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Policy Efficiency in a Model of Lobbying and Voting

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Abstract

This paper analyzes a two-stage game in which economic policy is determined as the endogenous outcome of a political process involving the interaction of two political parties and two interest groups ("lobbies"). In a symmetric world, when the political parties take into account the reaction of both lobbies to the announced policies, it is shown that, in equilibrium, economic policies can arise which are 'efficient' in the sense of maximizing the sum of the lobbies' utility. Conditions are presented under which this situation can occur and the consequences of relaxing the symmetry assumption are investigated in a specific example of the general model. (JEL D72)

In a series of influential papers, Brock and Magee (1978); Magee and Brock (1983); Young and Magee (1986); Magee, Brock and Young (1989) have analysed models of a political process which leads to endogenous economic policy. The endogenous policies of the political parties in these models clear the political market in much the same way that prices act as an equilibriating device in economic markets. These models are capable of explaining, for example, the implementation of trade policies which are not necessarily in the interests of the country as a whole but which do benefit some particular groups. What is especially interesting about their approach is that these authors do not assume that those with political power are concerned with the welfare of a particular interest group per se, but rather that such a bias comes about as a natural result of the democratic political process itself. (An alternative approach in which candidates have policy preferences or in which parties maximize the welfare of particular groups has been analysed by Whittman (1977), Alesina (1987, 1988) and Alesina and Tabellini (1989)).

The general idea is as follows. Suppose there are two political parties and two interest groups, henceforth "lobbies". Following Downs (1957), the political parties are only interested in achieving power and their objective is simply to maximize the probability of being elected in a model based on probabilistic voting. This election probability depends upon the policies which the parties plan to follow if elected, but crucially it also depends upon the financial resources at the disposal of the parties; these funds are used in the campaigning process to help sway voters one way or the other. The two lobbies, who stand to gain or lose depending upon which party gets elected, may choose to make financial contributions to the party whose policy they prefer, to increase the chances of that party's election. (The important point is that this money is not given before the policies are chosen as a way of influencing the policy choice by the party, but rather it is given after the policy is chosen as a way of increasing the election probability [1]). Anticipating these possible contributions, a party may choose a policy favouring one of the lobbies. It is assumed that such policy commitments are credible.

Brock-Magee-Young have modelled this as a game in which both parties simultaneously choose policies under the following hypothesis about the reaction of the lobbies. First they assume that each lobby is in some way associated with one political party, and will only make contributions to that party.[2] When the lobbies observe the two policies, they simultaneously choose their lobby contributions to their own party so as to maximize their expected utility. The lobbies therefore play a straightforward simultaneous move game for which the Nash equilibrium is the appropriate solution concept. Now each political party, when considering changing its policy, only takes into account the reaction of its own lobby in this Nash equilibrium, and assumes that the rival lobby's contributions remain fixed. Magee and Brock (1983) denote this the 'limited information solution'. One justification offered for this reaction hypothesis is, reasonably, that the task for the party of computing the

[1] Hence this money should be thought of as campaign contributions as opposed to money spent on lobbying.

[2] This is without loss of generality: see Magee and Brock (1976) who prove the "campaign contribution specialization theorem".

rival lobby's reaction may be too complicated.[3]

Our "reaction" is that a more satisfactory reaction hypothesis would be for the parties to take into account the full response of both lobbies to any change in policy. In other words we choose to use a standard two-stage game in which, at the first stage, both parties simultaneously select policies, and at the second stage both lobbies simultaneously choose contribution levels. Payoffs are then determined by the resulting election probabilities and the policies. At a sub-game perfect equilibrium, parties are forced to take into account the reaction of both lobbies at the second stage. This change in the reaction hypothesis leads to completely different results.

What we find is that provided the model satisfies certain symmetry conditions and with a quasi-linear specification of preferences over policies and money for the lobbies, then the equilibrium of the game will involve both parties choosing a policy which is efficient in the sense of maximizing the sum of the utilities of the two lobbies. If such a policy is unique then there will be no lobbying taking place in equilibrium since both parties choose the same policy: there is nothing to be gained by contributing to one of the parties. This result is in considerable contrast to some of the results obtained in the limited information structure, where active policy leading to Pareto inefficient allocations together with active lobbying is often found to obtain. The reason for this contrast is simple. In the Brock-Magee-Young approach, the political parties do not take into account the reaction of the rival lobby group when

[3] Although, it turns out in our model that this calculation is unnecessary: they need only be aware of our Proposition 1.

setting their policy so the incentive to set a policy favouring one's own lobby is great because only this lobby's favourable reaction is being considered. If the party additionally takes into account the adverse reaction of the rival lobby in terms of contributions to the rival party, then, under general conditions, we obtain the following result: if the policy is inefficient (relative to the policy of the other party) in the sense that the utility gain to the own lobby is smaller than the loss to the other lobby then the adverse reaction of the rival lobby will always at least offset any reaction of the own lobby. It follows that parties will not choose such inefficient policies since they can only reduce the probability of election success.[4]

Thus in a world where redistribution of income between interest groups can only be achieved by means of distortionary policies, such as trade tariffs/subsidies, our results suggest that the political game will not lead to distortionary policies. This is true however only when the economy can be considered as a conflict between just two interest groups, so that a distortionary policy involves a smaller gain to the gainers than the loss to the losers. It may be the case that there are other groups who do not actively lobby a political party who can be "squeezed" to the benefit of the two represented groups, so that a distortionary policy <u>does</u> lead to an increase in the joint utility of the two lobby groups. Our results show that this is all that matters for electoral success, and in this case distortionary policies will be followed. (Hence our narrow definition of efficiency need not imply efficiency taking into account all groups in society). We give a simple example of this, and also show that in the case

[4] The appendix to this paper demonstrates that this is indeed true for the symmetric case of the model presented by Young and Magee (1986).

where two extreme distributionary policies lead to the same maximum utility sum, positive lobbying may be observed in equilibrium.

The paper is organized as follows. In Section I the basic model is outlined and analyzed. In Section II the possibility of multiple efficient policies is investigated. In Section III a simple redistribution model is presented which illustrates the general results and allows consideration of the consequences of relaxing the symmetry assumption. Concluding comments are contained in Section IV.

I. The Political Game

Assume there are two players ("lobbies"), $i = 1, 2$, whose payoffs $u_i(\alpha)$ depend upon a policy parameter α belonging to some policy set A. The players can make contributions c_i to political parties: a quasi-linear form for the final payoff is assumed:[5]

$$u_i(\alpha) - c_i \qquad\qquad i = 1, 2.$$

There are two political parties, $j = 1, 2$, who commit to a policy and attempt to get elected. Let α_j be the policy of party j. Given the policies of the two parties, the two lobbies decide upon their lobby contributions, with lobby 1 contributing to party 1, and lobby 2 to party 2. The probability that party 1 gets elected depends upon the

[5] Our results go through if the utility cost of contributions is some function $v(c_i)$ where v is increasing and concave.

lobby contributions and the policies: $\pi(c_1, c_2 ; \alpha_1, \alpha_2)$.

ASSUMPTION 1: π is strictly increasing in c_1 and strictly decreasing in c_2.

This corresponds to the idea that lobby 1 supports party 1 and likewise for lobby 2.[6] Magee and Brock (1983) give an interpretation of Assumption 1 based on the level of information possessed by a voter; the potential cost to the voter of choosing the 'wrong' party may be high so the parties use their received contributions to unearth and distribute unfavourable (but socially valuable) information about the opposing parties. The more contributions a party elicits, the more adverse information the voters are given about the opposing party. Moreover π may depend directly on the policies, α_1 and α_2 : it is assumed that the more 'efficient' α_i is in terms of the sum of utilities, the greater the chance of party i being elected. More formally,

ASSUMPTION 2:

If $u_1(\alpha_1') + u_2(\alpha_1') > u_1(\alpha_1) + u_2(\alpha_1)$ then $\pi(c_1, c_2 ; \alpha_1', \alpha_2) \geq \pi(c_1, c_2 ; \alpha_1, \alpha_2)$ with equality in the utility sums implying equality in the probabilities. Likewise for party 2's policy.

The idea here is that some voters vote according to the total utility generated by each policy and not just according to the amount of lobbying. We can imagine that certain voters are not sure ex ante which group, 1 or 2, they will belong to.

[6] It is not necessary to make this restriction: our results go through if either lobby can choose which party to support.

Consequently they should rationally vote for the party whose policy yields the highest average utility $0.5\ u_1(\alpha) + 0.5\ u_2(\alpha)$. Alternatively there might be voters not belonging to either interest group and whose utility is positively correlated with the sum of lobby utility. (Assumption 2 also allows for the case where the policies do not have any direct effect on the probability of election).

Assumption 2 reflects two of the results in Becker (1983): that the political effectiveness of a group is mainly determined not by its absolute efficiency, but by its efficiency relative to other groups; political policies that raise efficiency are more likely to be adopted than policies that lower efficiency.

More formally, the game is a two-stage game. At the first stage, both parties j simultaneously choose $\alpha_j \in A$. The two parties attempt to maximize their probability of election, hence the payoff to party 1 is $\pi(c_1, c_2 ; \alpha_1, \alpha_2)$ and that to party 2 is $1 - \pi(c_1, c_2 ; \alpha_1, \alpha_2)$. The lobbies maximize, by choosing $c_i \in [0, c^{max}]$, their expected payoff, which for lobby i is

$$\pi(c_1, c_2 ; \alpha_1, \alpha_2)\, u_i(\alpha_1) + (1 - \pi(c_1, c_2 ; \alpha_1, \alpha_2))\, u_i(\alpha_2) - c_i \qquad (1)$$

We look for pure-strategy sub-game perfect equilibria of this two stage game. A key assumption is the following.

ASSUMPTION 3: $\pi(c, c ; \alpha_1, \alpha_2)$ is independent of c for all $c \in [0, c^{max}]$.

Assumption 3 states that, given the policies, the election probability is always the same when the two lobbies contribute the same amount: the scale of their lobbying does not affect the probability. This is slightly weaker than requiring homogeneity of degree zero in contributions.

A. The Lobby Sub-Game

To solve for the sub-game perfect equilibria of the model it is necessary to solve backwards, starting with the lobby sub-game in the second stage, given a choice of policies (α_1, α_2). Our first step is to show that if a party has a more efficient policy in the sense of a larger utility sum, then it must receive at least the lobby contribution which the other party receives.

LEMMA 1: Suppose that $\{u_1(\alpha_i) + u_2(\alpha_i)\} > \{u_1(\alpha_j) + u_2(\alpha_j)\}$ for $i \neq j$, and that a Nash equilibrium (c_i, c_j) of the lobby sub-game exists. Then $c_i \geq c_j$.

PROOF: We give the proof for $i = 1$; the argument for $i = 2$ is symmetric. From (1) the expected payoff to lobby i can be written as

$$u_i(\alpha_2) + \pi(c_1, c_2 ; \alpha_1, \alpha_2) (u_i(\alpha_1) - u_i(\alpha_2)) - c_i \quad (2)$$

Suppose that $c_2 > c_1$. We want to prove a contradiction. By the definition of a Nash equilibrium, lobby 1 cannot gain by increasing its contribution from c_1 to c_2:

$$(\pi(c_2, c_2 ; \alpha_1, \alpha_2) - \pi(c_1, c_2 ; \alpha_1, \alpha_2)) (u_1(\alpha_1) - u_1(\alpha_2)) - (c_2 - c_1) \leq 0 \tag{3}$$

Likewise lobby 2 cannot gain by reducing its contribution from c_2 to c_1 :

$$(\pi(c_1, c_1 ; \alpha_1, \alpha_2) - \pi(c_1, c_2 ; \alpha_1, \alpha_2)) (u_2(\alpha_1) - u_2(\alpha_2)) + (c_2 - c_1) \leq 0 \tag{4}$$

Using $\pi(c_1, c_1 ; \alpha_1, \alpha_2) = \pi(c_2, c_2 ; \alpha_1, \alpha_2)$ and adding (3) and (4):

$$(\pi(c_1, c_1 ; \alpha_1, \alpha_2) - \pi(c_1, c_2 ; \alpha_1, \alpha_2)) (u_1(\alpha_1) + u_2(\alpha_1) - u_1(\alpha_2) - u_2(\alpha_2)) \leq 0$$

but the first factor is positive by the assumption that π is strictly decreasing in c_2, while the second factor is also positive by the supposition of the lemma, a contradiction. ■

The intuition behind this result is straightforward. Suppose that party 1's policy yields a higher sum of utilities than that of party 2. If party 2 has a policy more favourable to lobby 2 than party 1 then it hopes to elicit contributions from its lobby; however because party 1 offers a higher utility sum, it must be the case that not only does lobby 1 prefer party 1, but by more (in terms of utility difference) than lobby 2 prefers party 2: lobby 1 has a larger incentive to lobby. Together with Assumption 3, which essentially implies that contributions to either lobby are equally effective, this means that lobby 1 will contribute at least as much as lobby 2.

The next lemma will prove useful.

LEMMA 2: Let α^* be a policy which maximizes the utility sum $\{u_1(\alpha) + u_2(\alpha)\}$. Then if party 1 plays α^* it is guaranteed a payoff of at least $\pi(0, 0 ; \alpha^*, \alpha^*)$. Likewise, party 2 by playing α^* must receive at least $(1 - \pi(0, 0 ; \alpha^*, \alpha^*))$.

PROOF: Suppose party 1 plays α^* against α_2 and let (c_1, c_2) be the contributions in the lobby sub-game after (α^*, α_2) , so party 1's payoff is $\pi(c_1, c_2 ; \alpha^*, \alpha_2)$. We have $c_1 \geq c_2$ by Lemma 1, so

$$\pi(c_1, c_2 ; \alpha^*, \alpha_2) \geq \pi(c_2, c_2 ; \alpha^*, \alpha_2) = \pi(0, 0 ; \alpha^*, \alpha_2) \geq \pi(0, 0 ; \alpha^*, \alpha^*) \tag{5}$$

where the inequalities and equalities follow respectively from Assumptions 1, 3 and 2. Symmetrically, party 2 can guarantee itself $(1 - \pi(0, 0 ; \alpha^*, \alpha^*))$. ■

We shall initially also need the following.

ASSUMPTION 4: There exists an α^* which is the unique policy which maximizes $\{u_1(\alpha) + u_2(\alpha)\}$ over the policy set A.

Assumption 4 implies that α^* is the "efficient" policy in the sense of maximizing the sum of utilities. Such an α will exist under standard assumptions: for example continuity of u_i and compactness of A together with strict concavity of the utility sum.

B. The Political Equilibrium

Given this assumption, we can now show that both parties choosing α^* is a Nash equilibrium.

PROPOSITION 1: Assume that for each (α_1, α_2) a pure strategy Nash equilibrium of the lobby game exists. Then $\alpha_1 = \alpha_2 = \alpha^*$, $c_1 = c_2 = 0$, is the outcome of a sub-game perfect equilibrium.

PROOF: Given that both parties are choosing the same policy α^* the lobbies must set $c_1 = c_2 = 0$ (there is no gain from lobbying, only cost), so the election probability of party 1 at the proposed equilibrium is $\pi(0, 0 ; \alpha^*, \alpha^*)$. By Lemma 2, if party 2 plays α^* , this probability can be no more than $\pi(0, 0 ; \alpha^*, \alpha^*)$, hence party 1 cannot gain by deviating. Likewise for party 2. ■

So in the equilibrium both parties choose the efficient policy and there is no lobbying. By deviating from α^* , it may be possible for a party to elicit contributions from its lobby, however these will always be at least offset by contributions from the other lobby.

While the proposition states that there will be a sub-game perfect Nash equilibrium in which both parties choose the efficient policy, it does not rule out the existence of other equilibria in which policies may be different. For example, in the case in which the policies have no direct effect on π, policies close to α^* may lead to no contributions by either lobby and are consequently as good for the parties as α^*. If however the policies do have a direct effect, so π is strictly increasing in the utility sum offered by α_1 and strictly decreasing in that of α_2, then the equilibrium must be unique.

PROPOSITION 2: If π is strictly increasing in the utility sum offered by policy α_1, $\{u_1(\alpha_1) + u_2(\alpha_1)\}$, and strictly decreasing in that offered by policy α_2, then the outcome path identified in Proposition 1 is the only possible equilibrium outcome path.

PROOF: First notice that the equilibrium election probability for party 1 must be $\pi(0, 0 ; \alpha^* \alpha^*)$. This follows immediately from Lemma 2 as both parties can guarantee this probability and they are playing a constant-sum game. Now suppose that the equilibrium involves at least one of the parties choosing $\alpha_i \neq \alpha^*$. If $\alpha_2 \neq \alpha^*$, then by the assumptions of the proposition, the last inequality in (5) is strict, so party 1 by playing α^* against α_2 would achieve a payoff greater than $\pi(0, 0 ; \alpha^*, \alpha^*)$. This means that party 2 gets a payoff less than it can guarantee itself by playing α^*, hence this cannot be an equilibrium. The argument is symmetric for $\alpha_1 \neq \alpha^*$. Hence the unique equilibrium has $\alpha_1 = \alpha_2 = \alpha^*$. ∎

When the probability of election function depends directly upon the policy, we obtain the standard median voter (Black (1958)) type result of complete policy convergence, whereas it is possible that there exist equilibria which do not exhibit this feature if the election probability is policy independent.

II. Non-Uniqueness of Efficient Policies

The results of Section I have shown that under certain conditions the outcome of the lobbying game will involve both parties choosing the efficient policy and neither lobby making contributions. The critical assumptions were firstly the existence of a unique efficient policy and secondly a substantial degree of symmetry in the model. In particular both lobbies' contributions were equally effective in the sense that any level of contribution by one lobby could be 'nullified' by an equal level of contribution by the other lobby, <u>and</u> making contributions is equally costly in terms of payoffs to both lobbies. Relaxing these assumptions may lead to different results, so in this section we dispense with the assumption of a unique efficient policy (Assumption 4).

Suppose that there exists more than one policy which maximizes the utility sum, with the distribution of utilities possibly varying between these policies. Then there will be equilibria involving any combination of such policies.

PROPOSITION 3: Assume that for each (α_1, α_2) a pure strategy Nash equilibrium of the lobby sub-game exists. Let α^{1*} and α^{2*} both maximize $\{u_1(\alpha) + u_2(\alpha)\}$ over the policy set A. Then there exist sub-game perfect equilibria in which $\alpha_i = \alpha^{1*}$, $\alpha_2 = \alpha^{2*}$, i, j = 1, 2.

PROOF: Lemma 2 establishes that playing α^*, where α^* is one of the efficient policies, guarantees party 1 $\pi(0, 0 ; \alpha^*, \alpha^*)$ and likewise guarantees party 2 $\{1 - \pi(0, 0 ; \alpha^*, \alpha^*)\}$. If party 1 plays α^{1*} and party 2 plays α^{2*}, where both policies are efficient, neither can gain by changing policy since this argument proves that against α^{2*}, party 1 cannot do better than $\pi(0, 0 ; \alpha^{2*}, \alpha^{2*})$ and by playing α^{1*} gets $\pi(c_1, c_2 ; \alpha^{1*}, \alpha^{2*}) = \pi(0, 0 ; \alpha^{2*}, \alpha^{2*})$ since $c_1 = c_2$ (both α^{1*} and α^{2*} offer the same utility sum). Likewise party 2 cannot do better than α^{2*}. This establishes that any combination of two efficient policies leads to an equilibrium. ∎

Moreover, if the policies have a direct effect on π as assumed in Proposition 2, then again there can be no other equilibria: from Lemma 2 the equilibrium payoff to party 1 must be $\pi(0, 0 ; \alpha^*, \alpha^*)$, and the argument of the proof of Proposition 2 establishes that playing a policy other than an efficient one would lead to a lower payoff. If α^{1*} and α^{2*} offer different utility distributions, it is quite possible that lobbying is positive in equilibrium (see below). It might, however, seem unlikely that multiple efficient policies would arise. In the example below we show how this might nevertheless happen in an interesting fashion.

III. Example: A Simple Redistribution Game

In this section we give an example to illustrate the results of Sections I and II. Depending upon the parameters of the model there may be a unique maximizer of the utility sum where no interference takes place, or there may be multiple maximizers involving a third group of agents being squeezed to the advantage of one of the lobby groups. The example also allows us to consider what might happen when the symmetry assumptions are dropped.

It is supposed that the agents in the economy are composed of three groups: lobbies 1 and 2 together with a third group of politically non-active agents. The numbers in each group are N , N and n respectively, and each agent has an endowment of income of one unit. The government has a single instrument of redistribution, namely to impose a uniform lump sum tax τ , where $0 \le \tau \le \tau^{max}$, and to redistribute the money raised to one of the lobby groups. The maximum tax rate τ^{max} satisfies $0 < \tau^{max} \le 1$. There is however a deadweight loss from this policy in the form of a fraction $(1 - \lambda)$, where $1 \ge (1 - \lambda) \ge 0$, of the tax revenue which simply gets "lost". There are two political parties and party 1's probability of election success is

$$\pi = \frac{K + c_1}{2K + c_1 + c_2} \qquad c_1 + c_2 > 0$$

$$\pi = 1/2 \qquad c_1 = c_2 = 0$$

where $K \ge 0$ is a constant; π does not depend directly on the policy chosen. It is assumed that $c^{max} = \infty$.[7] We consider policies of the form: levy a tax τ_i and redistribute the tax revenue $\lambda\tau_i(2 + n/N)$ to lobby i, with $\tau_i \in [0, \tau^{max}]$. (The subscript on τ refers not to the party whose policy this is, but to the lobby which benefits; so $\alpha_1 = \tau_2$ will mean that party 1 chooses a policy to benefit lobby 2 for

[7] Or at least large enough to exceed the maximum utility difference between any two policies, so the $c_i \le c^{max}$ constraint will never bind.

example). Lobby i's utility is simply net per capita income.

It should be stressed that the third group play no role in the model other than being a device to motivate the possibility of active distribution policy having a positive effect on the sum of lobby utility.

Given a policy τ_1 which distributes tax revenue to lobby 1, the utility of lobby 1 becomes

$$(1 - \tau_1) + \lambda\tau_1(2 + n/N)$$

and that of lobby 2 is $(1 - \tau_1)$. The utility sum is then

$$\tau_1 \,(\lambda(2 + n/N) - 2) + 2 \qquad (6)$$

which is increasing in τ_1 if

$$2\lambda + \lambda n/N - 2 > 0 \qquad (7a)$$

The maximum is reached in this case at $\tau_1 = \tau^{max}$, and by symmetry also at $\tau_2 = \tau^{max}$ (the policy which distributes all revenue to lobby 2). The utility sum is decreasing in τ_1 if

$$-1 < 2\lambda + \lambda n/N - 2 < 0 \qquad (7b)$$

The maximum is reached in this case at $\tau_1 = 0$, or equivalently $\tau_2 = 0$. (If the expression on the LHS of (7b) was less than -1 any positive policy would reduce both lobbies' welfare, so we do not consider this case).

We consider first the lobby sub-game after each party has chosen a policy favourable to its own lobby: $\alpha_1 = \tau_1$ and $\alpha_2 = \tau_2$. The utility of lobby 1 is

$$\pi\,(1 - \tau_1 + \lambda\tau_1(2 + n/N)) + (1 - \pi)\,(1 - \tau_2) - c_1$$
$$= (1 - \tau_2) + \pi(\tau_1 + \tau_2 + \tau_1(2\lambda + \lambda n/N - 2)) - c_1$$

Lobby 1 chooses c_1 to maximize this expression given c_2 , which leads to the first-order conditions

$$\frac{(K + c_2)\,(\tau_1 + \tau_2 + \tau_1(2\lambda + \lambda n/N - 2))}{(2K + c_1 + c_2)^2} \leq 1 \;\; ; \;\; c_1 \geq 0 \tag{8}$$

with complementary slackness. Given the symmetric condition for lobby 2, and assuming an interior solution c_1 , $c_2 > 0$, we get

$$\frac{(K + c_1)}{(K + c_2)} = \frac{(\tau_1 + \tau_2 + \tau_1(2\lambda + \lambda n/N - 2))}{(\tau_1 + \tau_2 + \tau_2(2\lambda + \lambda n/N - 2))} \tag{9}$$

Notice that if the utility sum is increasing in τ_1 (or τ_2), that is (7a) holds, then we have $c_1 > (<)\; c_2$ as $\tau_1 > (<)\; \tau_2$; if the utility sum is decreasing in τ_1 (or τ_2), that is (7b) holds, then $c_1 < (>) c_2$ as $\tau_1 > (<) \tau_2$. Taking into account the complementary slackness conditions we get the same relations except the strict inequality between c_1 and c_2 becomes an equality when $c_1 = c_2 = 0$. (This corresponds to Lemma 1).

We have dealt with the lobby sub-game after each party has chosen a policy favourable to its own lobby. We need also to consider the case where both parties choose policies favourable to the same lobby, say lobby 1. Let party 1 choose policy τ_1 , and party 2 policy τ_1^+ , with $\tau_1 > \tau_1^+$. Then the corresponding first-order conditions which hold with complementary slackness are:

$$\frac{(K + c_2)(\tau_1 - \tau_1^+)(2\lambda + \lambda n/N - 1)}{(2K + c_1 + c_2)^2} \leq 1 \ , \quad c_1 \geq 0$$

$$\frac{(K + c_1)(\tau_1 - \tau_1^+)}{(2K + c_1 + c_2)^2} \leq 1 \ , \quad c_2 \geq 0$$

At an interior solution with $c_1 , c_2 > 0$, we have

$$\frac{K + c_1}{K + c_2} = 2\lambda + \frac{\lambda n}{N} - 1$$

and taking account of the possibility that $c_1 = c_2 = 0$, this implies that when (7a) holds, $c_1 \geq c_2$, and vice versa when (7b) holds; again this corresponds to Lemma 1.

Finally there is the possibility that party 1 chooses a policy more favourable to lobby 2 than does party 2. In this case clearly $c_1 = c_2 = 0$. We are now in a position to analyze the equilibria of the model. There are two cases to consider.

A. Unique Efficient Policy

First we take the case where (7b) holds: this corresponds to the basic idea of the paper where Assumption 4 is satisfied. The sum of utilities is maximized only when $\tau_1 = \tau_2 = 0$; the deadweight loss of redistribution exceeds the amount which can be raised from the third group. In this case, from Proposition 1, each party having a non-active policy followed by zero lobbying is a sub-game perfect equilibrium outcome.[8] This is easily verified: at the proposed equilibrium the probability of election is one half and from the above derivations any deviation by party 1 will lead to a probability no greater than one half and likewise for party 2. (This equilibrium is Pareto efficient and not simply efficient in the sense of maximizing the joint utility of the lobby groups).

B. Multiple Efficient Policies: The Possibility of Positive Lobby Contributions

Second, when (7a) holds, so that Assumption 4 fails, active policy pays because the two lobby groups gain at the expense of the third group by more than the deadweight loss. Here, by the discussion of Section II, both parties playing either of

[8] As mentioned in Section I, there will also be equilibria close to this one in which $c_1 = c_2 = 0$ where the utility difference between the two policies is not large enough to induce positive lobbying contributions.

the maximum redistribution policies, which are both efficient, is an equilibrium.[9] To see if positive lobbying is possible in equilibrium, consider the equilibrium in which party i plays $\tau_i = \tau^{max}$ (both parties act as favourably to their lobbies as possible). For an interior solution, from (8),

$$c = \tau^{max}\lambda(2 + n/N)/4 - K \tag{10}$$

needs to be positive, otherwise $c_1 = c_2 = 0$. Clearly if $K = 0$, then provided only that $\tau^{max}, \lambda, n > 0$, we have $c > 0$. When K is low, starting from a situation where $c_1 = c_2 = 0$, the effect on the probability of a small increase in c_i is very large, and provided this multiplied by the utility difference is larger than unity, some lobbying must occur. If on the other hand the expression given by (10) is non-positive, then $c_1 = c_2 = 0$ is the solution: the gain from lobbying is less than the cost.

So we have the result that positive lobbying may occur in equilibrium once we dispense with Assumption 4. In the other equilibrium configurations, namely both play $\tau_1 = \tau^{max}$, both play $\tau_2 = \tau^{max}$, and party 1 plays $\tau_2 = \tau^{max}$, party 2 plays $\tau_1 = \tau^{max}$, there is clearly no lobbying.[10] However, in all cases an "efficient" policy is chosen by both parties (recall we have defined efficiency only in terms of the utility sum of the two lobbies, ignoring any third parties). The equilibrium with positive

[9] Recall that we defined "efficiency" only from the narrow point of view of the two lobbies. Clearly maximum redistribution is not a Pareto efficient allocation once we take into account the utility of the third group.

[10] This is because we restrict lobby i to contribute only to party i: we could easily dispense with this restriction in which case the latter equilibrium would be essentially identical to the one in which party i plays $\tau_i = \tau^{max}$.

lobbying is Pareto inferior to the other symmetric equilibrium.

An interesting feature of such multiple equilibria is that it is possible to observe both parties choosing "extremist" policies or both choosing identical policies.

An objection to this model is that it seems unlikely that the utility sum should have multiple maximizers. A positive lobbying equilibrium could nevertheless be obtained even in the absence of this feature if we restrict each party to choose only policies favouring their own lobbies. Suppose the constraints on redistribution are $\tau_1 \leq \tau_1^{max}$, $\tau_2 \leq \tau_2^{max}$ with $\tau_1^{max} > \tau_2^{max}$ so $\tau_1 = \tau_1^{max}$ is the unique maximizer of the utility sum - we are assuming that (7a) holds. Then from (9) and the definition of π, π is increasing in τ_1 and decreasing in τ_2 (taking into account the complementary slackness conditions this may be weakly increasing or decreasing), hence $\tau_1 = \tau_1^{max}$, $\tau_2 = \tau_2^{max}$ are in fact dominant strategies and so constitute an equilibrium, and this might involve positive lobbying as before.

C. <u>Asymmetric Lobbying Effectiveness</u>

Finally, it is interesting to ask how the results vary if we dispense with the symmetry between the lobbying costs and benefits which has played an important role so far. For example suppose that the marginal cost of contributing for lobby 1 is reduced to $\mu < 1$: so μc_1 is now the utility loss. (Alternatively we could have changed the form of π, with similar effects). Let us return to the world of Assumption 4, remaining within the example, so assume that (7b) holds, with

$\tau_1 = \tau_2 = 0$ maximizing the utility sum. First we show that $\tau_1 = \tau_2 = 0$ may no longer be an equilibrium. Suppose that party 2 plays $\tau_2 = 0$, and party 1 plays $\tau_1 > 0$. The first-order conditions are

$$\frac{(K + c_2)(\tau_1 + \tau_1(2\lambda + \lambda n/N - 2))}{(2K + c_1 + c_2)^2} \leq \mu \quad , \quad c_1 \geq 0 \tag{11}$$

$$\frac{(K + c_1)\ \tau_1}{(2K + c_1 + c_2)^2} \leq 1 \quad , \quad c_2 \geq 0 \tag{12}$$

with complementary slackness. Suppose that μ is sufficiently low that the following holds:

$$1 + (2\lambda + \lambda n/N - 2) > \mu \tag{13}$$

This implies that whenever $c_1 = c_2$, the first inequality in (11) is more likely to bind than the first in (12). Then provided lobby 1 has an incentive to lobby when $c_2 = 0$, that is if

$$\frac{\tau_1 + \tau_1\ (2\lambda + \frac{\lambda n}{N} - 2)}{4K} > \mu \tag{14}$$

(which in view of the assumption in (13), certainly follows if additionally $\tau_1 \geq 4K$), the lobby sub-game has an equilibrium with $c_1 > c_2$.[11] Hence by playing $\tau_1 > 0$ such that (14) is satisfied (always possible if $\tau^{max} > 4K$) party 1 pushes π above 1/2, so both parties playing efficient policies is not an equilibrium.

If an equilibrium exists when (13) holds and $\tau^{max} \geq 4K$, it must be the case that $\pi = 1/2$ since any other equilibrium probability could be improved upon by one or other of the parties changing its policy to that of its rival to guarantee itself $\pi = 1/2$. In fact both parties playing $\tau_1 = \tau^{max}$ can arise in equilibrium. Clearly party 1 cannot gain by changing its policy since there will be no lobbying and π will remain at 1/2. If party 2 plays $\tau_1 \geq 0$ or $\tau_2 > 0$ then (13) can easily be seen to imply $c_1 \geq c_2$ so it cannot gain.[12]

Hence we have the result that when one lobby is more effective at lobbying, the equilibrium policy may necessarily be biased in favour of that lobby at the expense of efficiency. The party of the other lobby has no choice but to acquiesce in this situation and also favour the effective lobby: it cannot afford a fight. (In equilibrium there is no lobbying).

While a "distortionary" policy can arise in the case of asymmetric lobbying

[11] This is easily seen. First, the reaction functions for both lobbies are continuous and bounded above with $dc_i/dc_j > (<) 0$ as $c_i > (<) c_j$; hence there exists a unique equilibrium of the lobby sub-game. Second, $c_1 = c_2 = 0$ cannot be a solution as (14) would imply that (11) is violated; it cannot be that $c_2 > c_1 = 0$ since the first inequality in (12) then holds with equality, and (14) then implies that (11) is violated. Finally, $c_2 > c_1 > 0$ is impossible since $c_1 > c_2$ at an interior solution by (13).

[12] Again this is easily checked by showing that when $c_1 = c_2$, the ratio of the marginal benefit from lobbying to its cost is greater for lobby 1 than lobby 2.

effectiveness, the equilibrium is quite different to the distortionary equilibria of the Brock-Magee-Young variety. They have policy dispersion - both parties having policies favouring their own lobbies - and positive lobby contributions. In our equilibrium, policies do not differ and there is consequently no lobbying: it is the mere threat of lobbying which distorts policy. An outside observer might conclude that lobbying is unimportant as none occurs in equilibrium. He would be quite wrong.

IV. Concluding Comments

This paper has presented a general model of the political process reflecting the influence of interest groups. Economic policy in this setup is determined as the result of a political equilibrium. Young and Magee (1986) present a model where the endogenous policy to be determined is a tariff. Their model, however, restricts the reaction of the lobbies in an irrational manner. The model of the present paper allows agents to use all of the information available to them when making decisions and consequently, policy is not as distorted as Young and Magee would suggest - indeed, according to the narrow definition of efficiency adopted in the present paper, the political equilibrium often involved the parties choosing efficient policies whilst the interest groups do not lobby.

The conditions under which these results hold are fairly general. Underlying the results is a simple mechanism: when the lobbies are symmetric and there is a unique maximizer of their utility sum, any attempt by a party to pursue a policy other than the one guaranteeing this maximum joint utility will harm the opposing lobby more than it benefits the own one. Consequently the party will suffer a net loss of lobby contributions which we have defined as important for the outcome of the election. Even if the sum of the lobbies' utility does not have a unique maximum, we have demonstrated in the general model that an 'efficient' equilibrium will arise, in which lobbying may or may not be present.

A simple redistribution game was used to illustrate our results. The structure of the general model was enhanced by assuming the existence of a group of politically non-active agents who could be 'squeezed' by the parties to court favour with the interest groups. Working within this example, we have been able to examine the role of our key assumptions. If the lobbies' utility sum has a unique maximizer then our general result (no lobbying and efficient policy) was shown to hold. In the case of multiple efficient policies, an equilibrium with active distortionary policy and lobbying is possible. This crucially depends upon the existence of the non-politically active agents who lose out to the interest groups in a lobbying equilibrium. Finally, when one lobby has the most power, both parties favour the most effective lobby so that policy is active even though there is no lobbying in equilibrium. Both parties acquiesce to the wishes of the strong lobby as neither party can afford to do otherwise. Although the main intention of this paper is to demonstrate that efficient policies are possible in the presence of interest groups, this latter result suggests a much more fundamental role for lobbies in the political process than Young and Magee. In their model, it is the <u>actual</u> lobbying which leads to distortionary policy, but our final result suggests that the mere <u>threat</u> of a strong interest group using its influence may be sufficient to lead to distortion.

APPENDIX

This appendix takes the symmetric case of the Young and Magee (1986) model and shows that if the reaction of both lobbies is taken into account when setting policy, then the party with the most active policy pushes its own election probability below 1/2 (which it can guarantee by adopting the policy of the opposing party).

There are two political parties and two lobbies. Each lobby has an endowment of E and lobby i makes c_i in contributions to party i (i = 1, 2) in response to the announcement of a distortionary policy α_i (these policies are normalized so that $\alpha_i = 1$ is a non-active policy). The probability that party 1 is elected is

$$\pi = \frac{c_1 \alpha_2}{c_1 \alpha_2 + c_2 \alpha_1} \tag{A1}$$

Young and Magee calculate the following solution to the lobby sub-game at an interior solution $c_1 > 0$, $c_2 > 0$:

$$c_1 \alpha_2 = c_2 \alpha_1 [\{(1 - (\alpha_1 \alpha_2)^{-m}) (1 + \frac{E \alpha_2}{c_2 \alpha_1})\}^{1/2} - 1] \tag{A2}$$

$$c_2 \alpha_1 = c_1 \alpha_2 [\{(1 - (\alpha_1 \alpha_2)^{-m}) (1 + \frac{E \alpha_1}{c_1 \alpha_2})\}^{1/2} - 1] \tag{A3}$$

where m is a constant. The following result indicates that if party 1 sets a more redistributive policy than party 2, then the outcome of the lobby sub-game is such that the probability of election of party 1 is below one-half (this being the probability it can achieve by setting a policy of equal magnitude to the other party).

RESULT A1: If $\alpha_1 > \alpha_2$ then $\pi < 1/2$.

PROOF: Rearrange (A2) and (A3) to get

$$c_1 \alpha_2 + c_2 \alpha_1 = c_2 \alpha_1 \{(1 - (\alpha_1 \alpha_2)^{-m}) (1 + \frac{E \alpha_2}{c_2 \alpha_1})\}^{1/2} \tag{A4}$$

$$c_1 \alpha_2 + c_2 \alpha_1 = c_1 \alpha_2 \{(1 - (\alpha_1 \alpha_2)^{-m}) (1 + \frac{E \alpha_1}{c_1 \alpha_2})\}^{1/2} \tag{A5}$$

Dividing (A4) by (A5) and rearranging yields

$$\frac{c_1 \alpha_2}{c_2 \alpha_1} = \frac{c_2 \alpha_1 + E \alpha_2}{c_1 \alpha_2 + E \alpha_1} \tag{A6}$$

By (A1), showing that $\alpha_1 > \alpha_2$ implies $\pi < 1/2$ requires that $\alpha_1 > \alpha_2$ yields $c_2 \alpha_1 > c_1 \alpha_2$ from the lobby sub-game. This can be proved by contradiction. Suppose that $\alpha_1 > \alpha_2$ and $c_1 \alpha_2 \geq c_2 \alpha_1$, then (A6) implies

$$c_2 \alpha_1 + E \alpha_2 \geq c_1 \alpha_2 + E \alpha_1 \tag{A7}$$

but $E\,\alpha_1 > E\,\alpha_2$ and $c_1\,\alpha_2 \geq c_2\,\alpha_1$ so that (A7) is violated, a contradiction. ■

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