A MODEL OF INEQUALITY AND INTEREST GROUP POLITICS*

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revised October 1997

* This research was partly supported by the Institutional Reform and the Informal Sector (IRIS) Center at the University of Maryland and the Academic Senate of the University of California at Santa Cruz. The views expressed here are our own, and not those of the above institutions. We are indebted to Donald Wittman for insights, encouragement and guidance, and to Joaquim Silvestre for clarifying important normative issues. We are also grateful to Christopher Clague, an anonymous IRIS referee, and seminar participants at the Indian Statistical Institute - Delhi, Santa Clara University, University of California at Riverside, University of California at Berkeley, University of Southern California, University of California, Davis, and University of Washington for helpful comments. This paper was also presented at the 1996 Annual Meeting of the American Political Science Association, in San Francisco, and at the 1996 meeting of the Indian and Southeast Asian Econometric Society, in Delhi. We received very helpful comments from the discussant, Kim Border, on the former occasion. Of course we are solely responsible for remaining shortcomings.

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ABSTRACT

In this paper we build a model to examine inequality of process and inequality of outcomes in interest group politics. The model has the following features: (i) interest groups which compete for rents in a noncooperative game, (ii) a self-interested rent-setting political decision maker (iii) democratic or popular pressure as a check on the self-interest of the political decision maker. We allow for a fixed and an endogenous number of influence groups, for differences in the effectiveness and precommitment abilities of interest groups, and for repeated play of the influence game. We show that in some cases, the costs of influence activities are highest when groups are relatively equal in their effectiveness or capacity for influence. We also show that this result can be reversed if social welfare incorporates enough concern for equity. We also show that in some cases, the political decision maker sets rents in such a way as to compensate for changes in inequality in the process of interest group politics.

JEL codes: H1

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1. Introduction

From an instrumental perspective, politics concerns two things: the provision of collective goods, and redistribution of goods or the resources that provide command over goods. These two aspects are typically intertwined in practice, since the distribution of costs and benefits arising from the provision of collective goods itself involves some implicit redistribution, relative to another choice of projects and taxes, or relative to the status quo. Nevertheless, it is common and useful to focus on issues arising from the redistributive processes of politics.

In democracies, the objective of political decision-makers can be thought of as pleasing voters, to the extent that doing this increases the chance of the decision-maker staying in office. This, in turn, is a plausible desire, based on the self interest of the decision-maker, and the existence of occupational choice, i.e., the political decision-maker has voluntarily chosen this occupation over others. Pleasing voters may involve redistribution: policies that achieve this are sometimes disparagingly referred to as "populist", but this is the instrumental essence of democracy. In fact, responding to voters in this way tends to imply redistribution from the minority to the majority[1]. In contrast to this is the observation that redistribution is often in the opposite direction: from the majority to minorities. To explain this, minorities that benefit in this way are modeled as "special interest groups"[2], who actively seek and obtain such redistributions. The contributions to the theory and empirical analysis of the workings of interest group politics are legion, though the construction of a complete, logically consistent story is not easy[3]. We shall not be concerned with this large and important problem here. Instead, our focus is on some features of the process of interest group politics, in particular, the impact of inequality of the process, and the implications for efficiency and for the inequality of outcomes.

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[1] See Wittman (1989a)

[2] Alternative terms are numerous: pressure groups, lobbyists, rent-seekers, etc. Seminal articles include Tullock (1967) and Krueger (1974).

[3] See, for example, Olson (1965), Tullock (1980), Becker (1983), Wittman (1989a,b), Mitchell and Munger (1991), Coate and Morris (1995), Lohmann (1994).

That such inequalities in the process of interest group politics exist, and matter, seems to be commonplace. For example, the role of the state in determining the differential effectiveness of different groups has been emphasized by political scientists such as Bates, who says:

> If economic interests can collude by free riding, then the interests with access to state power may be in a position to organize to defend their interests more effectively than those who are excluded from power... If the constitutional order facilitates access to state power, it apportions the capacity to organize. The constitutional structure thus determines which interests can shape collective outcomes by engaging in collective action. It determines which economic interests are politically effective. (Bates, 1990, p. 44)

Bates goes on to give examples such as the changing position of trade unions in the industrializing states of the nineteenth and early twentieth centuries, and the different strengths of the farmers' interests in colonial Kenya - where white farmers dominated the legislature and promoted collusive behavior and rent extraction by their own kind - and Ghana - where farmers were excluded from the interests represented by the government. Other cases are provided by Bardhan (1984), who emphasizes the relative equality of several competing interest groups in post-independence India, and Datta-Chaudhuri (1990), who contrasts this with the primacy of large commercial interests in South Korea's polity.

Other motivations for inequalities in the process of interest group politics can also be given. Rogerson (1982) examines a situation where firms lobby a regulator for a monopoly franchise, and the incumbent has an advantage in this situation. Kohli (1992, 1994) suggests that kinship and class ties may be important even at an informal level, i.e., in addition to the formal role of the character of the state, as in the above quote from Bates. No doubt inequalities are more the rule than the exception.

Our goal is to formalize some of the implications of such inequalities, by using a standard, stylized model of interest group politics, extended in directions that aid us in our objective. Specifically, we wish to highlight the impact of inequalities in this interest group game on the efficiency and the equity of the outcomes of the process. We will bring out some of the conflicts between equity and efficiency that can arise in such contexts. While our focus is to uncover such concerns, and not the construction of a general model of the process of interest group politics, we will comment wherever possible on our modelling strategy, and the force of our particular assumptions.

The remainder of the paper is organized as follows. In section 2, we use a stylized model of rent seeking with two interest groups to explore some of the consequences of inequality in the process of interest group competition. We examine inequality of position as well as of effectiveness. The basic conflict between equity and efficiency is identified. In section 3, we show how this tradeoff extends to the case of many interest groups. Section 4 provides a major extension of the analysis, incorporating a self-interested political decision maker who determines the level of rents, to his advantage and the advantage of interest groups, but to the detriment of unorganized voters. The political support of such voters allows the decision maker to remain in office, and this acts as a check on otherwise untrammelled rent creation. Sections 2-4 all maintain essentially the same stylized assumptions about the nature of interest group competition. In section 5, we explore the implications of alternative specifications of the process. We first discuss generalizations of the approach of sections 2-4, which use an exogenous "success function" for the process of interest group competition. Secondly, we analyze the consequences of an alternative approach, which is more behavioral, and allows interest groups to "bid" for shares of the rent. In both cases, we suggest that the tradeoff between equity and efficiency may still hold. Third, we briefly discuss interest group competition through elections, and suggest that the issues parallel those for interest group activity to influence policy choices of incumbents, which is our focus in the paper. Finally, section 6 provides a brief conclusion.

2. Two Interest Groups Competing for a Fixed Rent

We begin with the simplest possible case that will allow us to highlight the role of inequalities in the competition among interest groups. Thus we consider two groups competing for (shares of) a fixed amount of economic rent. This rent may be obtained through the award of a monopoly franchise, the allocation of quotas, the setting of regulated prices, etc. In our abstract formalism, situations where the rent is indivisible, and awarded probabilistically (in particular, the case of awarding a monopoly franchise), and cases where it is divisible and shared cannot be distinguished. The basic model of such interest group competition was suggested by Tullock (1980). With two groups, each group i expending nonnegative resources x_i, the probability that group i captures a given rent R, or the share that it gets, is assumed to be $x_i / (x_1 + x_2)$, unless both x's are zero. In that case, the probabilities/shares are each 1/2. With risk neutrality, and with costs being equal to the resources expended, group i's objective function is $x_i R / (x_1 + x_2) - x_i$. Assuming also that the choices are made simultaneously and noncooperatively, the Nash equilibrium of the interest group competition is easily derived to be $x_1^* = x_2^* = R/4$. Note that the "success functions" are assumed rather than derived from any optimization by a political decision-maker. Also, the form of the success functions is quite arbitrary, and we shall return to the issue of generalizations and alternatives[4] subsequently. For now, we note that the tractability of this approach makes it a popular and useful way of obtaining insights into the processes and outcomes of redistributive or conflictual situations in general[5].

Inequality of effectiveness

Two types of inequality can be introduced into this framework. First, suppose that the groups have different relative effectiveness in affecting the probability or share. Specifically,

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[4] Recent references on generalizations and alternatives include Hirshleifer (1995), Skaperdas (1996), Lohmann (1994), and Grossman and Helpman (1995).

[5] See, for example, the papers by Grossman (1995) and Grossman and Kim (1995).

suppose that group 1's success function is $\alpha x_1 / (\alpha x_1 + x_2)$. In this case, the parameter α is a clear measure of relative effectiveness, and hence of inequality in the process of interest group politics. The Nash equilibrium now becomes $x_1^* = x_2^* = \alpha R/(1 + \alpha)^2$. In this case, the costs of interest group activity, as measured by the sum of interest group expenditures, vary systematically with the degree of relative effectiveness. It is easy to show[6] that these costs are highest when $\alpha = 1$, i.e., when there is no inequality, and that they go down as α moves away from this value. Thus, if the desired goal is to reduce influence costs, one way to do this would be to increase inequality of the interest group process as much as possible[7]. Note that since the sum of the welfare of the interest groups is just R minus the total influence costs, increasing inequality increases total welfare by this measure. At the same time, the inequality of the outcome, in terms of the relative welfare of the interest groups, increases as the process becomes more unequal.

Of course, the model used to obtain this extreme conclusion is highly simplified. But it allows one to sharpen the reasons for the objections one may have to such a conclusion. One objection that can be handled straightforwardly is that some influence expenditures are not social costs, such as wasteful allocations of real resources (time, skill, and facilities, for example), but are transfers to the political decision-maker, in the form of bribes, gifts or other contributions. Thus, only fractions of the x's are expenditures on what Bhagwati (1982) has termed directly unproductive profit-seeking (DUP) activities. If these fractions are constant for both groups, then the costs of influence activity have the same behavior as inequality of the process (measured by α) varies, since the Nash equilibrium expenditures turn out to be the same for both interest groups. If transfers are weighted equally in total welfare, then again total welfare for the participants in the process (including a risk-neutral political decision-maker) is again just R minus the costs of the DUP activity, and welfare is increased by making the process more unequal.

Another possible objection is that interest group activities convey information, or lead to more efficient allocative decisions, as in Milgrom (1988)[8]. Thus a higher level of interest group activity may actually have positive benefits. To some extent, this is part of a larger class of possible generalizations, and we shall postpone this issue, remaining for now within the simplest framework.

Within the simple model, one can argue directly that the *process* of interest group politics should be fair or egalitarian: the normative goal of equality of process can take precedence over minimizing the costs of the process. In a related context, the value of fairness in the justice system dominates the desire to keep down the costs of litigation,

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[6] See Rogerson (1982), Leininger (1993), and Kohli (1992, 1994).

[7] We shall assume away the most obvious solution to the problem, banning such activities entirely, as infeasible.

[8] The process of litigation, which often involves redistributive issues, can also have such features.

although that remains important when fairness is not compromised. This approach basically brushes aside any considerations of efficiency as of second order importance. In the context of interest group politics, equality of process may not always be so obviously desirable, or achievable. However, considerations of equity in the *outcomes* may still be relevant, and we can think of incorporating them in an explicit welfare function.

Whether this makes normative sense depends on the type of influence activity being considered. When some influence activity is undesirable, such as bribery, corruption or nepotism, the normative goal is presumably to minimize the resources devoted to such an activity, irrespective of whether they are waste or transfers. In such cases, the comparison with the judicial process is inappropriate. On the other hand, there may be influence activities which are not in this category: lobbying by unions or trade associations, or other interest groups. Such groups may use up resources, or they may make transfers to political decision makers that we accept (e.g. hiring them as consultants after their political careers are over, or gifts), though admittedly this class of acceptable transfers to political or regulatory decision makers may be quite small. In such cases, where the influence process is not explicitly illegal or unethical, then the following analysis is relevant.

Hence, let us consider the case where all influence activity is of the DUP form, so that only the welfare of the interest groups matters. Let W_i^N denote the Nash equilibrium welfare of group i. Then some calculations[9] yield $W_1^N = \alpha^2 R/(1 + \alpha)^2$, $W_2^N = R/(1 + \alpha)^2$. In general, we can think of interest group welfare as being aggregated by some concave function $G(W_1, W_2)$. We noted above that if $G = W_1 + W_2$, then G is lowest when there is complete equality in the process of interest group competition. Now we consider other possibilities.

First, consider the case where G incorporates some unequal weighting of the welfare of the interest groups, so that $G = \gamma W_1 + W_2$. Then it can be shown[10] that G has a global minimum at $\alpha = 1/\gamma$. The case where there is equality of process is no longer the worst in terms of welfare, but increasing inequality sufficiently still increases welfare.

Now consider the case where G is symmetric, but concave. More specifically, suppose that G has the form $[W_1^\rho + W_2^\rho]^{1/\rho}$. This is, of course, the standard CES functional form, including the linear (utilitarian) case as one extreme possibility ($\rho = 1$). The other extreme is where $\rho \to -\infty$, which gives the Rawlsian case of extreme concern for equity. Kohli and Singh (1994) show that in this Rawlsian case, welfare is highest when the interest groups are equally effective in the process of competing for the rent, R. Thus, there is a clear conflict in this model between concern for equity in the outcomes and efficiency of the process in terms of the costs associated with the process of interest group competition for rents.

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[9] See Kohli and Singh (1994)

[10] See Kohli and Singh (1994).

In fact, the problem identified in Kohli and Singh (1994) is even more acute, in the sense that this conflict between equity and efficiency arises even when there is much milder concern for equity in the outcomes of the interest group competition. If we substitute the expressions for the Nash equilibrium into the CES form, we obtain, after some simplification, $G = R\,[1 + \alpha^{2\rho}]^{1/\rho}/(1 + \alpha)^2$. It is easy to show that the sign of the first derivative of this expression is the same as the sign of $\alpha^{2\rho - 1} - 1$. It follows that for $\rho < 1/2$, G has a global maximum at $\alpha = 1$, while complete equality in the process yields a global minimum for $1 \geq \rho > 1/2$. It can also be checked that G is independent of α when $\rho = 1/2$. The chief lesson is that even a relatively mild concern for equity of the outcome results in a preference for equality of the process, but with a cost in terms of efficiency.

Inequality of position

One assumption we have maintained so far is that both groups move simultaneously. However, institutional rules or informal connections may be such that one of the interest groups is able to precommit itself, taking account of the reaction of the other group[11]. The outcome is now a Stackelberg equilibrium. We now explore the consequences of this form of inequality.

Suppose that group 1 is the Stackelberg leader. Then it can be shown[12] that, if $\alpha \leq 2$, $x_1^{SL} = \alpha R/4$, and $x_1^{SF} = \alpha R(2 - \alpha)/4$. If $\alpha > 2$, then $x_1^{SL} = R/\alpha$, and $x_1^{SF} = 0$. Now two forms of comparisons can be made: in this case, what is the result of changing the inequality of effectiveness; and given α, what is the effect of this inequality of position in terms of the ability to precommit?

It is easy to see that if the social costs of the interest group competition are equal to their expenditures, these costs are highest when $\alpha = 3/2$. Thus, the worst situation here is when the Stackelberg leader is more effective, rather than when there is complete equality in the process, as was true in the Nash equilibrium case. To put this somewhat differently, if the Stackelberg leader and follower are equally effective in lobbying, then increasing the effectiveness of the leader a little bit will make things worse. On the other hand, it remains true that sufficiently increasing the inequality of the process will always reduce the costs of interest group politics as modeled here.

Once again, we may consider concern for equity of the outcomes. In the extreme case of a Rawlsian aggregation of interest group welfare, the best possible case turns out to be where the two groups are equally effective, just as in the case of Nash equilibrium[13]. The

[11] See, in particular, Dixit (1987).

[12] See Kohli (1992, 1994) and Leininger (1993). Further results for the Stackelberg case are also based on the analysis in these papers, and in Kohli and Singh (1994).

[13] It turns out that in this specific model, the Nash and Stackelberg equilibria coincide when the groups are equally effective (Kohli, 1992, 1994), but this is just an artifact of the assumptions.

difference here is that this is not the least efficient situation, in terms of rent-seeking costs. However, the case of equality certainly does not minimize the costs of rent-seeking. Thus, we still have the basic conflict between the equity and efficiency identified earlier. The general CES form is less tractable in the Stackelberg case, and we have not been able to analyze intermediate cases of concern for equity, but we would conjecture that a similar result would obtain as before.

We next compare the case of positional inequality (Stackelberg) with the case where interest groups are symmetric in this respect. The most striking feature of this comparison is the result that if $\alpha < 1$, i.e., the Stackelberg leader is less effective, then both interest groups are better off in the Stackelberg case than in the Nash case. Thus the issue of the appropriate aggregation of interest group welfare does not arise. Kohli (1992, 1994) has termed this the "underdog theorem"[14]. It provides one rationale for actually favoring the underdog by allowing it to move first, or otherwise precommit in interest group competition.

When $\alpha > 1$, the comparison of the two kinds of equilibria does depend on the form of the welfare aggregator G. In the utilitarian or linear case, with all interest group expenditures being DUP, the Stackelberg equilibrium is better if $\alpha < 1 + \sqrt{2}$, and the comparison is reversed when this inequality is reversed. If the interest group welfare levels are weighted unequally, so that $G = \gamma W_1 + W_2$, a similar bound can be obtained, which depends on the weight γ. With a Rawlsian aggregation of group welfare, the Nash equilibrium is preferable for all $\alpha > 1$. Again, one would expect this result to generalize somewhat: the greater the concern for equity of outcomes, the less desirable is it to allow a group with advantages in lobbying or rent-seeking to have further advantages in positioning.

We can summarize the main results of this section. Concern for equity of outcomes conflicts to some degree with efficiency, as measured by lowering the costs of interest group politics. Thus inefficiency in this respect may be part of the price we pay for equity in outcomes. Secondly, it may be beneficial to give underdogs in the dimension of effectiveness some compensating positional advantage in the process of interest group politics. However, these insights are obtained from a highly stylized and partial model. We now consider generalizations.

3. Many Interest Groups

The easiest generalization conceptually is to more than two interest groups. Typically, analyses here assume symmetry. However, our central focus is on asymmetries in the process of competition by interest groups. Tractability remains a concern, so we will maintain for now the special form of the success functions used in the last section. We will also restrict attention to the Nash case. With these *caveats*, we will indicate how the analysis of the previous section may be extended.

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[14] A similar result is also obtained by Leininger (1993).

The simplest case is where only one of the interest groups is different in terms of effectiveness. This case has been analyzed extensively be Rogerson (1982). Suppose that the distinctive group is indexed by "0", and that there are "n" other groups. Then the success functions are

group 0: $$\frac{\alpha x_0}{\alpha x_0 + \Sigma_{i=1}^{n} x_i}$$

group i: $$\frac{x_i}{\alpha x_0 + \Sigma_{i=1}^{n} x_i}$$, i= 1, ..., n

In this case, the total costs of the interest group process are given by

$$\frac{(1+2\alpha n-n)n}{(1+\alpha n)^2}.$$

This expression holds for $\alpha > (n - 1)/n$. If this inequality is violated, the distinctive group drops out, and we are back to the symmetric case. It can be shown that this expression is highest when all the groups are equally effective. It approaches zero as $\alpha \to \infty$. Thus efficiency in the narrow sense considered here suggests again that there should be as much inequality as possible.

To examine concern for equity, we have to derive the welfare expressions. These are given by

$W_i^N = R/(1 + \alpha n)^2$, i = 1,...n,

$W_0^N = [1 + (\alpha - 1)n]^2 R/(1 + \alpha n)^2$.

Now, with a Rawlsian aggregator, we can show that $G = \min_{i = 0,\ldots,n}\{W_i\}$ is highest when α = 1. Thus, the conflict between equity and efficiency identified in the case of two groups carries over to the case where there are many groups, but one of them is distinctive in terms of its effectiveness.

To some extent, the many-group case considered so far is not a significant generalization, since only one group remains distinctive. We now discuss the case where all groups have potentially different effectiveness in lobbying or rent-seeking. To our knowledge, this case has not been analyzed previously, so the techniques of solution presented are of independent interest, beyond our focus on inequality in interest group politics.

Therefore, let α_i be the effectiveness of group i, so that the success function for group i now becomes $\alpha_i x_i / \sum \alpha_j x_j$. The objective function for group i is

$$\frac{\alpha_i x_i R}{\Sigma \alpha_j x_j} - x_i$$

It reduces notation considerably to define $v_i \equiv \alpha_i x_i$. With this change in notation, the objective function of group i becomes[15]

$$\frac{v_i R}{\Sigma v_j} - \frac{v_i}{\alpha_i}$$

Finally, let $\overline{v_i} \equiv \Sigma_{j \neq i} v_j$. The Nash equilibrium is then described by the first order conditions

$$R\alpha_i \overline{v_i} = (\Sigma v_j)^2, \; i = 0,1,...,n.$$

These are n + 1 nonlinear equations, but they may be solved as follows. Since the right hand side of each of the first order conditions is the same, we can obtain n linear equations of the form

$$\alpha_i \overline{v_i} = \alpha_0 \overline{v_0} \;, \; i = 1,...,n.$$

These may be rewritten in matrix form as

$$A_0 v_{-0} = \alpha_{-0} v_0 ,$$

where A_0 is an nxn matrix with elements depending on the α_i 's, and the subscript '-0' denotes the nx1 vector, without the first group included. From these linear equations, after some algebra, we obtain

$$\overline{v_0} = e A_0^{-1} \alpha_{-0} v_0 ,$$

where **e** denotes a 1xn vector of ones. Adding v_0 to both sides, and substituting in the first order condition for group zero, we finally obtain

$$v_0 = \frac{\alpha_0 R e A_0^{-1} \alpha_{-0}}{(1 + e A_0^{-1} \alpha_{-0})^2}$$

A similar expression can be obtained for each interest group, and the original variables are easily recovered from the definition $v_i \equiv \alpha_i x_i$.

We can now use this solution to discuss the effects of increasing inequality in the process of interest group competition. It is simplest to do this for the case of three interest groups, which allows explicit expressions to be conveniently computed. In this case, we can show that the total expenditure by the three groups is

$$\Sigma x_i = \frac{2R[2\alpha_0\alpha_1\alpha_2(\alpha_0+\alpha_1+\alpha_2) - \Sigma\Sigma_{i\neq j}\alpha_i^2\alpha_j^2]}{(\Sigma\Sigma_{i\neq j}\alpha_i\alpha_j)^2}$$

What we are concerned with is changes in the distribution of the α_i 's that represent greater inequality. It is convenient to normalize so that the sum of the α_i 's is one. Also, suppose that $\alpha_0 \leq \alpha_1 \leq \alpha_2$. Then an example of increasing inequality would be a reduction in α_0, an

[15] Note that this can be interpreted as an alternative type of inequality, in the costs of influence. In this formalization, the two cases are mathematically equivalent, as the change of variables demonstrates.

increase in α_1 , and no change in α_2. Simple differentiation of the above expression shows that this reduces the total expenditure on lobbying or rent-seeking activities[16].

If we consider the equilibrium welfare of each interest group, again for the case of three groups, we obtain (using the normalization $\sum \alpha_i = 1$)

$$W_i = \frac{R(\alpha_i\alpha_j + \alpha_i\alpha_k - \alpha_j\alpha_k)^2}{(\Sigma\Sigma_{i \neq j}\alpha_i\alpha_j)^2}$$

Hence, with the same ordering as before, a Rawlsian aggregation of interest group welfare implies that $G = W_0$. Furthermore, an increase in inequality of the form described above will reduce G. The conclusion of this exercise is therefore that the tradeoff between equity and efficiency which was identified in the previous section carries over in essence to the case of many interest groups, each with different effectiveness.

4. Political Decision Makers and Voters

So far, we have examined the game of interest group competition for rents in isolation. We have assumed that changes in the parameters of this game have no impact on the rest of the economy, particularly the amount of the rent available. We now introduce explicitly the other two sets of actors: political decision makers and voters. The full set of interactions can be quite complex[17], so we shall again try to capture essential features as simply as possible. We shall maintain the assumptions on the rent-seeking game used in the last two sections, still postponing a discussion of alternatives.

There are many plausible assumptions regarding the objectives of political decision makers, but they all involve some combination of benevolence and self-interest. The latter is straightforward, though it can include intangible factors such as "ego rents" from being in office[18]. The assumption of some degree of benevolence seems harder to justify, to the extent that it makes political decision makers different from other actors in the nature of their motivations. Often, what appears to be benevolence is driven indirectly by self-interest: in this case the desire to be re-elected and continue to receive the rents of being in office. This clearly underlies models where the objective is to maximize political support[19]. It also lies more indirectly behind models where the political decision maker's objective is a weighted average of payments from interest groups and constituent welfare, as in Grossman and

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[16] A similar conclusion can be obtained if the inequalities are in costs, so that total expenditures are $\sum v_i$.

[17] See Potters, Sloof and van Winden (1994) for an overview and schematic representation.

[18] See Coate and Morris (1995) and the references therein.

[19] See Wittman (1989a), and the references therein.

Helpman (1995)[20]. In our analysis, we will explicitly assume that the political decision maker wishes to maximize expected income, taking account of the possibility of being rejected by voters[21].

It is convenient to begin, however, with the description of the role of voters. Here we shall adopt somewhat of a reduced form approach again, in that we do not model explicitly the process of campaigning, elections, and voting. The political decision maker controls the creation of the rents for which interest groups compete, but individual voters (as opposed to members of interest groups - clearly these categories must overlap in membership) are hurt by this rent creation, since it, at least partly, represents a transfer from voters to interest groups and to the political decision maker. Thus their support for the political decision maker is negatively related to the amount of the rent. This voter support matters in affecting how likely the regulator is to continue in his or her job. These effects are captured in a probability function, $\beta(R)$, where β is the probability that the political decision maker continues in office and $\beta' < 0$. Note also that we assume for simplicity that individual voters, because of organization costs, free rider problems and information problems, are not able to directly lobby to affect the rent creating policy. To the extent that they do so, they form another interest group, and are also part of the strategic rent-seeking game. Of course, the assumptions on voters constitute another kind of inequality built into our model.

We now describe the political decision maker's objective and choice process. We assume that he is risk neutral. Let y be his base reward from being in office, including salary and the money value of any non-pecuniary benefits such as ego rents. Let V be the salary in the best alternative occupation. Without any rewards from rent-seeking, the decision maker would require $y \geq V$ to choose to hold office. However, we assume that he also obtains some transfers from interest groups, which influence the decision of how to award or divide the rent among the competing groups. Suppose that the proportion of such expenditures which are transfers is the same for each group, say λ. If $L(\alpha, R)$ is the total expenditure, where α is the vector of effectiveness parameters, the political office holder receives $\lambda L(\alpha, R)$. Furthermore, in the rent seeking games considered in sections 2 and 3, the assumptions ensured that the total expenditures on such activities were proportional to the total rent, R. Hence, the rent setting politician's reward from rent-seeking activities by interest groups is $\lambda l(\alpha)R$. Finally, his expected utility is

$$E(u) = \beta(R)[y + \lambda l(\alpha)R] + [1 - \beta(R)]V$$
$$= \beta(R)[y - V + \lambda l(\alpha)R] + V.$$

The last expression in brackets must be nonnegative for him to choose to hold office. The political decision maker therefore maximizes E(u) by choosing R, taking account of the behavioral responses of firms and consumers to the potential level of rents. The increased

[20] In fact, Grossman and Helpman (1996) derive such an objective function explicitly from a model of electoral competition.

[21] The formalization we use is based on Appelbaum and Katz (1987).

possibility of being voted out of office as a result of increasing the amount of rents acts as a check on rent creation by the decision maker.

The first and second order conditions, assuming an interior solution are:

$$\partial E(u)/\partial R = \beta'(R)[y - V + \lambda l(\alpha)R] + \lambda l(\alpha)\beta(R) = 0$$

$$\partial^2 E(u)/\partial R^2 = \beta''(R)[y - V + \lambda l(\alpha)R] + 2\lambda l(\alpha)\beta'(R) < 0.$$

It is possible that there is no interior solution. A necessary condition for this would be

$$\beta'(0)[y - V] + \lambda l(\alpha)\beta(0) \leq 0.$$

In such a case, since the second term is positive, it must be that y is strictly greater than V. Also, the responsiveness of voters, measured by $\beta'(0)$, would have to be high. If the second derivative were everywhere nonpositive, the last inequality would also be sufficient for no rent creation. For the remainder of the analysis, we focus on the case where there is an interior solution, so there is positive rent creation.

The first order condition can be rewritten in a useful way by defining the elasticity of voter responsiveness to be

$$\delta(R) = -\beta'(R)R/\beta(R)$$

Then we have

$$\beta'(R)[y - V] + \lambda l(\alpha)\beta(R)[1 - \delta(R)] = 0$$

Hence, if $y > V$, i.e., the office holder's salary is greater than the alternative earnings, it must be the case that $\delta(R) < 1$ at the decision maker's optimum. Similarly, if $y < V$, $\delta(R) > 1$. Note, for example, that if $y > V$ but $\delta(R) > 1$ everywhere, this implies that there cannot be an interior solution[22].

We can now explore the impact of changes in inequality of the process of interest group competition on the level of rent creation. The first order condition shows that this effect works through the costs of interest group competition. Furthermore, the sign of this impact will depend on the relative sizes of y and V. In fact, an increase in the costs of rent-seeking increases the level of the rent if and only if $y > V$ ($\delta(R) < 1$ at the optimum)[23]. Since we saw in sections 2 and 3 that increased expenditures on interest group competition were generally associated with reductions in inequality, we obtain the following result. If political decision makers are strictly better off in office, even without collecting transfers from special interests, reducing inequality in the rent-seeking process increases both the expenditures on rent-seeking and the level of rents created. The logic of this conclusion is as follows. When $y > V$, the decision maker chooses a level of rent at which voters are less responsive to increases in the level of the rent. This allows him to respond to greater opportunities for transfers from interest groups by increasing the level of the rent.

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[22] Since the political decision maker is self-interested, and only cares about voter support to the extent that it affects his chances to enjoy the benefits of office, this model provides a simple case where there can be a bias towards interest groups at the expense of voters in general. See Wittman (1989a,b) and Lohmann (1994) for further discussion of this issue.

[23] This result is formally derived in Kohli and Singh (1996).

What are the broader implications of this result? The explicit introduction of voters, and of changes in the size of transfers from voters to interest groups means that we cannot evaluate the impact of changes in the inequality of the process of rent-seeking purely in terms of the welfare of interest groups. For example, if increasing the inequality of interest group competition increases the inequality of the outcome, but reduces the transfer from voters to organized interest groups, as well as the costs of interest group activity, a concern for overall equity may still favor increased inequality in interest group competition. Only direct concern for equality of process would change this conclusion. Thus, to some extent, explicitly incorporating the concerns of voters, and the objectives of political decision makers softens the conflict between equity and efficiency that was highlighted in sections 2 and 3. While, without specifying explicitly the welfare of voters, we cannot make explicit welfare comparisons as we did in the previous sections, one can argue that the model does give us a sense of the tradeoffs involved. How these tradeoffs are viewed will depend on the particular rent-seeking game and the nature of the interest groups: matters are very different if two industrialists are competing for a quota rent, than if the policy issue is the level of a minimum wage rate, and the interest groups represent capital and labor.

We also comment briefly on the case where $y < V$. Note that, for a fixed level of V reducing y increases the level of the rent set by the political decision maker: this is what we would expect. When the office holder's salary is lower than his alternative income, the level of rent must be at a point where $\delta(R) > 1$, i.e., voters are relatively responsive to the level of the rent. Now reducing inequality in the process of rent-seeking increases the costs of interest group competition per dollar of rent, but reduces the equilibrium level of the rent. Thus the overall effect is ambiguous. This also represents a softening of the equity-efficiency conflict.

It should be noted that we have been able to make the above statements irrespective of the magnitude of λ and of the nature of the function $l(\alpha)$. Thus our discussion above applies to a range of cases within the class of rent-seeking games considered in the previous sections. If we specialize further, one can obtain more specific results on the impact of changes in the rent-seeking game on the overall costs of rent-seeking. For example, if β is a constant elasticity function over the relevant range, the social cost of rent-seeking is independent of the nature of the rent-seeking game: changes in the inequality of the process, either in effectiveness or positioning, will not matter in this case[24].

Endogenous number of interest groups

Up to now, we have treated the number of interest groups as given, without explaining how it is determined. Since the issue of who gets to form active interest groups is an important one for questions of inequality, we discuss the determination of the number of interest groups. We will not, however, explicitly model the composition of interest groups,

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[24] The proof is in Kohli and Singh (1996). It involves a simple manipulation of the first order condition. We use the qualifier "over the relevant range" because, since β lies between zero and one, it cannot have the same elasticity for all nonnegative R

since this would take us somewhat far from our main thrust[25]. First, consider the situation where are no fixed costs of interest group formation. Then, if all groups are identical in effectiveness in the kind of rent-seeking game considered so far, the only bound on the number of such groups will be a function of the size of the population[26]. However, equal effectiveness is clearly not realistic in such a case. The interest group composed of me alone will be less effective than one with a million members.

To see the consequences of inequalities in the process of rent-seeking, consider the specific games of sections 2 and 3. With two interest groups and Stackelberg competition, if the leader is sufficiently more effective in lobbying, the follower will choose zero expenditure, and receive no rents. Essentially, there is just one active interest group. Thus, positional privilege in the process of interest group competition reduces the number of competitors. This effect can also arise with Nash competition. To see this, recall that with n+1 firms, and one firm distinctive in terms of its effectiveness, that firm will drop out if $\alpha \leq (n - 1)/n$. Thus, inequalities in effectiveness also limit the number of interest groups. These factors explain why many individuals or small groups are not active in rent-seeking or lobbying, as is assumed in the model of this section, where there are passive voters limiting rent creation at their expense, but not actively seeking a share of those rents.

There is a further serious limitation on the formation of interest groups, and that is the existence of fixed costs. These can be costs of organization or entry into the process or fixed costs of operation, including costs of access. Continuing with the example of n identical groups plus one which is distinctive in effectiveness, recall that the equilibrium welfare of the distinctive group is $W_0^N = [1 +(\alpha - 1)n]^2R/(1 + \alpha n)^2$. Without fixed costs, this becomes zero when $\alpha=(n-1)/n$, but with fixed costs of forming the group, or of lobbying, the group will drop out even before this bound is reached. The existence of fixed costs, or inequalities in fixed costs that parallel the inequalities in effectiveness may heighten the effect of those inequalities. Of course if the other groups have higher fixed costs, they might drop out sooner: such inequalities in fixed costs may outweigh inequalities in effectiveness. Thus groups with less clout may be active, while groups with more potential clout do not participate because of their higher fixed costs.

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[25] This issue has been variously addressed through the theory of clubs, as well as with cooperative game models, in numerous contributions. We can make some simple observations in the context of the current model. Consider the case of N potential rent-seeking groups with identical effectiveness. If two such groups combine, and lobby as one, and if their relative effectiveness is doubled, it is easy to show that each component will be better off after an equal split of the group's share. In fact, if there are no costs of combination, and if relative effectiveness depends on relative size, the equilibrium would be a grand coalition. This outcome would be suitably modified if there are costs of organization, and if there are diminishing returns in effectiveness as size increases.

[26] For example, with N people, there could be $2^N - 1$ groups formed.

To focus solely on the role of fixed costs, consider the case of N potential interest groups, which are identical in effectiveness, but heterogeneous in their fixed costs, f_i [27]. Suppose they are ranked by these fixed costs, so that $f_i \leq f_{i+1}$. Here, if n groups actively compete, then in the Nash equilibrium group i receives $R/n^2 - f_i$. Since the marginal group, n, makes zero profits (ignoring integer problems), the equilibrium number of groups is given by the condition $n^2 f_n = R$. Groups with higher fixed costs than group n will not be active in interest group competition.

Now we may consider changes in the distribution of the fixed costs over all the N potential interest groups. Since only the fixed costs of the marginal group matter, the general impact of increasing inequality in this distribution (say keeping $\sum f_i$ constant) is ambiguous. What matters is whether this increase in inequality reduces or increases the fixed costs of the marginal group. If, as might be plausible, n is considerably smaller than N, so that f_n is in the tail of the distribution of fixed costs, an increase in overall inequality might reduce f_n , and increase the equilibrium number of active interest groups. This increases the costs of interest group activity, though it makes the process marginally more competitive. If concern for equity includes inactive interest groups (as it should), so that $G(W_1, \ldots W_N)$ is a symmetric concave function, there will be little or no positive impact on welfare of spreading rents slightly more evenly among a small minority[28].

In this discussion, we have assumed that the fixed costs of participation in the interest group process are exogenously given. Another, complementary possibility is that they are determined by the political decision maker. For example, these may be fees and taxes collected by a regulatory administrator, in which case they are legal and flow into the government budget to benefit voters. Alternatively, they may be upfront but under-the-table payments that are transfers to the political decision maker. We consider the latter possibility first.

If the interest groups' fixed costs are simply transfers to the political decision maker, and are predetermined by him along with the level of the rent, he will choose their level to extract all the rent-seekers' surplus. Consider first the simplest case where all interest groups are identical, and all their expenditures are transfers to the political decision maker, i.e., $\lambda = 1$. Then the office holder is indifferent as to the choice of the upfront payment, f, since he always receives R. However, the equilibrium number of active groups will be given by $n = (R/f)^{1/2}$, which is simply a rearrangement of the zero-surplus condition for rent-seekers.

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[27] One important reason for this heterogeneity is the existence of economies of scope. For example, firms and professional associations, formed primarily for other reasons, are able to spread their fixed costs of organization over other activities besides lobbying. See Olson (1965) on this point.

[28] Note that the welfare function $G(W_1, \ldots W_N)$ allows us to incorporate the costs of rent-setting in a simple way. For example, all individuals may bear a cost R/N, while the n active rent-seekers each also gets a share of R, minus rent-seeking costs.

Since all expenditures by interest groups are transfers, there are no efficiency consequences as n changes, but an increase in f reduces the number of active groups. While fewer groups have a shot at (a share of) the rent this does not reduce equity, since they have no surplus in equilibrium. Now suppose that $\lambda < 1$, but there is no waste in upfront transfers[29]. Then the rent-setter will prefer to set f as high as possible (up to R), and by implication make n as low as possible, to efficiently extract interest group surplus. It may be noted that this mechanism is now somewhat like an all-pay auction, but conducted unofficially for the benefit of the politician. Finally, note that if groups are heterogeneous, so that inframarginal groups do obtain some net rewards, the tendency to reduce their number through higher upfront payments will again create a tradeoff, albeit for a limited subset of society, between equity and efficiency.

Alternatively, we can assume that the entry fees are collected legally and distributed to voters. This may be justified on the grounds that the fee can be easily collected without waste and, being publicly visible is less likely to be captured by political decision makers. Increasing such transfers to voters therefore increases the probability of retaining office, so that the function β now has the form $\beta(R, F)$, where F are the total fees collected and transferred, and $\beta_2 > 0$. The decision maker now has two instruments with opposing effects on voter support. He can still choose the fees to extract all the surplus of interest groups, and this drives the following result. In the case where there are n identical groups and one distinctive group, all moving simultaneously, the total rent set is unaffected by changes in the effectiveness parameter α. However, the total expenditure on lobbying decreases as α increases, this effect working through a decrease in the equilibrium number of active groups[30].

Repeated interactions

The analysis so far has been conducted in terms of a one-period situation. However, it is readily extended to repeated interactions. A key simplifying assumption we can make is that if a political decision maker is removed or exits (which happens with probability $1- \beta$), he is replaced by another, identical regulator. Furthermore, for simplicity, we assume that once a particular regulator exits, he has no re-entry option. Finally, we assume the regulator is infinite-lived, and that the rent-seeking game is repeated infinitely. These assumptions allow us to focus on stationary outcomes. In particular, Rogerson's (1982) analysis of a repeated rent-seeking game (for the case where the rent is exogenously given) carries over unchanged if the number of rent-seekers is given, and we need only focus on the regulator's decisions.

To illustrate how multiple periods change the analysis, consider the case of a fixed number of interest groups. This may seem incompatible with an infinitely repeated situation, but an interpretation of the number of groups as being determined by exogenous fixed costs is reasonable in this case. The goal is to focus on the regulator's choice of the rent as a single

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[29] Of course this assumption may be relaxed. What will matter then is the relative waste in the two methods of collecting transfers from interest groups.

[30] This result is proved in Kohli and Singh (1996), Proposition 5.

decision variable. It can be shown that the first order condition for the political decision maker is now given by

$$\beta'(R)[y - V] + \lambda l(\alpha)\, \beta(R)[1 - \delta(R) - \beta(R)d] = 0 ,$$

where d is the discount factor of the office holder.

Comparing this with the first order condition in the one period case, we see that the impacts of changes in inequality of effectiveness (changes in the parameter vector α), will be similar to that case, the difference here being that the sign of y - V must be opposite to the sign of $[1- \delta(R) - \beta(R)d]$ in equilibrium. A similar, modified analysis can be conducted in the case where the regulator also has the entry fee as a policy instrument, and where the number of groups is determined by the zero profit condition.

5. Alternative Specifications of Interest Group Competition

The stylized model of interest group competition used in the previous section provides sufficient tractability to illustrate clearly the basic tradeoffs between equality of process and efficiency that may exist in this arena. In this section, we discuss several possible generalizations and alternatives, and their possible implications for our results. First, we examine the rationale for the form of the "contest success function" we have used. Second, we discuss issues of timing and commitment with regard to the rent seekers and the rent setter. Third, we discuss more broadly the scope and nature of interest group expenditures, and the role of voters, campaigns and elections.

The contest success function we have employed is given by $\alpha_i x_i / \sum \alpha_j x_j$, where the x_i's are the expenditures, efforts, or costs of interest groups. By redefining variables, $v_i \equiv \alpha_i x_i$, this reduces to $v_i / \sum v_j$, which is a special case of the general symmetric additive form axiomatized by Skaperdas (1996), $h(v_i) / \sum h(v_j)$. More general forms than the one we have used can also be axiomatized, e.g., where $h(v_i) = v_i^m$, for m > 0. In such cases, however, explicit solution, and examination of the consequences of changes in inequality becomes somewhat more difficult, since we are no longer able to derive a set of linear equations to solve, from the first order conditions. However, we would conjecture that the conflict between efficiency and equity we have identified would remain in such generalizations, since unequal effectiveness will still tend to make disadvantaged interest groups curtail their efforts, or drop out altogether. Thus we do not see our use of a specific functional form as a serious limitation.

Even the generalizations of the functional form used suffer from the same problem, which is the lack of a behavioral foundation. One alternative would be to think of the rent as being awarded to the highest bidder, in an informal auction. The bids might include socially costly DUP type activities, or they might simply be transfers to the political decision maker. In the latter case, there are no efficiency consequences of rent seeking *per se*. However, greater efficiency in such transfers may lead to the political decision maker setting rents at a higher level[31]. If rent creation has efficiency costs, the net result for efficiency is ambiguous. Here inequality in the process also can matter. For example, the highest bid can be chosen not just in money terms, but based on weighted or adjusted values, taking account of class or kinship ties. Note that with complete information, bidding for an indivisible rent such as a monopoly franchise will lead to only the best-placed interest group being active: the others will realize they will be outbid[32]. If the rent is divisible, the nature of the bids and the sharing will depend on how the rent is obtained, e.g. through quota licenses, and the form of the demand curves of the interest groups.

Bidding processes involve a fundamental difference in the modeling of the rent-seeking game. Rather than an exogenous process entirely determining the allocation of the rent, interest groups offer payments or contributions taking account of how the political decision maker will respond. Such situations are formally analyzed by Bernheim and Whinston (1986), and termed "menu auctions". Abstractly, the political decision maker is the common agent of the various interest groups as principals. While the decision maker sets the rules of the "auction" interest groups move next in choosing their contribution schedules through individual optimizations, and these schedules are functions of the allocation of the politician[33]. In these models, expenditures by interest groups are pure transfers to the political decision maker. However, it is easy to incorporate some waste, as we see below.

To make concrete the difference in this alternative approach, consider the simplest problem of dividing a given rent R between two interest groups. Let s_1 be the share that goes to group 1. In this simple case, this is the only choice to be made by the office holder. Interest group i chooses its expenditure x_i as before, but now conditions it on the share s_1 . Thus each interest group chooses a contribution schedule $x_i(s_1)$. Suppose that the political decision maker receives a common fraction λ of these contributions. Then he chooses s_1 to maximize $\lambda[x_1(s_1) + x_2(s_1)]$. This implies that, in equilibrium, $x_1'(s_1) + x_2'(s_1) = 0$. Now the welfare of group 1 is given by $s_1R - x_1(s_1)$. Solving for the choices of the interest groups is now complicated, since the choice of a function is involved. However, we can observe that this is exactly a share auction as analyzed by Bernheim and Whinston (pp. 18-21). Since the value of λ does not matter, we can apply their results to conclude that the political decision maker receives λR, while neither interest group receives any surplus. In contrast to the case of exogenous success functions used in previous sections, the political decision maker is able to extract more from interest groups. If he can choose the level of the rent, he therefore has

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[31] See, for example, Appelbaum and Katz (1987). A related point is made by Wilson (1990).

[32] See Hillman (1989) for a survey of such models. Smoothness in the decision functions can be re-established by introducing incomplete information in the rent-seeking game. A general analysis of such contests is provided in Singh and Wittman (1995).

[33] Grossman and Helpman (1995) independently developed this kind of model, and they apply it to interest groups trying to influence trade policies.

an incentive to set it higher, than in the "success function" case, based on the analysis of section 4.

What is the consequence of inequalities in the effectiveness of the interest groups? Earlier, the political decision maker directly cared about transfers, but was influenced differentially by expenditures from different groups. Here, the differential influence must be incorporated directly in the politician's objective function, which now becomes $\lambda[\alpha_1 x_1(s_1)+\alpha_2 x_2(s_1)]$. Bernheim and Whinston's results imply that the equilibrium must involve maximizing $\alpha_1 s_1 R + \alpha_2(1-s_1)R$ or $(\alpha_1 - \alpha_2)s_1 R + \alpha_2 R$. But the solution to this involves awarding the entire rent to the favored group, if the weights are unequal. Thus, even a slight inequality in the process will lead to great inequality in the outcome. At the same time, the political decision maker does not extract all the surplus of the winning interest group, which is left with (supposing $\alpha_1 > \alpha_2$) the amount $(\alpha_1 - \alpha_2)R/\alpha_1$. Since less is transferred to the decision maker, than in the case of equal effectiveness, less is wasted. Thus, this very different model of interest group competition yields the same kind of conflict between equity and efficiency as in the model of sections 2-4. In this model also, considering equity in the larger context may soften the tradeoff. A lower "take" by the political decision maker may lead him to reduce the level of the rent. Thus redistribution from voters to organized interest groups can be reduced at the same time that inequality among active interest groups increases.

Finally, we note that we have restricted attention to activities by interest groups aimed at influencing political decision makers. However, both interest groups and political decision makers can and do try to influence voters. Modeling these kinds of activities requires a fuller specification of the process of campaigns and elections. Magee, Brock and Young (1989), in a synthesis of a sequence of their earlier articles, provide such a specification, where interest groups indirectly obtain rents by getting elected those candidates whose policies favor them. It is, in some respects, akin to the model of sections 2-4, in that political candidates set their policies in advance, rather than the menu auction approach, which allows the expenditures or contributions of interest groups to be set anticipating the policy responses of political decision makers. The approach of Magee *et al.* is subject to the same criticism of not having a behavioral foundation[34], in terms of the probability-of-support functions used. The issue of commitment and timing of policies, however, seems to depend on empirical circumstances. For example Austen-Smith (1991) notes that, in the context of elections, "It is illegal for interest groups explicitly to buy specific policies" (p. 76), but there may be ways of circumventing such restrictions, or enforcement may be weak. Whether in the context of election campaigns or the policy choices of incumbents, interest group activity may take illegal or questionable forms. To conclude this point, we note that interest group competition in the electoral process very much parallels the competition to influence incumbents, and

[34] See, in particular, the detailed evaluation of their work by Austen-Smith (1991). Grossman and Helpman (1996) overcome these kinds of objections in a model of electoral campaigns, again with a menu auction approach.

many of the same issues regarding equity and efficiency will arise in both contexts. It may be useful to provide an integrated analysis, but it is beyond our current scope.

A related aspect of influence activity is that by politicians *vis-à-vis* voters. This is not strictly interest group competition, but its existence certainly affects the conduct of such competition. For example, it has been suggested for the case of India that a major reason for transfers from interest groups to politicians is not consumption by the politicians, but the financing of campaigns, including payments to voters. Again, these are illegal, but do occur. A simple way to incorporate it into the model of section 4 is to allow the political decision maker to channel some collections from interest groups into payments to voters. The office holders objective then becomes

$E(u) = \beta(R,T)[y + \lambda l(\alpha)R] + [1 - \beta(R,T)]V - T,$

where T is the transfer to voters, and $\beta_2 > 0$. The first order condition for the choice of R is, as before,

$\beta_1(R,T)[y - V + \lambda l(\alpha)R] + \lambda l(\alpha)\, \beta(R,T) = 0,$

while the first order condition with respect to the transfers is

$\beta_2(R,T)[y - V + \lambda l(\alpha)R] - 1 = 0.$

This two-choice variable model can be analyzed similarly to the case where fixed fees are collected from active interest groups to benefit voters.

6. Conclusion

In this paper we have constructed a model to examine inequality of process and inequality of outcomes in interest group politics. The model has the following features: (i) interest groups which compete for rents in a noncooperative game, (ii) a self-interested rent-setting political decision maker (iii) democratic or popular pressure as a check on the self-interest of the political decision maker. We allow for a fixed and an endogenous number of influence groups, for differences in the effectiveness and precommitment abilities of interest groups, and for repeated play of the influence game. We have shown that in some cases, the costs of influence activities are highest when groups are relatively equal in their effectiveness or capacity for influence. We have also shown that this result can be reversed if social welfare incorporates enough concern for equity. Finally, in some cases, the political decision maker sets rents in such a way as to compensate for changes in inequality in the process of interest group politics. While the model we have used is stylized and special in its assumptions, we suggest that our broad conclusions are robust to alternative specifications. We also believe our approach helps to make more transparent some of the salient issues in a normative evaluation of interest group politics. Of course, such normative concerns involve deeper philosophical problems, and in this respect there remains much to be done in this area.

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