in Section 3, in which there are two organized pressure groups,  $i = 1, 2$ , which are restricted to two different technologies, described by production functions denoted respectively by  $\psi^i(w_i - C_i(a_1, a_2), a_i)$ . These functions are assumed to be differentiable, increasing and concave in both arguments, and homogeneous of degree one. These two groups compete over the allocation of government expenditures between two different types of publicly-provided private goods,  $a_1$  and  $a_2$ , where we are assuming that each type of good benefits only one of the groups, for simplicity. The population is split between the two groups, in proportions  $p$  and  $1-p$ . Our idea is to have the groups unrelated to initial wealth distribution, so we assume  $w_1 = w_2 = w$ . The government's budget constraint can thus be written as  $tw = pa_1 + (1-p)a_2$ . Finally, we assume the groups have the same coordination ability.

Proceeding just as in Appendix B, we can obtain the relationship that characterizes the efficient allocation:

$$\psi_2^1(k_1^*, a_1^*) = \psi_2^2(k_2^*, a_2^*) \quad , \quad (C.1)$$

where the subscript indicates the partial derivative with respect to the corresponding argument. It simply means that the efficient allocation should equate the marginal productivity of public capital in both sectors. Similarly, we can derive the relationship that characterizes the political equilibrium allocation:

$$\psi_2^1(k_1^0, a_1^0) = \frac{\psi_1^1(k_1^0, a_1^0)}{\psi_1^2(k_2^0, a_2^0)} \psi_2^2(k_2^0, a_2^0) \quad (C.2)$$

We thus see that the political equilibrium will be efficient only when the groups have the same marginal productivity of private capital. Broadly speaking, the equilibrium will be inefficient as long as the groups differ in terms of productivity. We can also assess the bias that will result in this equilibrium, still in the sense defined in text. If the technologies have constant returns to scale, the marginal productivities will be homogeneous of degree zero, and we can express the terms in (C.1) and (C.2) as functions of the private-public capital ratios. Suppose, without loss of generality, that group 1 has a larger marginal productivity of private capital than group 2 in the equilibrium allocation. We thus have  $\psi_2^1(k_1^*, a_1^*) < \frac{\psi_1^1(k_1^*, a_1^*)}{\psi_1^2(k_2^*, a_2^*)} \psi_2^2(k_2^*, a_2^*)$ . In order to achieve equality, we must increase  $\frac{k_1}{a_1}$  relatively to  $\frac{k_2}{a_2}$ , so that the LHS will increase, and the RHS will decrease (assuming that both types of capital are complements). It follows that the political equilibrium will be biased towards group 2, which is precisely the one for which private capital is less productive in the efficient allocation. This is precisely the manifestation of the comparative advantage intuition that was stressed in our model.

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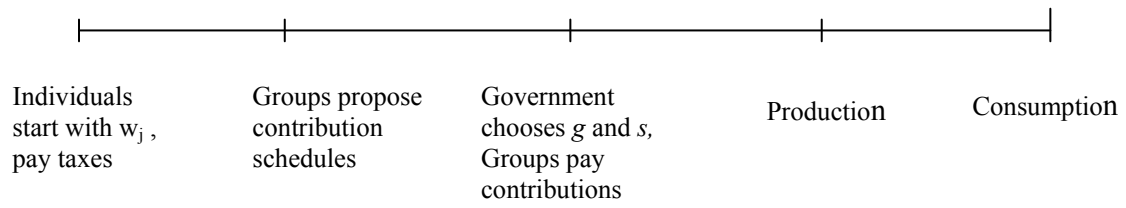
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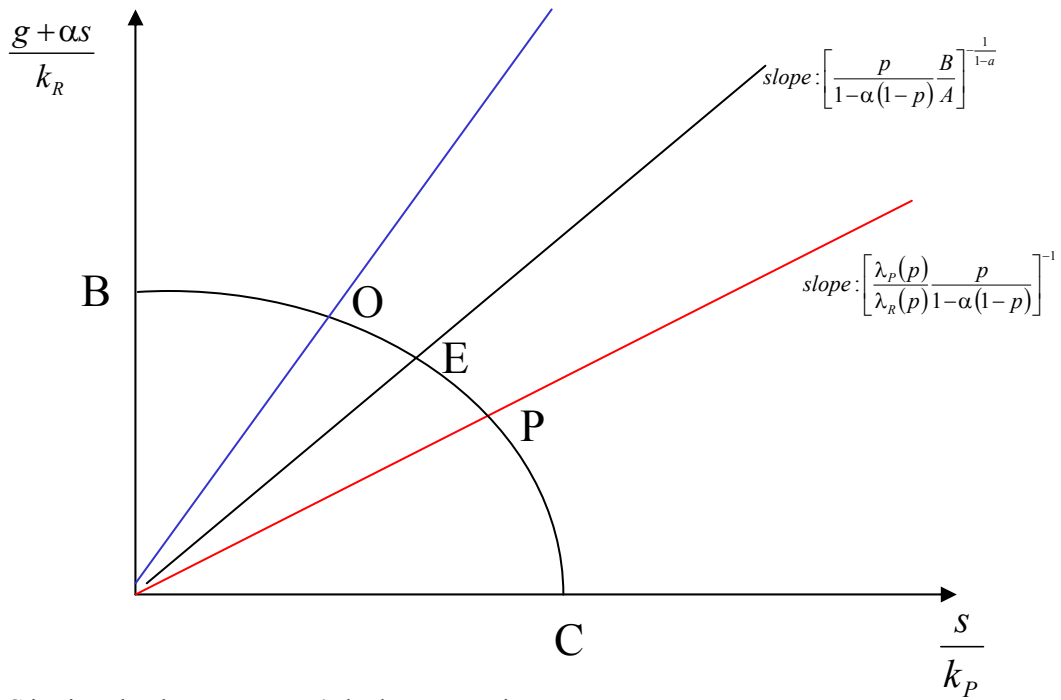
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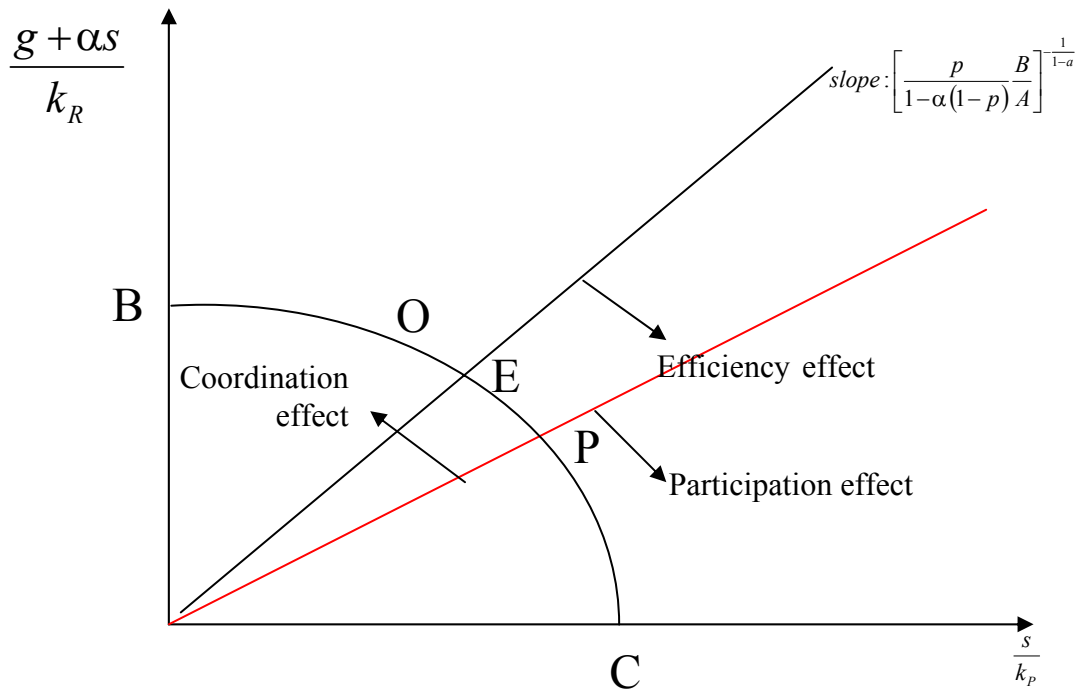


**Figure 1**



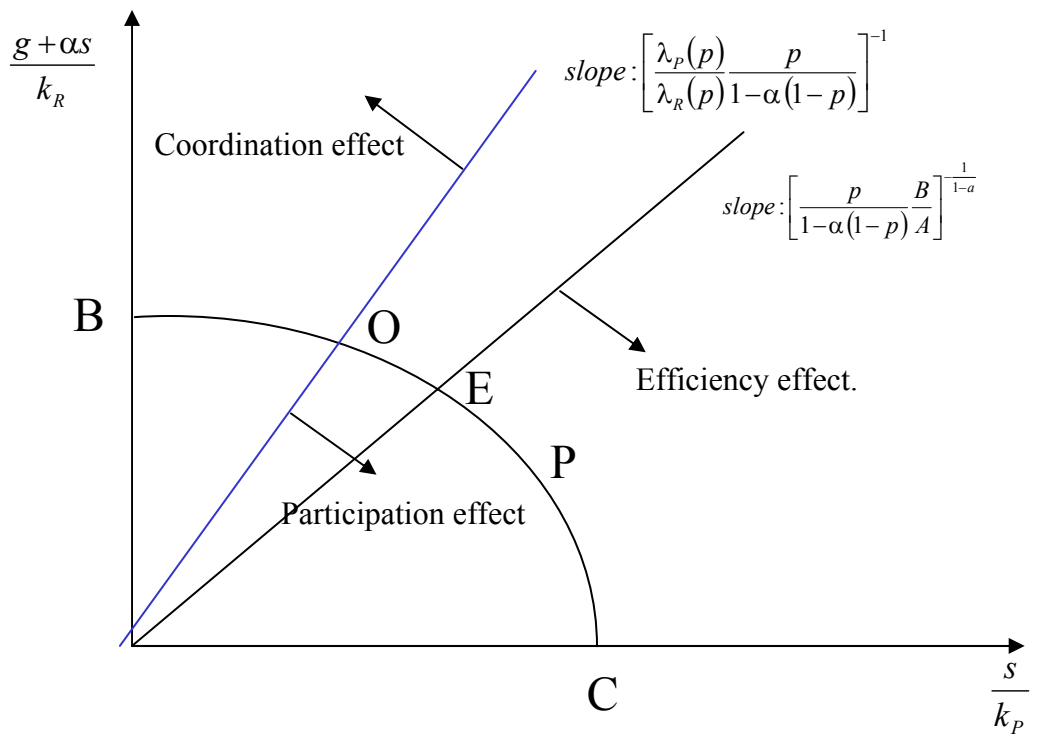
Note: BC is given by the government's budget constraint

**Figure 2**



Note: BC is given by the government's budget constraint

**Figure 3**



Note: BC is given by the government's budget constraint

**Figure 4**

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