Lobbying and Efficiency under Imperfect Taxation

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Abstract

This paper addresses the issue of the efficiency of lobbying in an environment of imperfect taxation. Under fiscal policy failure (i.e. lack of tax instruments), the allocation of resources is not Pareto optimal. The introduction of lobbying, in such a case, is found to enhance efficiency because contributions from lobbies substitute for the missing tax instruments. Furthermore, the efficiency gain from lobbying is shown to increase with inequality and lack of democracy. This finding implies that democratic governance and policies that reduce conflicts of interest in a society (i.e. policies that promote equality) might in some cases be more effective in controlling lobbying than direct restrictions and prohibitions. These results are obtained by modeling lobbying for taxes as a common agency game (menu auction). The standard description for this type of auctions is modified in a way that is consistent with imperfect taxation.

Keywords: Lobbying, efficiency, taxation, menu-auction, democracy, inequality

1. Introduction

It is a popular belief that lobbying constitutes a waste of resources and leads to political decisions that are not serving the interests of the general public[1]. On the other hand, few can doubt the growing importance of lobbying in modern politics[2]. This apparent contradiction has led to a series of papers that identify conditions, under which, lobbying can enhance economic efficiency.

One of the first to point out that lobbying does not necessarily hinder economic efficiency was Becker (1983). Other examples of theoretical work done in this spirit

[1] This argument has caused the introduction and strengthening of laws imposing restrictions on contributions to politicians and political parties in many democratic countries. The Bipartisan Campaign Reform Act that passed in 2002 in USA is such an example.

[2] Data from the USA show a rapid increase in political money in recent years (source: Campaign Finance Institute (CFI)-tables and figures).

are: Coate (2004) who expresses the view that contributions to politicians enhance informative advertising, Pratt (2002) who argues that contributions to politicians convey to the voters private information lobbies have on these politicians and Maniadis (2008) who argues that lobbying can solve dynamic consistency problems by serving as a commitment device.

In this paper a different approach is used to assess the effect of lobbying on economic efficiency. In particular, a model of public good provision is considered, where it is assumed that there exists a fiscal failure (lack of tax instruments), so in the absence of lobbying, the resource allocation is inefficient. The introduction of lobbying restores efficiency, because contributions act as a substitute for the missing policy instruments[3].

The model is simple; I consider a static economy with two goods, one private and one public. All individuals in this economy start with different endowments. The public good is generated from the private good on "one to one" basis. Public good provision is decided by an exogenously chosen individual, henceforth referred as the "governor". Specifically, the governor performs two tasks; first, he imposes a flat lump-sum tax on all individuals and second, he decides how the tax revenues are allocated between public good provision and his salary. The governor makes these decisions by maximizing a function of all agents' utility, including his own. In the absence of lobbying, the flat tax implies lack of tax instruments and the outcome will, in general, be inefficient. This is so because there are only two available instruments (tax and governor salary) but more than two individuals in the economy. Thus, the tax burden cannot be allocated efficiently.

The case with lobbying is resolved using the menu auction model, which in the words of Martimort and Semenov (2008) "is the current paradigm to model pluralistic politics". This model was introduced by Bernheim and Whinston (1986) and extended by Dixit, Grossman and Helpman (1997, from now on DGH)[4]. As it has been shown by DGH, the resulting equilibrium is efficient. DGH have also shown, that under

[3] The idea that payments to government officials, in return for policy favors, can be beneficiary in the presence of weak or imperfect institutions can be found in the early literature on corruption. See for example Lef (1964) and Huntington (1967).

[4] The first to model lobbying as a "menu auction" were Bernheim and Whinston (1986) and were followed by many others. Some examples are Grossman and Helpman (1994), Dixit, Grossman and Helpman (1997), Persson (1998) and Martimort and Semenov (2008).

lobbying and efficient taxation, all the benefits from lobbying are allocated to the government. Thus, they claim, that if lobbies can commit ex ante not to lobby for efficient taxes, efficient taxes should not occur[5].

In this work, the setting is somehow different; I assume the existence of inefficient taxes (lack of tax instruments) and consider the effects of lobbying in such an environment. This assumption constitutes a deviation from the basic menu auction model, since under inefficient taxation the objective of the governor is not always increasing in contributions. This deviation warrants an appropriate adaptation of the equilibrium definition in DGH. Nevertheless an efficiency result can be derived in this case as well. In other words, lobbying enhances efficiency when the government lacks tax instruments. This is because lobbying eradicates the consequences of missing instruments (flat lump-sum tax), since in essence political contributions allow full tax discrimination (contributions provide the missing instruments because they are individual-specific).

This paper argues that lobbying can play a useful role in the presence of imperfect taxation. However, this argument does not imply that lobbying is the best way to deal with institutional failures, since political and moral concerns associated with contributing money in return for policy favors are not examined here. Rather, it is shown that institutional failures can make lobbying desirable and, therefore, help in explaining its emergence and persistence.

Furthermore, numerical calculations indicate that the welfare benefit from introducing lobbying increases with lack of democracy and increased inequality. This finding seems to be consistent with casual observation and people's beliefs as indicated by relevant indices.

Section 2 presents the general case of the basic model without lobbying. Section 3 describes equilibrium with lobbying. In section 4, a specific application is considered and its implications are discussed. Finally, section 5 concludes.

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[5] Other explanations for the use of inefficient policy instruments are information asymmetries (Hammond (1979) and Coate and Morris (1995)) and commitment failures (Dixit and Londregan (1995)).

2. The Model without Lobbying

2.1 General framework

The economy consists of *n-1* private individuals $i = 2,3,..,n$ (henceforth called "citizens") and the governor (individual 1). The governor is charged with deciding on the government budget. The utility of all individuals, including the governor, is given by $U_i = U(C_i, G) \quad i = 1,2,..,n$, where C_i is the private good consumption and G is public good provision. U_i is increasing in its elements. One can interpret citizens as trivial lobbies with only one member or as lobbies that have many identical members. The governor similarly can be either thought as a "monarch" or as a special interest group consisting of policy makers (i.e. elite politicians and top government employees).

Citizens face the following budget constraint: $C_i + t = e_i, i = 2,...,n$ (1), where t is a lump-sum tax common to all citizens and e_i is an exogenous endowment, which differs across individuals. The governor is also modeled as an individual, which implies that he faces two budget constraints: a private budget constraint: $C_1 + t = e_1 + s$ (2) and a public budget constraint: $(n-1)t = S + G$ (3), where s is the governor's salary paid from taxation and $S \equiv s - t$ (4) is the net governor salary[6]. The private constraint states that the governor's consumption equals his private resources, and the public one (associated with his public office) states that government spending should equal the taxes collected. Without loss of generality, assume: $e_2 \le ... \le e_n$ and $e_1 \ge 0$. Finally, notice that equation (3) along with the non-negativity of consumption implies $t = \frac{S+G}{n-1} \le e_2$, while $S, G \ge 0$.

Two points should be noted on the general framework discussed above. First, as indicated by the utility functions and the budget constraints, individuals differ in income but not in preferences[7]. Concentrating on endowment differences (instead of differences in preferences) allows the association between the degree of inequality in the economy and the efficiency gains from lobbying.

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[6] A setting with two government budget constraints can be found in the policy application by DGH.
[7] For a similar assumption see Dabla-Norris and Wade (2001).

Second, the governor decides both on the amount of taxes collected (t) as well as on their spending (S, G). Once these decisions have been made, citizens' consumption levels, as well as the governor's are determined residually, since their endowments are exogenous. A more active role will be given to them in section 3.

2.2 Policy choice

The governor's objective is to maximize an increasing and separable function of all individuals' utilities, including his own: $F = F(U_1, U_2, ...U_n)$. The purpose of this function is to capture the political considerations the governor has to take into account when deciding[8]. It is a fact that in most societies, individuals who have political authority can't act solely on the basis of their own interests, since other issues should be considered i.e. reelection, possible revolution etc.

Formalizing the above, the governor's problem can be expressed as follows:

$$\max_{C_i, G, S, t} F(U_1, U_2, ..., U_n)$$

s.t.

$$U_i = U(C_i, G) \quad i = 1, 2, ..., n$$
$$C_i + t = e_i \quad i = 2, 3, ..., n$$
$$C_1 = S + e_1$$
$$(n-1)t = S + G$$
$$C_i \geq 0, G \geq 0$$

Combining restrictions and concentrating on interior solutions[9], the problem can be rewritten in a more compact way:

[8] For a vivid account of political objectives and restrictions under different regimes see Shleifer and Vishny (1994).

[9] The existence of an interior solution can be proved if one makes mild additional assumptions on *F* and *U*.

$$\max_{C_i,G} F(U(C_1,G),U(C_2,G),....,U(C_n,G)) \quad i=1,2,...,n$$

s.t.

$$C_i = e_i + \frac{e_1}{n-1} - \frac{G}{n-1} - \frac{C_1}{n-1} \quad i=2,3,....,n$$

The Langrangean is:

$$F(U(C_1,G),U(C_2,G),....,U(C_n,G)) + \sum_{i=2}^{n} \lambda_i \left(e_i + \frac{e_1}{n-1} - \frac{G}{n-1} - \frac{C_1}{n-1} - C_i \right)$$

The F.O.C with respect to C_1, C_i & G are:

$$\frac{\partial F}{\partial U_1}\frac{\partial U_1}{\partial C_1} - \frac{1}{n-1}\sum_{i=2}^{n}\lambda_i = 0 \quad (5)$$

$$\frac{\partial F}{\partial U_i}\frac{\partial U_i}{\partial C_i} = \lambda_i \qquad i=2,3,...n \quad (6)$$

$$\sum_{i=1}^{n}\frac{\partial F}{\partial U_i}\frac{\partial U_i}{\partial G} - \frac{1}{n-1}\sum_{i=2}^{n}\lambda_i = 0 \quad (7)$$

Combining (5), (6) and (7) one can get:

$$\frac{1}{n-1}\frac{\dfrac{\partial U_1}{\partial G}}{\dfrac{\partial U_1}{\partial C_1}}\sum_{i=2}^{n}\lambda_i + \sum_{i=2}^{n}\lambda_i \frac{\dfrac{\partial U_i}{\partial G}}{\dfrac{\partial U_i}{\partial C_i}} = \frac{1}{n-1}\sum_{i=2}^{n-1}\lambda_i \quad (8)$$

By contrast, Samuelson's condition for efficiency is:

$$\sum_{i=1}^{n}\frac{\dfrac{\partial U_i}{\partial G}}{\dfrac{\partial U_i}{\partial C_i}} = 1 \quad (9)$$

Condition (9) can be derived if full fiscal discrimination is assumed. In other words, if individualized taxes or subsidies (t_i) are introduced in the model, we end up with the efficiency condition above[10].

One can notice that (8) and (9) are equivalent only if: $\lambda_i = \lambda, \forall i$ .Equations (6) imply one obvious way for this to be possible. That is when the following conditions hold: **(i)** $\frac{\partial F}{\partial U_i} = \frac{\partial F}{\partial U} \quad \forall i \geq 2$ (all citizens matter the same i.e.: $F = U_1 + b\sum_{i=2}^{n} U_i$) and **(ii)** there is constant (for given *G*) marginal utility of consumption (i.e.: $U_i = C_i G^a$). In all other cases, the allocation described by equations (5)-(7) will be inefficient.

To see this, let us assume for the moment that the governor's objective function is symmetric (i.e. $\frac{\partial F}{\partial U_i} = \frac{\partial F}{\partial U} \quad \forall i \geq 2$) and an extra unit of tax is collected to finance the governor's salary. Efficiency requires that the marginal cost of the extra tax is equal across all citizens. If this is not the case, then there is a "better" way to allocate the extra tax. Flat tax though implies that the tax paid is always equal for all citizens. Furthermore, since endowments differ, the level of consumption per individual will also be different. Unless citizens are characterized by constant marginal utility, their marginal utilities of consumption (cost of extra taxation) will also differ. Thus, the lack of policy instruments (flat tax assumption) causes inefficiency, because it doesn't allow for the individualization of the tax burden[11].

It has been established that the simple economy assumed here, will end up in an inefficient allocation. In the next paragraph, lobbies will be introduced to the model and the efficiency of the resulting allocation will be considered.

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[10] This is due to the fact that individualized taxes and subsidies allow unrestricted lump-sum transfers among all individuals in the economy (citizens and governor). The problem under the assumption of individualized lump-sum taxes/subsidies is equivalent to the "First Best" problem: $\max_{C_i, G} F \ s.t. \sum_{i=1}^{n} C_i + G = \sum_{1}^{n} e_i$

[11] If instead of a lump sum tax a proportional tax is considered the result in general is not affected. Results are available upon request

3. Introducing Lobbying

3.1 Setting

Let us now introduce lobbies to the simple economy studied in the previous paragraph. The introduction of lobbying generates two shifts in the model. First, the citizens' budget constraint becomes: $C_i + t + B_i = e_i, i \geq 2$ (10) where: B_i stands for the contribution paid by citizen i to the governor. Second, the governor's private budget constraint is now: $C_1 = \sum_{i=2}^{n} B_i + S + e_1$ (11). Furthermore the budget constraints of the citizens along with non-negativity of consumption imply:

$$B_i(S,G) \in \left[0, e_i - \frac{S+G}{n-1}\right] \forall i \geq 2 .$$

This simply states that contributions cannot be negative or exceed the after tax endowment of citizens.

The citizens' budget constraint reflects the fact that their endowments will now be allocated among private good consumption, tax and contribution to the governor. Here, unlike the previous paragraph, citizens have a decision to make: how much to contribute. On the other hand, the governor's private budget constraint, simply states that now the governor has an extra source of income in addition to his salary (contributions).

Let us consider now the decisions of the agents in the economy:

The citizens decide on contributions in order to maximize their utility. Notice that they are not interested just on the tax burden, but also on the structure of the budget, since public good provision also affects their utility. Thus, they condition their contributions on both t and G or equivalently, due to the balanced budget condition, on S and G.

The governor, in turn, decides on the government budget in order to maximize his objective function F. Namely, he decides on the amount of taxes collected and on how the revenue will be allocated between his salary and public good provision. Again, using the balanced budget condition this turns out to be a decision on S and G. The difference in the governor's decision in this section is that he takes into account the contribution schedules offered by citizens.

This situation can be depicted as a "menu auction". Each citizen offers to the governor a "menu", a contribution which is a function of the governor's policy. Then, the governor chooses the policy that maximizes his objective.

The notion of "menu auctions" has been introduced by Bernheim and Whinston (1986) who also proposed an appropriate equilibrium for this game (truthful equilibria). Their work has been extended by DGH. For those not familiar with the concept, the following informal description adapted from Martimort and Moreira (2005) might be useful.

Under common agency, many principals (citizens) design non-cooperatively contribution schedules for the common agent (governor). Then the agent chooses policy (in this case S and G). Preferences are common knowledge. A priori, many equilibria of this two-stage game can be sustained due to the freedom in specifying contributions off the equilibrium. By imposing that contributions are truthful, i.e. reflect relative preferences of the principals among alternatives, Bernheim and Whinston (1986) as well as DGH significantly reduced this indeterminacy and selected efficient equilibria. Since each principal's marginal preferences among alternatives are fully reflected by his truthful contribution, what this principal pays at the margin for inducing a change in the agent's choice of policy is exactly what it is worth to him. Thus, because of truthfulness, common agency aggregates preferences efficiently[12].

Although the model presented here is similar to the general formulation in DGH it is not identical. Their efficiency result is based on the assumption that the agent's objective is always increasing in principals' contributions. This is not always the case here.

[12] See proposition 4 in DGH.

To see this assume that $\frac{\partial^2 F}{\partial U_i^2} \leq 0$, $\frac{\partial^2 U_i}{\partial C_i^2} < 0$ and that the marginal utility of zero consumption is infinite (Inada condition). Consider now the case where all the citizens' endowment is channeled to taxation (public good provision and governor salary) and contributions to the governor. All citizens' consumption will therefore be zero. Since the governor's objective (*F*), is an increasing function of all citizens' utility, an infinitely small decrease in any contribution, for given public good provision and salary, will lead to an infinite increase in *F*. Thus, for given taxes, it will be optimal for the governor not to receive contributions that exceed a certain level. As contributions increase, the governor's consumption increases while citizens' consumption decreases. Since the governor cares about citizens' welfare, he will inevitably face a tradeoff between his consumption and that of the citizens[13].

The discussion above implies that certain contributions can be harmful to the governor's objective. In what follows, it will be assumed that the governor can reject such contributions. Thus, the description of the game between the citizens and the governor and the definition of equilibrium should be modified accordingly.

Formally, the game between the citizens and the governor can be modeled as a three-stage game. In stage one, the citizens submit simultaneously their contribution schedules ($B_i = B_i(S,G)$). In stage two, the governor chooses whether to reject any of the suggested contributions. Finally, in stage three, the governor selects S and G, taking into account the citizens' contribution schedules that are still standing.

In the next paragraph, equilibrium for this game is defined and an efficiency result similar to that in DGH is proven.

3.2 Equilibrium

It will be useful to write the governor's objective and the citizens' utility in terms of policy instruments and contributions. Substituting equations (11) into the citizen's utility we can write $U_i(S,G,B_i(S,G)) \equiv U(S,G,B_i(S,G);e_i)$. Substituting all budget

[13] In their application DGH assume that a complete set of tax instruments is available to the government. In such a case the principals' utility is independent of contributions. Once though inefficient taxation is assumed as DGH consider reasonable, their general results do not apply directly.

constraints (equations (10)-(11)) into the governor's objective we can write: $F = F(S,G,B(S,G))$, where: $B(S,G) = \{B_i(S,G)\}_{i\geq 2}$.

Before defining the equilibrium we need to define an auxiliary function. Define:

$\bar{F}(S,G,X,B(S,G)) \equiv F(S,G,\{X_i B_i(S,G)\}_{i\geq 2})$, where $X = \{X_i\}_{i\geq 2}$ and $X_i \in \{0,1\}$.

Function $\bar{F}$ incorporates into the governor's objective the possibility of rejecting a contribution.

Definition 1:

A policy set $\{S^o, G^o, X^o\}$ and a set of contribution schedules $B^o(S,G)$ is equilibrium of the three stage game described in the previous paragraph (henceforth the game) iff:

(a) $\{S^o, G^o, X^o\} = \arg\max_{S,G,X} \bar{F}(S,G,X,B^o(S,G))$

(b) For all $i \geq 2$, there does not exist a feasible policy set $\{S^*, G^*, X^*\}$ and a feasible contribution schedule $B_i(S,G)$, such that:

$U_i(S^*, G^*, X_i^* B_i(S^*, G^*)) > U_i(S^o, G^o, X_i^o B_i^o(S^o, G^o))$ and

$\{S^*, G^*, X^*\} = \arg\max_{S,G,X} \bar{F}(S,G,X,\{B_j^o(S,G)\}_{j\geq 2, j\neq i}, B_i(S,G))$.

This is the standard definition of a menu auction equilibrium appropriately adopted to incorporate possible rejections of contributions by the governor.

Definition 2:

A truthful equilibrium is an equilibrium in which all contribution schedules are truthful.

A truthful contribution schedule relative to a utility level $\bar{U}_i$ is given by:

$$B_i^T(S,G) = \min\left\{ e_i - \frac{S}{n-1} - \frac{G}{n-1}, \max\left\{ 0, e_i - \frac{S}{n-1} - \frac{G}{n-1} - \Phi(\bar{U}_i, G) \right\} \right\} \quad i \geq 2 \quad (12)$$

where: $\Phi(\bar{U}_i, G)$ solves $\bar{U}_i = U(C_i, G)$ with respect to C_i [14].

The expression $e_i - \frac{S}{n-1} - \frac{G}{n-1} - \Phi(\bar{U}_i, G)$ is the compensating variation. Truthfulness implies that that the citizens' contributions reflect exactly the shift in their utility caused by a change of policy. Thus, when the compensating variation is feasible, it defines the contribution schedule.

Proposition 1:

Assume an interior[15] equilibrium of the game exists and that the resulting utility levels are given by $\bar{U}^o = \left\{ \bar{U}_i^o \right\}_{i=1,..,n}$ .Then the best response set of citizen *i* to the contribution schedules $\left\{ B_j^o(S,G) \right\}_{j \neq i}$, of the other citizens contains his truthful strategy relative to $\bar{U}_i^o$.

Proof: see Appendix A

This proposition implies that individual *i* has nothing to loose if he responds with his truthful contribution relative to $\bar{U}_i^o$ since it will guarantee to him this level of utility.

Proposition 2:

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[14] By definition of function Φ, $\bar{U}_i = U(C_i, G) \Leftrightarrow C_i = \Phi(\bar{U}_i, G)$. Substituting C_i from the private budget constraint (eq.10) and using the balanced government budget (eq.4) to eliminate t one can get this expression.

[15] An interior equilibrium is an equilibrium where all individuals have positive consumption, public good provision is positive and all citizens' contributions are positive but smaller than their maximum value.

A truthful interior equilibrium of the game is Pareto efficient, in the sense that the resulting allocation of consumption and public good satisfies Samuelson's condition for efficiency i.e. $\sum_{i=1}^{n} \frac{\frac{\partial U_i}{\partial G}}{\frac{\partial U_i}{\partial C_i}} = 1$ [16].

Proof:

Using the definition of truthful contribution schedules, and the fact that F is separable and increasing in its arguments, the choice of S and G, for any $\bar{U}_i$, can be described in the following way:

$$\max_G U(e - G - \sum_{i=2}^{n} \Phi(\bar{U}_i, G), G)$$

The FOC for this problem give:

$\frac{\partial U_1}{\partial C_1}\left[-1 - \sum_{i=2}^{n} \frac{dC_i}{dG}\right] + \frac{\partial U_1}{\partial G} = 0$, since by definition: $C_i = \Phi(G; \bar{U}_i)$.

Furthermore, because $\bar{U}_i = U(C_i, G)$ and $\bar{U}_i$ is a constant, then: $\frac{dC_i}{dG} = \frac{\frac{\partial U_i}{\partial C_i}}{\frac{\partial U_i}{\partial G}}$.

Substituting this result in the FOC and rearranging terms we get: $\sum_{i=1}^{n} \frac{\frac{\partial U_i}{\partial G}}{\frac{\partial U_i}{\partial C_i}} = 1$, which is the condition for Pareto optimality. Since this is true for interior truthful contributions relative to any set of utility levels, it will also be true in the case of the equilibrium utility levels.

In essence the governor's problem is to choose his consumption and public good provision in order to maximize his utility, given the citizens' equilibrium utility level

[16] This proposition can't be derived directly from proposition 4 in DGH which is based on the assumption that the government's objective is always increasing in contributions.

(as given by their truthful contributions). In general, this will give a first best solution, if transfers among all individuals (including transfers among citizens) are possible. In this setting, though, transfers among citizens would require negative contributions which are assumed away here. Nevertheless, if the functional forms of F and U_i and the distribution of endowments are such that non-negativity constraints for contributions are not binding, the solution to the equilibrium of the game will be Pareto efficient[17]. In other words, if a first best allocation is possible, it can be achieved by the instruments in hand.

The proposition proven above highlights the main argument of this paper: in the presence of a fiscal distortion (in this case lack of tax instruments), lobbying enhances efficiency in the economy.

The following example will illustrate this point. Comparative statics will be calculated numerically to identify the effect various parameters have on the efficiency gains from lobbying.

4. Application

4.1 General Framework

In this application, I consider specific functional forms, for functions F and U and solve the model for both cases (with and without lobbying). The purpose of this exercise is twofold. First, to confirm the plausibility of the theoretical approach described above and second, to carry out comparative statics. Comparative statics calculations computed here will allow the assessment of the effects of introducing lobbying under different economic or political conditions (i.e. degree of inequality and level of benevolence/democracy).

The objective function F is assumed to be of the form: $F = U_1 + b\sum_{i=2}^{n} U_i$, where the coefficient $b \geq 0$ is a parameter of benevolence of the governor and captures how

[17] The application in the next section provides such an example.

much he cares about citizens. It can also be considered as a proxy for the degree of democracy in the economy[18]. The point is that in developed democratic societies citizens' welfare is appropriately incorporated in policy making. One can argue that the reasonable range for parameter b is $b \in [0,1]$, since in a completely fair political regime all individuals including the governor will matter the same. Nevertheless, assuming that $b > 1$ is possible does not impose any restrictions in the analysis and thus the case of an altruistic governor can be studied as well. Furthermore, assuming $b > 1$ is consistent with the interpretation of citizens as lobbies with many identical members.

The private utility function U_i is assumed to be a constant returns to scale Cobb-Douglas function: $U_i = C_i^a G^{1-a}$ [19]. Finally, it is assumed that $n = 3$ (2 citizens).

Before turning to the reports of the calculations, one more thing should be noted. Because of the assumed utility function, there is a unique level of efficient public good provision: $G^* = (1-a)\sum_{i=1}^{n} e_i$. Since this is the case, public good provision can be used as a measure of inefficiency. (i.e. the further away public good provision is from its efficient level, the greater is the inefficiency in the economy)[20].Thus by keeping total endowment constant and shifting other parameters, one can track down the effects of these shifts on efficiency.

The calculation results are presented in two tables. The first displays the effects of shifts in income distribution and the second the effects of shifts in the degree of benevolence (b).The solution is robust to the parameter values used[21].

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[18] See Grossman and Helpman (1994) for a similar interpretation.

[19] As it is shown in appendix B, S.O.C. for the case with no lobbying are satisfied for this particular setting.

[20] As it is shown in Appendix C, the distance between any public good level satisfying the budget constraints and first best public good provision is equivalent to the simple sum of Equivalent Variations. For a discussion of this and other efficiency measures see Hammond (1990). For a representative agent version of this measure see Lucas (1990).

[21] The reported results are calculated numerically. Appendix D reports the theoretical work that precedes calculations.

In the tables presented below G is public good provision, U_i is individual utility, F is the governor's objective, e_i is citizen endowment, b is the parameter of benevolence in F and a is the parameter in the private utility function.

4.2 Effects of difference in endowments

In what follows, total endowment is set equal to 1 ($e_2 + e_3 = 1$ and $e_1 = 0$). Parameters a and b are set at 0.5 and 1 respectively. For these parameter values ($a = 0.5$ and $e_1 + e_2 + e_3 = 1$) the efficient value of public good provision (G) is 0.5.

The assumption that the governor has no endowment is made for simplicity of exposition. It depicts the case where the governor's total income comes entirely from taxation and contributions. The results obtained do not depend on this assumption.

Table 1 below, reports the solution of the model with lobbying (*L* in the regime column) and without lobbying (*NL* in the regime column) for different values of e_2 and e_3.

Table 1: *Effects of Inequality* (*b*=1)

Endowments	***Regime***	u_1	u_2	u_3	***F***	***G***	***Efficiency Gains***
e_1=0.45	*NL*	0.2823	0.2460	0.3313	0.8596	0.4926	0.0074
e_2=0.55	*L*	0.2617	0.2617	0.3362	0.8596	0.50	
e_2=0.49	*NL*	0.2884	0.2800	0.2973	0.8658	0.4997	0.0003
e_3=0.51	*L*	0.2840	0.2840	0.2979	0.8658	0.50	
e_2=0.50	*NL*	0.2887	0.2887	0.2887	0.8661	0.50	0
e_3=0.50	*L*	0.2887	0.2887	0.2887	0.8661	0.50	

As it has been mentioned in the previous paragraph, public good provision can be used as a measure of the overall efficiency of an allocation. Since in all efficient allocations $G = 0.5$, table 1 implies that the inefficiency of the outcome without lobbying increases (G drifts away from its efficient value 0.5) along with inequality. Furthermore, since the outcome with lobbying is efficient in all cases ($G = 0.5$), efficiency gains from lobbying also increase with inequality.

A special note should be made on the last two lines of table 1. As it can be seen from the value of *G*, when the two citizens have identical endowments, the achieved allocation without lobbying is efficient ($G = (1-a)\sum_{i=1}^{n} e_i = 0.5$) and coincides with the allocation under lobbying. The intuition is straightforward. The source of inefficiency in the model without lobbying is lack of policy instruments. There are only two independent instruments available (*S*, *G*), but more than two individuals in the economy. If all citizens are identical though, there are in essence only two individuals in the economy (the governor and the "representative citizen") and hence, the two available instruments are sufficient. Furthermore, since no instruments are lacking in this case, contributions from lobbies are redundant. Thus, the introduction of lobbying does not have any effect.

This observation provides the intuition for the result reported here: increased inequality generates increased inefficiency and therefore increased efficiency gains from lobbying. If all citizens are identical, the "lack" of policy instruments has no effect on the economy. As people start to differ, the effects of missing instruments become apparent. These negative effects on the allocation of resources increase along with citizens' differences. Since the only source of difference among citizens in this model is income distribution, inefficiency along with efficiency gains from lobbying, increase with inequality.

4.3 Effects of the degree of benevolence (democracy)

In what follows endowments e_2 and e_3 are set equal to 0.49 and 0.51 respectively while e_1 is set equal to 0. Parameter a is set equal to 0.5.

Table 2 reports the solutions with and without lobbying for different values of b.

As it can be seen from table 2, a decrease in the degree of benevolence (b), decreases efficiency measured in terms of *G* in the case without lobbying and therefore increases the efficiency gains from lobbying.

Table 2: *Effects of Democracy* (e_2=0.49, e_3=0.51)

Endowments	*Regime*	u_1	u_2	u_3	*F*	*G*	*Efficiency Gains*
***b*=0.5**	***NL***	0.4075	0.1923	0.2167	0.6120	0.4994	0.0006
	L	0.4014	0.2067	0.2203	0.6120	0.50	
***b*=1**	***NL***	0.2884	0.2800	0.2973	0.8658	0.4997	0.0003
	L	0.2840	0.2840	0.2979	0.8658	0.50	
***b*=1.5**	***NL***	0.2130	0.3119	0.3276	1.1723	0.4998	0.0002
	L	0.2089	0.3134	0.3288	1.1723	0.50	

To explain the result presented above let us first look at the case without lobbying. As the governor becomes less benevolent, his salary increases. This increase can either come from extra taxation or a decrease in public good provision. Since the governor cares about citizens, he takes into account the fact that a big increase in the flat lump-sum tax will impose an excessive burden to the poor. Thus, in an interior equilibrium the increase in the governor's salary will, partly at least, come from a decrease in public good provision which, in turn, implies a decrease in efficiency[22]. On the other hand, under lobbying, contributions allow different transfers to the governor from each citizen. Thus, in the case with lobbying the governor always chooses the efficient level of public good provision regardless of his benevolence. Again, contributions restore efficiency because they substitute for individual specific taxes.

4.4 Discussion

As it can be seen from both tables in paragraph 4.3 the introduction of lobbying always constitutes a Pareto improvement in comparison to the case without lobbying. Both citizens' utility increases, while the governor's objective remains unchanged. This implies that, in the presence of inefficient taxation, lobbying might have a useful role to play. This observation can help explain the emergence and persistence of lobbying. Moreover, the efficiency enhancing role of lobbying can explain why direct restrictions on Lobbies are not always effective. The creation of various types of advocacy groups (PAC's, 527's etc.) in order to go around US laws restricting campaign contributions seems to corroborate this.

[22] Notice that this result does not depend on the assumption of no endowment for the governor. If his non-benevolence is sufficient to induce a positive salary then a further decrease in his benevolence will inevitably increase his salary and therefore decrease public good provision.

Furthermore, tables 1 and 2 in paragraph 4.3, indicate that the welfare gains from lobbying increase with the degree of inequality and decrease with the level of benevolence of the governor (democracy).

The idea that the quality of democratic institutions is associated with lobbying is intuitive. Political participation and democratic checks and balances allow a better incorporation of citizens' preferences in policy making and thus leave small room for lobbying. Rose-Ackerman (1999) writes in this respect: "Is the establishment of democracy an anticorruption policy? The desire for reelection constraints the greed of politicians. The protection of civil liberties and free speech, which generally accompanies democratic electoral processes, makes open and transparent government possible."[23]

The association between inequality and rent seeking goes back to Olson (1965). The relation between these two is well founded and appears both in the economic literature and in reports from development organizations[24]. Nevertheless, there is debate on the direction of causality. In other words, is lobbying and corruption causing inequality or the other way round[25]? In the model presented here, it is inequality that causes lobbying. As it has been shown the greater the inequality the greater the inefficiency caused by the lack of policy instruments[26]. This in turn, implies that lobbying is more desirable in economies with great inequality. A more straightforward way to think about this is to view inequality as generating conflict of interest over government policy. It is reasonable to think that the greater this conflict is, the greater is the ability of a policy maker to collect rent from setting a policy[27].

One can expect that people's perception of corruption is strongly affected by the amount of political money[28]. Thus, based on the above analysis, countries that have strong democracies and small income inequality should not face big corruption problems (or at least should not do badly on indices based on the perception of corruption). Table 3 that reports the Transparency International Corruption Perception

[23] On the relation between democracy and corruption see also Sandholtz and Koetzle (2000).
[24] See for example the 2003 World Development Report and Gupta et al. (1998).
[25] See Alesina and Angeletos (2005) and Dabla-Norris and Wade (2001) for theoretical models addressing the issue.
[26] A similar result has been obtained by Esteban and Ray (2006) in a different setting.
[27] For a similar interpretation see Cheikbossian (2008).
[28] The US Supreme Court ruled in 1976 in favor of controls to campaign contributions "because of the compelling state interest in preventing corruption or the appearance of corruption".

Index, the Economist Intelligence Unit Democracy Index[29] and the UN Gini Index for EU 15, USA and Canada seems to support this view.

Table 3[a]:

Countries	***Corruption***	***Democracy***	***GINI***
Sweden	9.3	9.88	25.0
Denmark	9.3	9.52	24.7
Holland	9.0	9.66	30.9
Finland	9.0	9.25	26.9
Canada	8.7	9.07	32.6
Luxemburg	8.3	9.10	*NA*
Austria	8.1	8.62	29.1
Germany	7.9	8.82	28.3
Ireland	7.7	9.01	34.3
Great Britain	7.7	8.08	36.0
USA	7.3	8.22	40.8
Belgium	7.3	8.15	33.0
France	6.9	8.07	32.7
Spain	6.5	8.34	34.7
Portugal	6.1	8.16	38.5
Italy	4.8	7.73	36.0
Greece	4.7	8.13	34.3

[a]**Source:** Transparency International CPI 2008 table, The Economist Intelligence Unit's Index of Democracy, U.N. Human Development Report 2007/2008.

Finally, the results obtained from the model have a policy implication. If the control of lobbies is socially desirable (for moral, political or other reasons), then long term policies that strengthen democratic governance and reduce the conflicts of interest in society, might prove more effective than direct restrictions, that are difficult to enforce in the first place.

5. Conclusions

The classic approach to lobbying for taxes assumes that a set of perfect tax instruments is in place. This paper deviates from this approach and studies the effects of lobbying under imperfect taxation. The basic result is that lobbying can constitute a Pareto improvement. It is argued that this result can help in explaining the emergence of lobbying as well as the difficulty in restraining it. Furthermore, an application has been used to identify conditions that increase the usefulness of lobbying. Along these lines, it has been shown that lobbying is more desirable in societies that lack in

[29] The Transparency International CPI measures the perceived levels of public-sector corruption in a given country and is a composite index. The CPI 2008 is calculated using data from 13 sources originated from 11 independent institutions. All sources measure the overall extent of corruption (frequency and/or size of bribes) in the public and political sectors and all sources provide a ranking of countries on a scale from zero (highly corrupt) to ten (highly clean).The Economist Intelligence Unit's index of democracy, on a 0 to 10 scale, is based on the ratings for 60 indicators grouped in five categories: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture. Each category has a rating on a 0 to 10 scale, and the overall index of democracy is the simple average of the five category indexes.

democracy and exhibit conflicts of interest over tax policy (i.e. are characterized by great income inequality).

The framework used in this paper sheds light on the positive effects of contributions to state officials, but also misses an aspect of lobbying that may be important in fully understanding it. A possible extension of the model discussed here might be helpful in this regard. For instance, one could introduce a cost of secrecy associated with lobbying[30]. In most countries, laws restrict the amount of money that can be donated to politicians or political parties. Therefore, contributions in excess of this amount must be kept secret. In this case, contributions and salary are not perfect substitutes from the point of view of the governor. Thus, a tradeoff emerges between efficiency gains and secrecy costs associated with lobbying.

[30] See Shleifer and Vishny (1993) for a model capturing the effects of secrecy.

Appendix

A. Proof of proposition 1

Assume (S^o, G^o), $B^o(S,G)$ is an interior equilibrium and $B_i^T(S,G)$ is the truthful contribution of citizen *i* relative to the equilibrium utility level $\bar{U}_i^o$.

Assume $(X', S', G') = \arg\max_{X,S,G} F(S, G, X_{j\neq i}\{B_j^o(S,G)\}_{j\neq i}, X_i B_i^T(S,G))$ (A.1) or (X', S', G') is the best response of the governor to $\{B_j^o(S,G)\}_{j\neq i}, B_i^T(S,G))$.

Then, if $(S', G') = (S^o, G^o)$ (A.2), $B_i^T(S', G') = B_i^o(S^o, G^o)$ (A.3) and therefore: $X^o = X' = \{1\}$ (A.4). Then, the truthful strategy is a trivial best response and yields to citizen *i* utility $\bar{U}_i^o$.

If, on the other hand, $(S', G') \neq (S^o, G^o)$ then the following must be true:

$$F(S', G', X'_{j\neq i}\{B_j^o(S', G')\}_{j\neq i}, X_i' B_i^T(S', G')) > F(S^o, G^o, \{B_j^o(S^o, G^o)\}_{j\neq i}, B_i^T(S^o, G^o)) =$$

$$= F(S^o, G^o, B^o(S^o, G^o)) \geq F(S^*, G^*, X^*_{j\neq i}\{B_j^o(S^*, G^*)\}_{j\neq i}, 0), \quad \text{(A.5)}$$

where, $(X^*, S^*, G^*) = \arg\max_{X,S,G} F(S, G, X_{j\neq i}\{B_j^o(S,G)\}_{j\neq i}, 0)$ (A.6)

The first inequality follows from the fact that (X', S', G') maximizes the relevant function *F*. The equality in the second step follows from the definition of a truthful contribution while the last inequality follows from the fact that the equilibrium is interior (no equilibrium contribution is rejected by the governor).

The chain of inequalities presented above implies that the truthful contribution can't be zero or be rejected. This is because, in such a case, the first expression in the chain above would be simply smaller than the last.

This, in turn, leaves two cases to be considered. The truthful contribution either equals the compensating variation or is equal to its maximum value. In the first case the truthful contribution is a best response since it yields to citizen *i* utility $\bar{U}_i^o$ while

the latter can't arise. This is because in such a case citizen *i* can do better than $\bar{U}_i^o$ and therefore B_i^o would not be his best response in the first place. Thus, the truthful contribution is trivially a best response since the resulting utility is equal to that of any other best response.

B. Second Order Conditions are satisfied in the case without lobbying.

Consider the particular functional forms assumed in the application. Function *F* is linear in *U*. Thus, if the utility possibility set is convex, the F.O.C are sufficient for a maximum. In order to show that, it suffices to show that all U_i are concave in *S,G*[31].

First consider the governor's private utility: $U_1 = U(C_1, G) \quad with \quad C_1 = S$, (B.1). Then, since U_1 is concave in C_1, *G* it must also be concave in *S,G*.

For the citizens' utility function, the determinant of the Hessian matrix has to be calculated. For notational simplicity I drop the subscript *i*: $U = U(e - \frac{S}{n-1} - \frac{G}{n-1}, G)$, (B.2).

The total second order derivatives with respect to *S*, *G* are:

$$U_{SS}^* = (\frac{1}{n-1})^2 U_{CC} \le 0 \quad \text{since } U_{CC} \le 0 \quad \text{(B.3)}$$

$$U_{GG}^* = (\frac{1}{n-1})^2 U_{CC} - \frac{2}{n-1} U_{CG} + U_{GG} \le 0 \quad \text{since } U_{GG} \le 0 \,\&\, U_{CG} \ge 0 \quad \text{(B.4)}$$

$$U_{SG}^* = (\frac{1}{n-1})^2 U_{CC} - \frac{1}{n-1} U_{CG} \quad \text{(B.5)}$$

Using the fact that, by CRS, $U_{CC}U_{GG} = U_{CG}^2$ (B.6), we can show that $U_{SS}^* U_{GG}^* = U_{SG}^{*2}$ (B.7), which proves that all *U* are concave with respect to *S,G*.

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[31] See Mas-Collel, Whinston and Green (1995 p. 818-824).

C. *G* as a measure of efficiency

In this paragraph it will be shown, that for the functional forms assumed in the application, the distance between the efficient level of public good provision G^* and an inefficient level G ($abs(G^*-G)$) (where G is associated with an allocation satisfying the budget constraints) , is an adequate measure of the inefficiency of any resource allocation associated with G.

Claim: Consider an inefficient allocation satisfying the budget constraints $A=\{\{C_i\},G\}$, (C.1) and an efficient $B=\{\{C_i^*\},G^*\}$, (C.2). Then, the total additional amount of private good required making all individuals initially under A indifferent to the allocation B is:

(a) independent of $\{C_i\}$ and $\{C_i^*\}$

(b) increasing in G if $G>G^*$ and decreasing in G if $G<G^*$

Proof: Define ΔC_i to be the additional amount of private good discussed above.

Then: $(C_i+\Delta C_i)^a G^{(1-a)} = C_i^{*a} G^{*(1-a)} \Leftrightarrow \Delta C_i = C_i^* \left(\frac{G^*}{G}\right)^{\frac{1-a}{a}} - C_i$. (C.3)

Define: $T \equiv \sum_i \Delta C_i$, (C.4). Then, because in every allocation $\sum_i C_i + G = e$ (C.5),

the expression above becomes: $T = \left(e-G^*\right)\left(\frac{G^*}{G}\right)^{\frac{1-a}{a}} - \left(e-G\right)$ (C.6).

Furthermore, substituting $G^* = (1-a)e$ (C.7) in this expression:

$T = ae^{\frac{1}{a}}(1-a)^{\frac{1-a}{a}} G^{\frac{a-1}{a}} - e + G$ (C.8), which proves **(a)**.

If this expression is differentiated with respect to G: $\frac{dT}{dG} = (a-1)e^{\frac{1}{a}}(1-a)^{\frac{1-a}{a}} G^{\frac{-1}{a}} + 1$

(C.9), then: $\frac{dT}{dG} > 0 \Leftrightarrow [(1-a)e]^{\frac{1}{a}} < G^{\frac{1}{a}} \Leftrightarrow G^* < G$ (C.10), which proves **(b)**.

It has been proven that the amount of private good required to bridge an inefficient allocation to an efficient one, is an increasing function of the distance between inefficient and efficient public good provision.

D. Solving the application with lobbying

D.1 An additional efficiency result.

"If all but the poorest citizen lobby, the outcome is efficient". This result will be used in the next paragraph in the determination of equilibrium for the application. This is formally stated in the following claim.

Claim: Let a choice of truthful contribution schedules $B(S,G)$ satisfying:

$$X_i'B_i(S',G') = 0 \quad \textit{for } i = 2 \quad \textit{and } 0 < X_i'B_i(S',G') < e_i - \frac{S'+G'}{n-1} \ \forall i > 2, \ \text{(D.1.1)}$$

where: $\{S',G',X'\} = \arg\max_{S,G,X} \bar{F}(S,G,X,B(S,G))$ (D.1.2).

Then, (S',G') satisfies Samuelson's condition for efficiency.

The intuition for this is simple. There are still *n-1* available instruments to individualize the transfer from citizens to the governor (*n-2* contributions and the official salary *S*).

Proof: Since all citizens but citizen 2 bribe:

$$C_1 = S + \sum_{i=3}^{n} B_i \ \text{ and } \ B_i = e_i - \frac{G}{n-1} - \frac{S}{n-1} - \Phi(G;\Delta_i) \ \forall i \geq 3 \quad \text{(D.1.3)}$$

while: $C_2 = e_2 - \frac{S}{n-1} - \frac{G}{n-1}$ (D.1.4).

Because the utilities of all contributing citizens are held constant, and due to the assumptions on *F* (separable and increasing) the governor's problem becomes:

$$\max_{S,G} F(U(C_1,G),U(C_2,G))$$

s.t.

$$C_1 = e - e_2 - \frac{n-2}{n-1}G + \frac{1}{n-1}S - \sum_3^n \Phi(G;\bar{U}_i) \qquad \text{(D.1.5)}$$

$$C_2 = e_2 - \frac{S}{n-1} - \frac{G}{n-1} \qquad \text{(D.1.6)}$$

The first order conditions for this problem are:

$$\frac{\partial F}{\partial U_1}\frac{\partial U_1}{\partial C_1} = \frac{\partial F}{\partial U_2}\frac{\partial U_2}{\partial C_2} \qquad \text{(D.1.7)}$$

$$\frac{\partial F}{\partial U_1}[\frac{\partial U_1}{\partial C_1}(-\frac{n-2}{n-1} - \sum_{i=3}^n \frac{dC_i}{dG}) + \frac{\partial U_1}{\partial G}] - \frac{1}{n-1}\frac{\partial F}{\partial U_2}\frac{\partial U_2}{\partial C_2} + \frac{\partial F}{\partial U_2}\frac{\partial U_2}{\partial G} = 0 \qquad \text{(D.1.8)}$$

Substituting in the second condition $\frac{\partial F}{\partial U_1} = \frac{\frac{\partial U_2}{\partial C_2}}{\frac{\partial U_1}{\partial C_1}}\frac{\partial F}{\partial U_2}$ (D.1.9), factoring out $\frac{\partial F}{\partial U_2}$, dividing by $\frac{\partial U_2}{\partial C_2}$ and using the fact that $-\sum_{i=3}^n \frac{dC_i}{dG} = \sum_{i=3}^n \frac{\frac{\partial U_i}{\partial G}}{\frac{\partial U_i}{\partial C_i}}$ (D.1.10), one ends with the efficiency condition:

$$\sum_{i=1}^n \frac{\frac{\partial U_i}{\partial G}}{\frac{\partial U_i}{\partial C_i}} = 1. \qquad \text{(D.1.11)}$$

D.2 The poor does not lobby alone.

Given *n=3, F* and *U* as given by the application, we know (from appendix B) that $F(S,G,0,0)$ has a unique interior maximum. Assume $(S^*,G^*) = \arg\max_{S,G} F(S,G,0,0)$ (D. 2.1) and that F^* is the corresponding maximum value.

Claim: There can be no equilibrium with $X_2^o B_2^o(S^o,G^o) > 0$, *and* $X_3^o B_3^o(S^o,G^o) = 0$ (D.2.2).

Proof: To show this let us assume the contrary is true.

Then: $\bar{F}(S^o, G^o, X^o, B^o(S^o, G^o)) \geq F^*$ (D.2.3), because otherwise the contribution by the poor citizen (citizen 2) would be rejected by the governor. Notice that the governor's objective is given by: $F^o = U_1^o + b(U_2^o + U_3^o)$ (D.2.4), where the superscript *o* denotes values consistent with the assumed equilibrium. Now, define $S^{'} = S^o + B_2^o(S^o, G^o)$ (D.2.5). Then the following must be true:

$F(S^{'}, G^o, 0, 0) > \bar{F}(S^o, G^o, X^o, B^o(S^o, G^o)) \geq F^*$ (D.2.6).

This is because: $C_1^{'} = C_1^o$ (D.2.7) and the poor citizen's consumption increases, while the rich citizen's consumption decreases by the same amount. Since the poor citizen's utility is smaller than the rich citizen's utility in both considered allocations and $\frac{\partial^2 U}{\partial C_i^2} < 0$ (D.2.8), it must be: $U_2^{'} + U_3^{'} > U_2^o + U_3^o$ (D.2.9), and therefore since: $U_1^o = U_1^{'}$ (D.2.10),

$U_1^{'} + b(U_2^{'} + U_3^{'}) > U_1^o + b(U_2^o + U_3^o)$ (D.2.11)

The last inequality implies that: $F(S^{'}, G^o, 0, 0) > F^*$ (D.2.12), which is not possible, since it is (S^*, G^*) and not $(S^{'}, G^o)$ that maximizes $F(S, G, 0, 0)$.

D.3 Equilibrium of the game in the application

Let us assume an interior truthful equilibrium of the application game exists. Then, the value of the governor's objective in this case is the same to that obtained by him in the case with no lobbying. Formally, we can prove the following claim.

Claim: Assume that (S^o, G^o) and $B^o(S, G)$ constitute a truthful interior equilibrium of the application game, then $F(S^o, G^o, B^o(S, G)) = F^* = \max_{S,G,X} F(S, G, 0, X_3 B_3^o(S, G))$ (D.3.1).

Proof: Since the equilibrium is interior and truthful, we can write: $B^o(S,G) = \left\{ B^o(S,G;\bar{U}_i) \right\}_{i\geq 2}$ (D.3.2). Substituting this into the governor's objective and maximizing with respect to (S,G), we can write: $F(S^o,G^o,B^o(S,G)) = F(\bar{U}_2,\bar{U}_3)$ (D.3.3).

Since the governor is not rejecting any contribution, it must be that: $F(\bar{U}_2,\bar{U}_3) \geq \max\{F_2,F_3\}$ (D.3.4), where: $F_2 = \max_{S,G,X} F(S,G,X_2 B_2^o(S,G),0)$ (D.3.5) and $F_3 = \max_{S,G,X} F(S,G,0,X_3 B_3^o(S,G))$ (D.3.6). Notice that by the argument in the previous paragraph $F_2 = F^*$ (D.3.7). Thus, in order to prove the claim, we need to show that: $F(\bar{U}_2,\bar{U}_3) = F_3 = F^*$ (D.3.8).

Define as (S',G') the argument that maximizes F_3.Then there are three cases. First, $B_3^o(S',G') = 0$ (D.3.9) in which case $F_3 = F^*$ (D.3.10). Second, $B_3^o(S',G')$ equals its maximum value. In this case: $X_3' = 0$ and $F_3 = F^*$ (D.3.11). The proof is not given here, but the argument used is analogous to that of paragraph D.2 above. Third, $B_3^o(S',G')$ lies in the interior of the relevant set. Then, the contribution will either be rejected and $F_3 = F^*$ or not and $F_3 \geq F^*$ (D.3.12).

Let us now consider the last case. We can substitute (S',G') and the truthful equilibrium schedule in the governor's objective. Then we can write $F_3 = F(\bar{U}_3)$ (D.3.13). Now we proceed to show that: $F(\bar{U}_2,\bar{U}_3) = F(\bar{U}_3)$ (D.3.14).

Assume the contrary $F(\bar{U}_2,\bar{U}_3) > F(\bar{U}_3)$ (D.3.15) is true. Consider: $S'' = B_1^o(S^o,G^o) + S^o$ (D.3.16). Then, with an argument analogous to that in paragraph D.2 and using the proof in paragraph D.1 it can be shown that: $F(S'',G^o,0,B_3^o(S'',G^o;\bar{U}_3) > F(\bar{U}_2,\bar{U}_3) > F(\bar{U}_3)$ (D.3.17). This is not possible because: $(S',G') = \arg\max_{S,G} F(S,G,0,B_3^o(S,G))$ (D.3.18).

We have been able to show so far that: $F(\bar{U}_2,\bar{U}_3) = F(\bar{U}_3) \geq F^*$ (D.3.19). As we will see in paragraph D.4, $\frac{\partial^2 F(\bar{U}_2,\bar{U}_3)}{\partial \bar{U}_3^2} < 0$ and $\frac{\partial^2 F(\bar{U}_3)}{\partial \bar{U}_3^2} < 0$. This implies that as the rich citizen's utility increases, the governor's objective eventually starts to decrease. Then, it is optimal for the rich, in both cases, to keep increasing his utility until the lower bound in the government objective (F^*) is reached.

Thus, in equilibrium: $F(\bar{U}_2,\bar{U}_3) = F^* = F(\bar{U}_3)$ (D.3.20). This concludes the proof of the claim.

Calculation of equilibrium

We can find a finite number of candidate equilibriums from the system $F(\bar{U}_2,\bar{U}_3) = F^* = F(\bar{U}_3)$ (D.3.21) that can be checked against the definition of equilibrium. The solution to this system will be an equilibrium if the rich does not deviate to offer zero contribution, that is if $\bar{U}_3$ is greater to what he gets when there is no lobbying. We don't need to consider a deviation of the poor to zero contribution, since he will be indifferent. This is because, when the rich is the only one offering positive contributions, the governor will achieve F^*. This is possible if he can allocate to the poor utility $\bar{U}_2$. The governor will do that by substituting the poor citizens' contribution by extra taxation.

The equilibrium determines the total transfer from each citizen to the governor but not its composition (contribution or salary paid through taxation). This is because the governor's salary and the contributions he receives are perfect substitutes.

Uniqueness

If an interior truthful equilibrium exists, there is no other truthful equilibrium. A possible equilibrium with zero contributions by both citizens can be dismissed by the point discussed above. On the other hand, a possible equilibrium where one or both citizens offer the maximum contribution can not stand. This is because the relevant

contributions allocate zero utility to the citizen offering them, and therefore, will be rejected by the governor.

D.4 Calculation of $F(\bar{U}_2,\bar{U}_3), F(\bar{U}_3)$**.**

For the functional forms assumed, with *n*=3, when both citizens lobby:

$$C_1 = S + B_2 + B_3 \quad \text{and } \bar{U}_i = C_i^a G^{1-a} \Leftrightarrow C_i = (\frac{\bar{U}_i}{G^{1-a}})^{\frac{1}{a}} \qquad \text{(D.4.1).}$$

For: $a = 1-a$, $C_i = \frac{\bar{U}_i^{\frac{1}{a}}}{G}$, $B_i = e_i - \frac{S}{2} - \frac{G}{2} - \frac{\bar{U}_i^{\frac{1}{a}}}{G}$, $i = 2,3$ and

$C_1 = e - G - \frac{\bar{U}_2^{\frac{1}{a}} + \bar{U}_3^{\frac{1}{a}}}{G}$, where $e = e_2 + e_3$, then: $U_1 = (C_1 G)^a = ((e-G)G - \bar{U}_2^{\frac{1}{a}} - \bar{U}_3^{\frac{1}{a}}$ (D.4.2).

For: $a = 0.5, e = 1$, the governor's objective in this case becomes:

$$F(\bar{U}_2,\bar{U}_3) = (\frac{1}{4} - \bar{U}_2^2 - \bar{U}_3^2)^{\frac{1}{2}} + b(\bar{U}_2 + \bar{U}_3) \qquad \text{(D.4.3)}$$

Let us turn now to the case where only citizen 3 bribes. In this case:

$C_1 = S + B_3 = \frac{S}{2} + e_3 - \frac{G}{2} - \frac{\bar{U}_i^{\frac{1}{a}}}{G}$ (D.4.4) and for $a = 1-a$:

$U_1 = (C_1 G)^2 = (\frac{SG}{2} + e_i G - \frac{G^2}{2} - \bar{U}_i^2)^{\frac{1}{2}}$ (D.4.5).

The consumption and utility of citizen 2, who doesn't bribe, is given by:

$C_2 = e_2 - \frac{S}{2} - \frac{G}{2}$ (D.4.6), $U_2 = (C_2 G)^{\frac{1}{2}} = (e_2 G - \frac{SG}{2} - \frac{G^2}{2})^{\frac{1}{2}}$ (D.4.7).

The governor's problem becomes: $\max_{S,G} U_1 + bU_2$ (D.4.8).

The first order conditions with respect to *S* are given by:

$\frac{1}{2}A(\frac{G}{2})-\frac{1}{2}bD(\frac{G}{2})=0 \Leftrightarrow A=bD$ (D.4.9), where: $A=(C_1G)^{\frac{-1}{2}}$, $D=(C_2G)^{\frac{-1}{2}}$.

Notice that the first order conditions with respect to *G* are not necessary, since the claim proven in D.1 states that in this case: $G=(1-a)e$, (D.4.10). Using $a=0.5$ and $e=1$ we get:

$$A=bD \Leftrightarrow \frac{S}{2}=-\frac{1}{1+b^2}(b^2e_3-e_2)+\frac{2b^2}{1+b^2}\bar{U}_3^{\,2}-\frac{1}{4}\frac{1-b^2}{1+b^2} \quad \text{(D.4.11).}$$

$U_2=(C_2G)^{\frac{1}{2}}=[\frac{b^2}{2(1+b^2)}(\frac{1}{2}-2\bar{U}_3^{\,2})]^{\frac{1}{2}}$ and $U_1=(C_1G)^{\frac{1}{2}}=[\frac{1}{2(1+b^2)}(\frac{1}{2}-2\bar{U}_3^{\,2})]^{\frac{1}{2}}$, (D.4.12)

Thus: $F(U_3)=(1+b^2)[\frac{1}{2(1+b^2)}(\frac{1}{2}-2\bar{U}_3^{\,2})]^{\frac{1}{2}}+b\bar{U}_3$ (D.4.13).

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References

Alesina, A.., Angeletos, G.M., 2005. Corruption, Inequality and Fairness. NBER. WP 113-99.

Becker, G., 1983. A theory of competition among pressure groups for political influence. Quarterly Journal of Economics 98, 371–400.

Bernheim, B.D., Whinston, M.D., 1986. Menu Auctions, Resource Allocation and Economic Influence. Quarterly Journal of Economics 101, 1-31.

Campaign Finance Institute, (CFI). www.cfinst.org

Cheikbossian, G., 2008. Heterogeneous groups and rent-seeking for public goods. European Journal of Political Economy 24, 133–150.

Coate, S., 2004. Political Competition with Campaign Contributions and Informative Advertising. Journal of the European Economic Association 2(5), 772-804.

Coate, S., Morris, S., 1995. On the Form of Transfers to Special Interests. Journal of Political Economy 103, 1210-35.

Dabla-Norris, E., Wade, P., 2001. Rent-Seeking and Endogenous Income Inequality. IMF, WP/01/15.

Dixit, A.., Grossman, G.M., Helpman, E., 1997. Common Agency and Coordination: General Theory and Application to Government Policy Making. Journal of Political Economy 105(4), 752-769.

Dixit, A.. K., Londregan, J. B., 1995. Redistributive Politics and Economic Efficiency. American Polit. Sci. Rev., 89, 856-66.

Esteban**,** J., Ray, D., 2006. Inequality, Lobbying, and Resource Allocation. American Economic Review, 96(1), 257-279.

Gupta, S., Davoodi, H., Alonso-Terme, R., 1998. Does Corruption Affect Inequality and Poverty? Washington DC, IMF, WP/98/76.

Grossman, G. M., Helpman, E., 1994. Protection for Sale. American Economic Review 84, 833-850.

Hammond, J. P., 1990. Theoretical Progress in Public Economics: A Provocative Assessment. Oxford Economic Papers, 42(1), 6-33.

Hammond, P. J., 1979. Straightforward Individual Incentive Compatibility in Large Economies. Review of Economic Studies, 46, 263-82.

Huntington, S.P., 1968. Political Order in Changing Societies. New Heaven: Yale University Press.

Leff, N. H., 1964. Economic Development Through Bureaucratic Corruption, in: Heidenheiner A. J. (Ed.), Political Corruption: Readings in Comparative Analysis. Holt Reinehart, New York, pp 8-14.

Lucas, R. Jr, 1990. Supply Side Economics: An Analytical Review. Oxford Economics Paper 42(2), 293-316.

Maniadis, Z., 2008. Campaign contributions as a commitment device. PhD dissertation UCLA.

Martimort, D., Semenov, A., 2008. Ideological uncertainty and lobbying competition. Journal of Public Economics, 92, 456–481.

Martimort, D., Moreira, H., 2005. Common Agency with Informed Principles. Mimeo IDEI Toulouse.

Mas-Collel, A.., Whinston, M. D., Green, J. R., 1995. Microeconomic Theory, Oxford University Press, New York.

Olson, M., 1965. The Logic of Collective Action: Public Goods and the Theory of Groups , Harvard University Press, Cambridge, Mass.

Persson, T.,1998. Economic Policy and Special Interest Politics. Economic Journal, 108, 310-327.

Prat, A.., 2002. Campaign advertising and voter welfare. Review of Economic Studies, 69 (4), 997–1017.

Rose-Ackerman, S., 1999. Corruption and Government: Causes, Consequences and Reform, Cambridge University Press, Cambridge.

Sandholtz, W., Koetzle, W., 2000. Accounting for Corruption: Democracy and Trade. International Studies Quarterly, 44(1), 31-50.

Shleifer, A.., Vishny, R., 1993. Corruption. Quarterly Journal of Economics 108 (3), 599-617.

Shleifer, A.., Vishny, R., 1994. The Politics of Market Socialism. Journal of Economic Perspectives, 8(2), 165-176.

The Economist Intelligence Unit Democracy Index.
http://www.economist.com/media/pdf/Democracy_Index_2007_v3.pdf

Transparency International Corruption Index.
http://www.transparency.org/news_room/in_focus/2008/cpi2008/cpi_2008_table

United Nations Human Development Report 2007/2008.
http://hdrstats.undp.org/indicators/147.html

World Bank, 2003. World Development Report.