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FOREWORD

In a federal system of governments, superior governments may mandate the production of certain outputs by subordinate governments. There is reason to believe that such mandates may be suboptimal, compared to the determination of output by the subordinate government. Such a suboptimal phenomenon begs an explanation. This research develops an explanation, based on decision-making by utility-maximizing individuals. Its findings has relevance for understanding and predicting the occurrence of intergovernmental mandates and for the design of institutions governing intergovernmental relations.

Governments are modelled as responding to the preferences of constituents, as expressed through interest group pressure. The logic of collective action dictates the characteristics of the production of political pressure by these interest groups. These characteristics, in turn, influence the incentives for interest groups of different sizes to choose whether to seek to advance their agenda by lobbying the subordinate government directly or lobbying the superior government to impose a mandate on the subordinate government. The interdependence of an interest group’s lobbying decision on the other groups’ decisions dictates a game-theoretic formulation of the model. The model provides results relating the interjurisdictional distribution of interest group members and funding methods to the likelihood of the occurrence of a mandate.
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EXPLAINING INTERGOVERNMENTAL MANDATES:
A LOBBYING MODEL

David L. Sjoquist and Loren Williams

I. INTRODUCTION

The hierarchical structure of a federal system of government permits higher levels of
government to enact laws and rules which compel lower levels to produce a specific quality or
quantity of some service, to restrict production to certain techniques or inputs, to employ
particular organizational forms and procedures, to limit expenditures, or to impose only certain
taxes.\(^1\) Such laws or rules are intergovernmental mandates. The objective of this research is
to find a plausible, theoretically satisfactory explanation for the occurrence of these mandates.

The literature on mandate can be divided into three types. The first type paints a broad
picture by developing taxonomies of mandates and compiling inventories of mandates through
surveys.\(^2\) The second category consists of case studies focused on a particular mandate, some
facet of the mandate process, or one of several mechanisms intended to 'control the mandate
problem'.\(^3\) The third type, which is most related to the current paper, uses a theoretical model
to explain the imposition of mandates in terms of the preferences of and prices faced by
constituents of local jurisdictions. Literature in the former two categories does not explicitly
address the questions of why and how mandates arise, which are the questions of interest here.

\(^{1}\)Federal and state constitutions do impose limitations on the mandates that can be imposed.

\(^{2}\)Examples of this literature include ACIR (1978), Lovell et. al. (1979), and Kelly (1990).

\(^{3}\)Examples of this literature include Toma (1986), Kuzmack (1990), Lunceford (1990), D’Aliello
Three explanations have been proposed in the literature, two descriptively and the third in somewhat more careful analytic terms. The first is that higher level governments intervene to correct for inefficient resource allocations made at lower levels due to interjurisdictional externalities. The second is that mandates are a consequence of higher level politicians’ ability to exploit a form of fiscal illusion and reap political benefits from providing valuable services while the officials at the lower levels bear the political costs of financing them. The third is that interest groups subvert local decision-making by appealing to the higher level government for intervention.

While they surely have some applicability, the first two explanations require far too much to be given up for either of them to provide a general explanation. The first requires that mandates be limited to goods, services or financing structures which produce either positive or negative externalities on other lower level jurisdictions. The second demands a limit on either the information available to individuals from whom resources are being extracted, or bounds on their rationality. Since neither the restriction on the type of mandate nor deviations from the neoclassical paradigm are suitable first principles on which to develop a general theory, this research develops the third explanation.

A model in which government decision making, at both the higher and lower levels, responds to political pressure by interest groups is formulated. Based on the logic of collective action, certain features of the production of political pressure by interest groups are specified. This institutional structure is then imposed on two types of rational, utility-maximizing individuals, each with different preferences over the output decision of the government. Decisions by the two types are interdependent, so simple game theoretic concepts are employed
to describe the equilibrium strategies of each type, both in terms of the level of government to lobby and the quantity of resources to devote to lobbying. On the basis of these three elements, it is shown how variations in the sizes of the interest groups, tax structures and financing rules affect the utility received by each individual. These results are used to make comparative static predictions for the effects of such variations on the equilibrium strategy choices.

Our objective is to demonstrate that mandates can be explained by behavior and institutions that we already understand; that mandates do not represent a paradox. Understanding this mechanism is critical for formulating any predictions about the occurrence of mandates. Furthermore, since we have some knowledge about circumstances under which local governments are more or less likely than higher levels of government to provide an efficient level of public goods, the operation of this mechanism has welfare implications as well, although not explored in this paper.

In a series of papers, Hoyt and Toma (1989, 1991, 1993), extend Becker’s (1983) model of interest group competition for political influence in order to address the question of the decision to intervene in the first place. The most general of these, and the one closest to the present paper, is Hoyt and Toma (1989), in which they model state limitations on local tax revenues. The authors assume one state government and a large number of identical local jurisdictions in which the governments deliver one publicly provided private good, produced at constant cost and financed with a flat-rate property tax. The only role that the state government plays is to require that local governments increase or decrease their output. In each jurisdiction, there are two groups of individuals (small size, high per capita property wealth and large size, low per capita property wealth), which have identical benefit functions over the public good.
Since the smaller, wealthier group pays a price higher than its per capita share of the cost, they will prefer an output less than the efficient level and correspondingly the larger, poorer group will prefer an output greater than the efficient level.

Government output is modelled as a function of the relative political pressure of the two groups. The redistribution of benefits inherent in the change of output motivates each group to increase its political pressure on either or both the local and state governments. The model produces results predicting the relative lobbying expenditures by the two groups at the local and state levels which are consistent with supraoptimal output chosen at the local level and state-mandated reductions in that output through tax and expenditure limitations.\(^4\)

Hoyt and Toma (1989) is the first paper that discusses mandates as a choice process and recognizes that the outcome depends on the polity, local or state, in which the choice is being made. However, a number of issues are left unresolved. The specification of the pressure function implies that individual lobbying, rather than group lobbying, is more effective; the model does not allow for local determination of output; and it does not permit consideration of heterogeneous jurisdictions. They leave unexplained why the state-determined output is a function of what in the absence of a mandate would be the locally determined output. While they state that output is a function of relative pressure, it appears (p. 206) that output is a function of the maximum of the pressure from the two groups. They also assume that individuals lobby both local and state governments, while we demonstrate that individuals will not split their lobbying efforts.

\(^4\)There is no conclusion that the resulting output is the efficient level, and even if it were, the welfare gains may be dissipated by the social costs of lobbying.
Hoyt and Toma (1991) provides some improvement in that heterogeneous jurisdictions are allowed and the formation of interest groups is endogenized. Nevertheless, these papers do not develop an internally consistent theory of mandate determination. However they do provide guidance as to the articulation of an interest group model to examine the determinants of intergovernmental mandates.

We expand on the work of Hoyt and Toma in several ways. First, the specification of the production of political pressure by interest groups allows for benefits to collective action, and relies on slightly weaker assumptions. Second, we allow individuals, acting through their interest groups, to choose to compete politically at the local level; the model also permits an outcome in which there is not a mandate. In what follows, we present a fully articulated, behaviorally-based model of mandate determination.

The remainder of the paper is organized as follows: Section II develops the theory, while Section III demonstrates the results concerning the effect of the size of the interest groups on alternative lobbying strategies. Section IV contains a summary of the conclusions and points out directions for future research.

II. A MODEL OF MANDATE DETERMINATION

We assume a simplified world in which there are two goods, two levels of government, local and state, a fixed population with two types of individuals residing in a fixed, finite number of local jurisdictions. The political choice system is modelled as a competition between interest groups, as pioneered in Becker (1983, 1985), and is similar to applications of such a model in Hoyt and Toma (1989, 1991, 1993).
The state is subdivided into \( m \) non-overlapping and non-empty local jurisdictions, each with its own government. Local governments provide a single local public good, \( G \), in their jurisdiction.\(^5\) The state government produces no output but can specify the quantity of \( G \) to be provided in each jurisdiction. Individuals express their preferences for \( G \) by forming coalitions (interest groups) with other individuals to lobby the governments. In response to this pressure, the quantity of \( G \) to be provided is chosen by either the state or local government. Individuals maximize utility over \( G \) and the private good \( x \), subject to exogenous income, prices and tax shares. Individuals may differ in their demand for \( G \), due to differences in utility functions, incomes or tax shares.

This particular representation of the governmental choice mechanism is employed because a majority rule voting mechanism cannot explain mandates without restricting the model to public goods with interjurisdictional spillovers. It is not possible to aggregate a set of disgruntled minorities across jurisdictions to produce the state-wide majority needed to enact a mandate.

A mandate is defined as follows. If \( G \) equals \( G^l \), the quantity determined by a local government, there is no mandate. If \( G \) equals \( G^s \), the quantity determined by the state government, there is a mandate. Since the state government dominates the local government, \( G \) will equal \( G^s \) whenever \( G^l \) differs from \( G^s \).\(^6\) Regardless of the level of government at which the output decision is made, \( G \) is produced by the local government at constant marginal production and administrative cost.

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\(^5\)We assume a purely local public good, that is one without such spillovers. This is a simplification and not a logical necessity; the basic framework could be extended to analyze the spillover case.

\(^6\)Usually mandates are thought of as cases in which the quantity (or quality) of \( G \) dictated by the state is greater than that chosen locally, i.e. \( G^s > G^l \). This is admitted, but not required by the model.
The following notation is adopted. Subscripts refer to an individual or a group of identical individuals. We let $i$ refer to either an individual or a group of individuals; its use is clear from the context. Superscripts refer to geographic groupings; superscripts in lowercase refer to a specific local jurisdiction.

**Government Behavior**

Governments, at either level, are assumed to maximize the sum of the weighted cardinal utilities of the residents in their jurisdictions, where the weights are interpreted as political pressure and are determined endogenously. That government policies are responsive to the pressure exerted by special interests is well-established. The seminal theoretical papers are Stigler (1971) and Peltzman (1976). Empirical support is reported by, *inter alia*, McCormick and Tollison (1981), Mueller and Murrell (1986), Lybeck (1986), Coughlin, Mueller and Murrell (1990), Schattschneider (1935), Magee, Brock and Young (1989), Plotnick (1986), and Kristov and Lindert (1992). In addition, there is a long strand of literature which follows Olson’s (1982) hypothesis that an economy’s macroeconomic performance is deleteriously affected by the influence of special interests.

To model the federal structure, the local government of jurisdiction $f$ is assumed to respond strictly to the preferences of individuals who reside in $f$; whereas the state government responds to the preferences of all individuals who reside in the state. $G$ is financed by taxes solely on the residents of $f$ and absent a mandate each jurisdiction may provide a different

---

7 This framework is similar to that used in other investigations of pressure groups and lobbying. See, for example, Magee, Brock and Young (1989); Coughlin, Mueller and Murrell (1990); and Roe (1992).
quantity. However, in the case of a mandate, jurisdiction $f$ and all of the other jurisdictions in the state, are required to provide $G^s$.

A further consequence of $G$'s being a local public good is that there is a presumption in favor of its being determined locally. Thus, we assume that only if pressure at the state level exceeds some threshold will the state government provide a mandate. The government choice function for jurisdiction $f$ is specified as

$$ G^f = \begin{cases} 
\arg \max \left\{ \sum_{i}^{N^f} P^L_i U_i(G, x_i) \right\}, & \text{if } \sum_{i}^{N^f} P^S_i < \bar{P} ; \\
\arg \max \left\{ \sum_{i}^{N^S} P^S_i U_i(G, x_i) \right\}, & \text{otherwise}; 
\end{cases} $$

(1)

where $P^L_i$ and $P^S_i$ are indices of political pressure produced by individuals of type $i$, at the local and state levels, respectively; $N^f$ and $N^S$ are the number of residents in the $f$th jurisdiction and the state, respectively; $U_i(G, x_i)$ are utility functions for individuals of type $i$; and $\bar{P}$ is the threshold level of pressure required for the state legislature to act. The threshold $\bar{P}$ reflects the institutional arrangements that reserve certain powers to the local governments. At the state level, these arrangements take the form of constitutional restrictions on state mandates, mandate reimbursement requirements or legislative requirements that fiscal notes be attached to legislation affecting local governments. $\bar{P}$ will vary with the particular public good in question, to reflect the degree to which there is perceived to be a state-wide interest in the quantity or quality of $G$. Note that the sum of the pressures must exceed the threshold in order for the state to act, but what action it takes depends upon the relative pressures and the preferences of the individuals. In other words, the state will compromise rather than decline to act if it faces competing political pressures.
Pressure is determined endogenously by a process discussed in detail below; here simply note that the one of the arguments of the pressure function is \( e_i \), individual lobbying expenditures. Individuals of type \( i \) trade off consumption of \( x \) for influence over the decision on the quantity of \( G \) to be provided. The other argument of the pressure function is the number of individuals having the same preferences as \( i \). As argued below, the size of a pressure group is expected to be greater than one; however this formulation does admit pressure groups comprising only one member. An individual (or all individuals of type \( i \) has (have) the option of not exerting any pressure at all, in which case \( P_i = 0 \), and \( i \)'s preferences over \( G \) are ignored by the government. Finally, notice that \( G(.) \) is homogeneous of degree zero in \( P_i^L \) and the \( P_i^S \), as long as increasing or decreasing \( P_i^S \) does not cause \( \sum_i P_i^S \) to cross the \( \bar{P} \) threshold. Since the choice of the amount of pressure to be produced may be separated from the choice of which level of government to lobby (as discussed below in the context of the individual's optimizing problem), the discontinuity at \( \sum_i P_i^S = \bar{P} \) is irrelevant. This implies that, once the level of government to be lobbied is selected, only relative pressure matters.\(^8\)

**Politics**

Lobbying is modelled as the production of pressure on government legislators, either local or state, to pass ordinances or statutes which result in \( G' \) being produced as desired by the

---

\(^8\)Note that if lobbying expenditures are zero, the \( G \) selected according to (1) will be the mean of the most-preferred \( G \) of all of the residents. Since the government honors the preferences of the voter whose tastes are at the mean of the distribution (if there is such a voter), this is referred to as the 'mean' voter model of government output determination. See Mueller (1989), Chapter 10 for discussion of results which provide some evidence that this model performs at least as well as the median voter model in a representative democracy.

\(^9\)This is consistent with the emphasis found in Becker (1983) that the influence of pressure groups is a function of relative rather than absolute pressure.
lobbying party. Political pressure is assumed to be produced as a function of the lobbying expenditures undertaken and the number of individuals lobbying for a given outcome. Expenditures produce pressure by, *inter alia*, purchasing advertising, funding campaigns or making direct contributions to politicians. Membership of the interest group produce pressure by, *inter alia*, voting, canvassing and writing letters.

It is assumed that all of the members of a pressure group are identical in terms of preferences and income, and thus in terms of their optimally-chosen lobbying expenditures. Identical individuals implies that all individuals of a given type participate in their interest group to the same degree.\(^{10}\) Furthermore, this assumption implies that the number of individuals of type \(i\), \(N_i\), are exogenous; they merely count the number of individuals of type \(i\) in the local jurisdictions and the state, respectively.

Within a world of only one public good, this assumption of a heterogeneous set of pressure groups each with identical members is perfectly general, since the number of groups is not restricted. Modelling the behavior of interest groups with heterogeneous membership introduces serious complications in terms of the choice process within the interest groups themselves, which are unwarranted in the present investigation.\(^{11}\) Finally, note that most state mandates are vertical, applying to only one local output; the essence of mandating such goods seems captured by the one-good/two-type model.

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\(^{10}\)For a recent study which introduces heterogeneity and by-standing by affected individuals, see Kristov, Lindert and McCelland (1992).

\(^{11}\)The same assumption about the composition of interest groups is made, with similar arguments, in Denzau and Munger (1986).
Consideration of group behavior suggests several restrictions to be placed on the pressure production function. First, both money expenditures and membership are productive; the greater the resources devoted to producing pressure, the greater the pressure produced. Second, the observation that lobbying is done by groups, rather than by individuals, or at least in addition to individuals, may be explained by their being increasing returns to scale, over some range, in the production of political pressure. Third, since the product of this group effort, a policy, is a public good with benefits for all members of the group, free-riding within the group will occur. As the group size increases, the prevalence of this free-riding behavior will increase and the scale economies will become less important. The free-riding will necessitate the use of an increasing portion of the group’s resources to police such behavior. Thus the production of pressure exhibits decreasing returns after the group reaches some size. If a group has no members, then there will be no lobbying expenditures and no pressure will be produced; however, even if there are no lobbying expenditures, pressure may be produced by a group solely as a function of its membership.

The first two of these conditions are non-controversial. The third is a contention that is implied in Olson (1965), but has been the subject of criticism and a great deal of research. Theoretical analyses have shown that the effect of group size on the individual contributions to a collective effort are a priori indeterminate.\textsuperscript{12} A number of experimental studies provide results consistent with this theorizing.\textsuperscript{13}

\textsuperscript{12}Chamberlin (1974); McGuire (1974); and Austen-Smith (1981).

\textsuperscript{13} Marwell and Ames (1979); Schneider and Pommerene (1991); Issac, Walker and Thomas (1984); Issac, McCue, and Plott (1985); and Issac and Walker (1988).
The production function for political pressure is specified as

$$P_i = P(E_i, N_i)$$

(2)

where $E_i$ and $N_i$ represent the lobbying expenditures and size of the $i$th group, respectively.\textsuperscript{14}

The following conditions on $P(.)$ are imposed, in part to reflect the discussion above.

(i) $P(E, N)$ is defined on the domain of non-negative values of $E$ and $N$.

(ii) $P(E, N)$ is continuous and differentiable over its domain.

(iii) $P(E, N)$ is non-decreasing over its domain:

(iv) $P(E, N)$ exhibits increasing returns to both $E$ and $N$ over some region of its domain. This region is bounded from above by the lesser of the following:

$$E_q(N) = \{ E \mid \frac{\partial^2 P}{\partial E^2} = 0 \}, \forall N,$$  

or

$$N_{q}^{-1}(N),$$

where $N_q(E) = \{ N \mid \frac{\partial^2 P}{\partial N^2} = 0 \}, \forall E$.

The locus of all such $E_q^{\ast}(N)$ and $N_q^{\ast}(E)$ is referred to as the upper bound of strictly increasing returns.

(v) $P(E, N)$ exhibits decreasing returns to both $E$ and $N$ over some region of its domain. This region is unbounded from above and is bounded from below by the greater of the following:

$$E_q(N) = \{ E \mid \frac{\partial^2 P}{\partial E^2} = 0 \}, \forall N,$$

or

$$N_q^{-1}(N),$$

where $N_q(E) = \{ N \mid \frac{\partial^2 P}{\partial N^2} = 0 \}, \forall E$.

\textsuperscript{14}The fact that the number of members of the group must be an integers precludes the use of calculus to characterize the pressure function. As a simplification, in order to permit taking derivatives, it is assumed that $N_i$ varies continuously.
The locus of all such \( E_q(N) \) and \( N_q(E) \) is referred to as the lower bound of strictly decreasing returns.

(vi) The marginal product of expenditures does not decrease as the size of the group increases:

\[
\frac{\partial^2 P}{\partial E \partial N} \geq 0.
\]

(vii) Define \( \varepsilon = \frac{\partial P}{\partial E \frac{E}{P}} \) and \( \eta = \frac{\partial P}{\partial N \frac{N}{P}} \), the partial elasticities of pressure with respect to \( E \) and \( N \). For \( E > E_q(N) \) and \( N > N_q(E) \), the elasticities of pressure are decreasing in \( E \) and \( N \), respectively.

Conditions (i) and (ii) are formalizations permitting mathematical treatment of the production of pressure. Conditions (iii)-(v) follow from the considerations discussed above. Some assumption on the cross-partial derivative is required, and condition (vi) seems plausible. Condition (vii) is a stronger assumption on the consequences of free-riding than just diminishing returns, stating that for groups over a certain size (measured either in expenditures or numbers), the responsiveness of the political process to increases in the size of a pressure group diminishes.

As can be shown, sufficient conditions for (vii)\(^{15}\) are \( \varepsilon \geq 1, \eta \geq 1, \) and \( \left| \frac{\partial^2 P}{\partial N^2} \right| \geq \frac{\partial^2 P}{\partial E \partial N} \). The first two conditions require that the technology for producing political pressure be sufficiently responsive to the size and expenditures of interest groups. The third condition says that the marginal product of expenditures is not too greatly increased as the size of the interest group increases.

---

\(^{15}\)Proof is available from the authors upon request.
Individuals’ Optimizing Problem

Let the two types of individuals be indexed as $j$ and $k$. An individual in any jurisdiction has two choices to make: first, whether to lobby at the state or local level and second, what portion of his resources to devote to lobbying expenditures.\textsuperscript{16} Although these decisions are actually made simultaneously, it is convenient to model the decision process as having two stages and discuss these two separately.

The game is modelled with the assumptions of common knowledge and of perfect information. The latter is a formality since both choices take place simultaneously; however it is necessary in the two-stage exposition, since it ensures that once the players choose the level at which they will lobby, that they both know the other’s choice. Further, it means that each player knows the other players’ strategy choice in the second stage, when decisions on the amount of lobbying expenditure is made.\textsuperscript{17} The solution of the game is taken to be the set of lobbying strategies that satisfy the Nash criterion.

Solutions to the game are examined sequentially. First, the selection of individual lobbying expenditures in the second stage is considered, given that the level of government to be lobbied has been selected. Since the strategies and the payoffs are continuous, solutions may be deduced from consideration of the "best response" or "reaction" correspondences derived from each players’ maximization problem. Then the first stage is examined, in which individuals decide which level of government to lobby. Here the strategies are discrete and the payoffs (to

\textsuperscript{16}As shown below, it will never be optimal for an individual to split his lobbying resources between the two levels.

\textsuperscript{17}For formal definitions and discussion of common knowledge and perfect information, see Rasmussen (1989).
pure strategies) are discontinuous, so the solutions are obtained by examination of the payoffs to the various strategy combinations. Finally, this structure is used to examine how changes in exogenous variables may change the first stage game to one with different equilibria. This provides the basis for predictions for observable behavior, in particular, predictions about which level of government will be lobbied.

Optimization and Equilibrium in the Second Stage

In the second stage, individual $i$ has already determined the level of government at which he will lobby, so the problem is the optimal allocation of resources between consumption of the public good $G$ and a private good $x$. However, an individual cannot choose $G$ directly, but must choose to spend some resources (perhaps zero) on pressure group lobbying by her interest group.\footnote{This resource cost may be associated with monetary outlays for lobbying or non-monetary outlays, including the cost of voting.} Since $E_i = e_iN_i$, where $e_i$ is the (identical) per capita lobbying expenditure by all individuals of type $i$, (1) may be rewritten as

$$G = G(P_j(e_i, N_j), P_x(e_i, N_i)),$$

or

$$G = G(e_i, N_j, e_i, N_i).$$

Individual $i$'s problem is

$$\max_{e, x} U_i(G, x), \quad \text{s.t.} \quad Y_i = T_iG + P_x x_i + e_i,$$

(3)

where $G$, $x$ and $e$ are as defined above, $Y_i$ is $i$'s exogenous income and $T_i$ is $i$'s tax price. Since it is assumed that $G$ is produced at constant marginal cost, both in terms of the actual production cost and in terms of the administrative or financing costs, $T_i$ is constant. $T_i$ may differ across
types of individuals. \( T_i \) is assumed, for the moment, to be the same regardless of which level of government determines \( G \). \( P_x \) is the price per unit of the private good. \( U(.) \) is assumed to be concave, continuous and twice-differentiable. Finally, it is assumed that local governments are required to balance their budgets. This implies
\[
T_j N_j f + T_k N_k f = 1, \quad f = 1, \ldots, m
\]
The first order necessary conditions to the solution of problem (3) for an individual of type \( j \) are given by:
\[
\frac{\partial U_j}{\partial G} (G, x) \frac{\partial G}{\partial P_j} (e_j, N_j, e_k, N_k) \frac{\partial P}{\partial e_j} (e_j, N_j) - \lambda_j \left( T_j \frac{\partial G}{\partial P_j} (e_j, N_j, e_k, N_k) \frac{\partial P}{\partial e_j} (e_j, N_j) + 1 \right) = 0. \tag{4a}
\]
\[
\frac{\partial U_j}{\partial x} (G, x) - P_x \lambda_j = 0, \text{ and} \tag{4b}
\]
\[
Y_j - T_j G (e_j, N_j, e_j, N_j) - P_x x_j - e_j = 0. \tag{4c}
\]
Let \( \gamma_j = T_j \frac{\partial G}{\partial P_j} \frac{\partial P_j}{\partial e_j} + 1 \) represent the full price of a dollar spent on lobbying including both the lobbying expense and the associated tax burden. Note that \( \gamma_j \geq 1 \) as \( \frac{\partial G}{\partial P_j} \geq 0 \). Suppressing extraneous notation, (4a) and (4b) may be combined as
\[
\frac{\partial U_j}{\partial G} \frac{\partial G}{\partial P_j} \frac{\partial P_j}{\partial e_j} = \frac{\partial U_j}{\partial x} \gamma_j \frac{\partial x}{P_x}. \tag{4d}
\]
This condition says that, at an optimum, an individual equates the benefits of a dollar spent on lobbying to a dollar spent on consumption of $x$ and, in conjunction with (4c), implies a demand function for $G$. The full price of $G$ is given by\(^{19}\)

$$\rho_i^G = \frac{\gamma_i}{\frac{\partial G}{\partial P_i \frac{\partial P_i}{\partial e_i}}} = T_i + \frac{1}{\frac{\partial G}{\partial P_i \frac{\partial P_i}{\partial e_i}}}.$$  

Let $G_j^*$ represent the $G$ implied by $j$'s optimal choice of $e$ and $x$; $j$'s demand function for $G$ may be represented as

$$G_j^* = G\left(\rho_j^G (T_j, N_j, e_k, N_k), P_x, Y_j\right).$$  

(5)

This shows that, for given values of $T_j, N_p, N_f, P_x$ and $Y_j$, $j$'s demand for $G$ depends on $e_k$, the per capita lobbying expenditure of individuals of type $k$. Solving the first order conditions, which implies that solving (5) for $G_j^*$, requires that $j$ form some conjecture as to $k$'s choice of $e$. We invoke the Cournot-Nash assumption, i.e. $j$ takes $e_k$ as given when choosing $e$ and $x$. Equations (4c) and (4d) can thus be solved for each value of $e_k$; the solutions will provide the optimal choice of lobbying expenditure $e_j^*$, and each solution will imply $G_j^*$. Finally, note that concavity of $U(.)$ ensures that preferences for $G$ are single-peaked for any $T_i$; therefore, $U_i(.)$ is monotone decreasing in $|G_i^* - G|$.

The resulting equation for $e_j^*$ is the Cournot-Nash reaction function for $j$, given the $k$'s choice of lobbying expenditure:  

\(^{19}\)As may be seen from (4d), individual equilibrium requires $\gamma_i > 0$ which implies 

$$- \frac{1}{\frac{\partial G}{\partial P_i \frac{\partial P_i}{\partial e_i}}} < T_i \quad \text{and} \quad \rho_i^G > 0.$$  

17
\[ e_j^* = R_j(e_k), \]  

where \( R_j \) is \( j \)'s reaction function. The reaction function for \( k \) is symmetric.

We adopt assumptions that ensure that this second stage game results in a unique, stable equilibrium in lobbying expenditures; the \( R_j \)'s provide a convenient way to characterize conditions that ensure this result.\(^{20}\) In addition to the conditions on \( U_i(\cdot) \) (i.e. concavity and differentiability) and \( P_i(\cdot), \) (differentiability), \( |R_j' < 1 \) is sufficient to ensure this result.\(^{21}\) This condition puts a limit on the magnitude of the optimal response of \( j \) to \( k \)'s choice of \( e. \)\(^{22}\) It does not, however, restrict the sign of \( R_j' \).

The individual's optimization problem thus described is the same regardless of the level of government at which she chooses to lobby. This provides enough structure to demonstrate the first result.

**Proposition 1.** Individuals will never find it optimal to split their lobbying expenditures between the two levels of government.

**PROOF.** Let \( G = G'(P_j, P_k) \). Suppose \( k \) chooses \( e_k^S \) such that \( P_k^S < \bar{P} \) (\( P_k^S = 0 \) is a special case). Then if \( j \) chooses \( e_j^S > 0 \) such that \( P_j^S < \bar{P} - P_k^S \), \( G \) remains \( G' \) and \( U_j \) necessarily

\(^{20}\)It would be preferable to specify conditions with more economic content; however this does not appear possible in the present case. A discussion and solution in a somewhat different model is provided in Coggins, Graham-Tomasi and Roe (1991).

\(^{21}\)Existence of an equilibrium is ensured by the stated conditions on \( U(.) \) and on the strategy set (the \( e_i \)'s) being convex and compact, and is proved via an application of the Kakutani fixed point theorem; see Fudenberg and Tirole (1991) and Tirole (1988). Asymptotic stability is ensured by \( |R_i' | |R_k' | < 1 \); see Fudenberg and Tirole (1991, 24). Uniqueness follows from the stated condition.

\(^{22}\)This condition is strongly satisfied if \( e_i^* = \bar{e}_i \), where \( \bar{e}_i \) is a fixed level of expenditures.
decreases. So, unless $e_j^s$ is such that $P_j^s \geq \bar{P} - P_k^s$, $e_j^s = 0$ is optimal and all $j$'s lobbying expenditure is directed toward the local government.

Suppose $P_j^s \geq \bar{P} - P_k^s$; then $G = G^s(P_j^s, P_k^s)$. Then, since a state decision takes precedence, for any $e_j^l$, $G = G^s$. Therefore $e_j^l = 0$ is optimal and all $j$'s lobbying expenditure is directed toward the state government.

The argument is symmetric, so reversing the subscripts completes the proof.

Note that if $P_j^s(.) = 0$ and $P_j^s(.) \geq \bar{P}$, then the state will set $G$ equal to $j$'s most preferred level, given $j$'s after-lobbying income, $Y_j - e_j^s$. Maximization of utility implies that $j$ will spend the minimum required to achieve this outcome, so $j$'s equilibrium lobbying expenditure will be $\bar{e}_j^s = \left\{ e_j^s \mid P^s(E_j, N_j) = \bar{P} \right\}$. Furthermore, if $e_j^s = 0$ and $e_j^s = \bar{e}_j^s$, then $e_k^l = e_k^s = 0$.

Equilibrium in the First Stage

Turn now to the first stage, which involves an analysis of payoffs to the various strategies. The payoffs to $j$ are expressed in terms of utility, maximized according to (3), taking $e_k$ as given.

The general structure of the games in lobbying strategies is represented below.

<table>
<thead>
<tr>
<th></th>
<th>$s_k^s$</th>
<th>$s_k^l$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$s_j^s$</td>
<td>$U_j^s$, $U_k^s$</td>
<td>$\bar{U}_j$, $\bar{U}_k$</td>
</tr>
<tr>
<td>$s_j^l$</td>
<td>$\bar{U}_j$, $\bar{U}_k$</td>
<td>$U_j^l$, $U_k^l$</td>
</tr>
</tbody>
</table>

The strategies $s_i^s$ and $s_i^l$ refer to the choice of lobbying at the state and local level, respectively and the payoffs are as follows:
\[
U_i^\alpha = U_i(G^\alpha, x^*_i); 
\]  
(7)

\[
\hat{U}_j = U_j(G^S_k, x^*_i); 
\]  
(8a)

\[
\hat{U}_k = U_k(G^S_j, x^*_i); 
\]  
(8b)

\[
\hat{U}_i = U_i(G^S, x^*_i); 
\]  
(9)

where \( \alpha = S, L \) and \( x^*_i \) is the optimal choice of \( x \), given the relevant quantity constraint on \( G \).

If the outcome is \( \{s_j^S, s_k^S\} \), then the output is \( G^S \), the consequence of equilibrium choices of \( e_j^S \geq 0 \), and \( e_j^L = 0 \). The payoffs are given by (7). If the outcome is \( \{s_j^L, s_k^S\} \), payoffs are given by (8a) and (9), where \( \hat{G}^S_k \) is the result of the \( k \)'s optimal choice of \( e^S \), given the \( j \)'s choice of \( e^L \). (Recall that \( e_j^L = 0 \) is optimal in this case.) The results from the outcome \( \{s_j^S, s_k^L\} \) are just the reverse, i.e., (8b) and (9). Finally, if \( \{s_j^L, s_k^L\} \) obtains, neither group chooses to lobby at the state level. The output is \( G^L \), the consequence of equilibrium choices of \( e_j^L \geq 0 \), and \( e_j^S = 0 \); the payoffs are given by (7).

Depending on the relative magnitudes of the payoffs, there will be a number of different games. As a simplification, it is assumed that in the case of pure strategies, neither player is indifferent between his own choices; this implies that \( U_i^S \neq \hat{U}_j \) and \( \hat{U}_i \neq U_j^L \). Given this assumption, individuals \( j \) and \( k \) may be playing one of sixteen possible games, each of which may have one or more equilibria in any of the four pure strategy profiles or in mixed strategies.


<table>
<thead>
<tr>
<th>Game</th>
<th>Relative Payoffs</th>
<th>Equilibria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$U_i^L &gt; \bar{U}_i$  [ U_i &gt; U_i^S ]</td>
<td>${s_i^L, s_i^L}$ is the equilibrium (dominant strategy equilibrium).</td>
</tr>
<tr>
<td>2</td>
<td>$U_i^L &lt; \bar{U}_i$  [ \bar{U}_i &gt; U_i^S ]</td>
<td>${s_i^L, s_i^S}, {s_i^S, s_i^L}$ are pure strategy equilibria; there is one equilibrium in mixed strategies.</td>
</tr>
<tr>
<td>3</td>
<td>$U_i^L &gt; \bar{U}_i$  [ \bar{U}_i &lt; U_i^S ]</td>
<td>${s_i^L, s_i^L}, {s_i^S, s_i^S}$ are pure strategy equilibria; there is one equilibrium in mixed strategies.</td>
</tr>
<tr>
<td>4</td>
<td>$U_i^L &lt; \bar{U}_i$  [ \bar{U}_i &lt; U_i^S ]</td>
<td>${s_i^S, s_i^S}$ is the equilibrium (dominant strategy equilibrium).</td>
</tr>
</tbody>
</table>

The games with symmetric relationships between the payoffs are shown in Table 1 and with asymmetric relationships in Table 2. The equilibrium strategy choices provide an explicit definition of a mandate, in terms of the model.

**Definition 1.** A mandate is said to occur if, in equilibrium, it is optimal for either interest group, or both, to lobby the state government to determine $G$.

$G_j^S$ (resp. $G_k^S$) indicates a mandate in response to lobbying by only group $j$ (resp. $k$). $G_h^S$ indicates a mandate which is determined in response to lobbying by both groups.

---

23Note that, in each case, there are one or three equilibria. This is an example of Wilson’s (1971) oddness theorem, which says that almost all games with finite strategies have a finite and odd number of equilibria, in pure or mixed strategies. For a discussion and reference to other odd-number theorems, see Fudenberg and Tirole (1991, 479-80).
### TABLE 2
**GAMES WITH ASYMMETRIC PAYOFF RELATIONSHIPS**

<table>
<thead>
<tr>
<th>Game</th>
<th>Relative Payoffs</th>
<th>Equilibria</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a</td>
<td>$U_j^L &gt; \tilde{U}_j$ &lt;br&gt; $U_k^L &lt; \tilde{U}_k$ &lt;br&gt; $\tilde{U}_i &gt; U_i^S$</td>
<td>${s^L_i, s^L_k}$ is the equilibrium.</td>
</tr>
<tr>
<td>6a</td>
<td>$U_j^L &gt; \tilde{U}_j$ &lt;br&gt; $U_k^L &lt; \tilde{U}_k$ &lt;br&gt; $\tilde{U}_i &lt; U_i^S$</td>
<td>${s^S_i, s^S_k}$ is the equilibrium.</td>
</tr>
<tr>
<td>7a</td>
<td>$U_i^L &gt; \tilde{U}_i$ &lt;br&gt; $\tilde{U}_j &gt; U_j^S$ &lt;br&gt; $\tilde{U}_k &lt; U_k^S$</td>
<td>${s^L_i, s^L_k}$ is the equilibrium.</td>
</tr>
<tr>
<td>8a</td>
<td>$U_i^L &lt; \tilde{U}_i$ &lt;br&gt; $\tilde{U}_j &gt; U_j^S$ &lt;br&gt; $\tilde{U}_k &lt; U_k^S$</td>
<td>${s^L_i, s^S_k}$ is the equilibrium.</td>
</tr>
<tr>
<td>9a</td>
<td>$U_j^L &gt; \tilde{U}_j$ &lt;br&gt; $U_k^L &lt; \tilde{U}_k$ &lt;br&gt; $\tilde{U}_j &gt; U_j^S$ &lt;br&gt; $\tilde{U}_k &lt; U_k^S$</td>
<td>${s^L_j, s^L_k}$ is the equilibrium.</td>
</tr>
<tr>
<td>10a</td>
<td>$U_j^L &gt; \tilde{U}_j$ &lt;br&gt; $U_k^L &lt; \tilde{U}_k$ &lt;br&gt; $\tilde{U}_j &lt; U_j^S$ &lt;br&gt; $\tilde{U}_k &gt; U_k^S$</td>
<td>No equilibrium in pure strategies; there is one equilibrium in mixed strategies.</td>
</tr>
</tbody>
</table>

Games 5b, 6b, 7b, 8b, 9b and 10b are found by reversing the subscripts.
Referring to Table 1, the equilibrium in game 1 is that both groups choose not to lobby the state and the decision is made locally; the outcome is $G^L$ and there is no mandate. In both of the pure strategy equilibria occurring in game 2 only one of the groups chooses to lobby the state and the mandate reflects the interests of that group; the outcomes are $G_j^S$ and $G_k^S$. This game also has a mixed strategy equilibrium; the interpretation of which is discussed below. In game 4, both groups choose to compete at the state level; the mandated government decision $G_{bs}^S$, reflects the interests of both. In game 3, the equilibria in pure strategies may be the same equilibrium as in either game 1 or 4. In the games with asymmetric payoff combinations presented in Table 2, games 5a, 5b, 6a, 6b, 8a, 8b, 9a and 9b have equilibria which imply mandates; games 7a and 7b result in local decisions.

While the pure strategies are characterized in terms of the relative magnitudes of the payoffs, the mixed strategy equilibria are characterized in terms of the absolute magnitudes. Group $j$ will adopt a mixed strategy if it can select mixing probabilities such that group $k$ is indifferent to playing any strategy, pure or mixed. An equilibrium occurs if $k$ selects mixing probabilities such that $j$ is indifferent between it’s own mixed strategy and either pure strategy. Thus, the equilibrium mixing probabilities of one group depend on the payoffs to the other group. In particular,

$$
p_k^S = \frac{U_j^L - \bar{U}_j}{U_j^S - \bar{U}_j + U_j^L - \bar{U}_j};
$$

(10)

where $p_k^S$ is the probability that $k$ plays $s_k^S$ in equilibrium. The equation for $p_j^S$ is symmetric.

While the formal rules characterizing the mixed strategy are easily obtained from equation (10), interpretation of this result is difficult. Since from Proposition 1, it will never be optimal for $j$ to incur local lobbying expenditures if $k$ is lobbying at the state, it is not reasonable to
interpret the mixed strategy equilibrium as randomizing behavior. Rather, the probabilities associated with such an equilibrium are interpreted as providing a measure of the likelihood of observing a state mandate.²⁴

So, whether the outcome is a pure or mixed strategy equilibrium will depend on the magnitudes of the payoffs from the alternative strategy profiles. It is most natural to imagine that the unilateral determination of $G$ would provide the greatest payoff, and failure to have any influence would provide the least; this would result in the relationship $\bar{U}_i < U_i^L \preceq U_i^S < \bar{U}_i$. This relationship defines game 4 in Table 1 and the equilibrium, in this case a dominant strategy equilibrium, is $\{s_1^S, s_2^S\}$ and the outcome is $G_s^S$. However, other outcomes are clearly possible and, to the extent that the values of the payoffs depend on exogenous factors ($\rho$, $\gamma_j$ and $T_j$), these factors will influence the equilibrium strategies in the game of choosing the level of government to lobby. It is these choices that determine whether or not a mandate will occur.

III. COMPARATIVE STATICS

In what follows, use is made of the characteristics of the government output decision and the pressure function to first deduce the effects of changing demographic, economic and institutional factors on the payoffs obtained under different lobbying strategies and then to show comparative static results.

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²⁴In general, there is no commonly accepted way to interpret mixed strategy equilibria. Rasmussen (1989) provides a discussion.
Factors Influencing Payoffs to the First-Stage Game

First, the implications of changes in the distribution of types across the state and of the provision of state funding for mandates are examined. For some of the results, it will be convenient to collapse the measure of size to one dimension and characterize the size of an interest group solely in terms of its numbers. To do so requires some restriction be placed on how changes in \( N_i \) effect \( E_i \).

As shown above, equations (4a)-(4c) described the conditions that the optimal choice of expenditure, \( e_i^* \), must satisfy for some value of \( N_i \). It is assumed that small changes in \( N_i \) will not induce a large change in \( e_i^* \).\(^{25}\) Then, since \( \frac{dE_i}{dN_i} = \frac{\partial e_i^*}{\partial N_i} N_i + e_i^* \), the total expenditures will not decrease with an increase in the numerical size of the group, i.e. \( \frac{dE_i}{dN_i} \geq 0 \).\(^{26}\) Furthermore, this ensures that a small increase in \( N_i \) will not reduce the pressure exerted by the \( i \)th group. This assumption holds regardless of the magnitude of \( N_i \), in particular regardless of whether \( N \) measures the size of the local or state-wide interest group.

Finally, note that since the two-stage game is one of perfect information and common knowledge, these results require that once a strategy is selected in the first stage, resources are optimally allocated to lobbying in the second stage.

The first two results examine how changes in the distribution of the two types affect the payoffs received from different strategies by an individual of an arbitrary type. Changes are examined at two levels, within the local jurisdiction and across the state as a whole.

\(^{25}\) In general, the sign of \( \frac{\partial e_i^*}{\partial N_i} \) is indeterminate.

\(^{26}\) Even if \( e_i^* = 0 \), \( E_i \) cannot decrease, since negative values are inadmissible.
**Proposition 2.** For residents of any jurisdiction \( j \), a ceteris paribus decrease in \( \frac{N_j^I}{N_k^I} \) will reduce \( U_j^L \) and increase \( U_j^S \), provided that:

\[
(i) \quad N_j^I > N_q^I(E) , \quad \text{and} \\
(ii) \quad \frac{N_j^S}{N_k^S} \geq \frac{N_j^I}{N_k^I} .
\]

Condition (i) says that both of the local interest groups are large enough to experience diminishing returns to the production of pressure; condition (ii) says that the relative size of interest group \( j \) does not decrease when lobbying is shifted from the local to the state level.

**PROOF.** Recall that \( \frac{\partial \varepsilon}{\partial E} < 0 \ \forall \ \ E > E_q^I(N) \), and \( \frac{\partial \eta}{\partial N} < 0 \ \forall \ \ N > N_q^I(E) \). If all \( m \) jurisdictions are identical and if \( \frac{N_j^I}{N_k^I} = 1 \) and \( \frac{E_j^I}{E_k^I} = 1 \), then

\[
\frac{P(mE_j,mN_j)}{P(mE_k,mN_k)} = \frac{P(E_j,N_j)}{P(E_k,N_k)} (= 1) ,
\]

where the right-hand side represents the relative pressure produced by lobbying at a local government and the left-hand side the relative pressure at the state level. There is no gain or loss of influence when the lobbying focus shifts to the state.

Maintaining the identical jurisdiction assumption, if \( \frac{N_j^I}{N_k^I} < 1 \), and \( \frac{E_j^I}{E_k^I} < 1 \), then

\[
\frac{P(mE_j,mN_j)}{P(mE_k,mN_k)} > \frac{P(E_j,N_j)}{P(E_k,N_k)} ,
\]

since \( \varepsilon(E_j,N_j) > \varepsilon(E_k,N_k) \) and \( \eta(E_j,N_j) > \eta(E_k,N_k) \). A shift of lobbying from the local to the state level is an equi-proportionate increase in the size of the two interest groups. However, this has a disproportionate effect; the smaller group will gain influence relative to the larger group.
Furthermore, the magnitude of this effect, which may be measured by 
\[ \frac{P(mE_i, mN_i)}{P(mE_k, mN_k)} - \frac{P(E_i, N_i)}{P(E_k, N_k)} \]
increases as \( \frac{N_i}{N_k} \) decreases.

Relaxing the identical jurisdiction assumption, consider an arbitrary jurisdiction \( f \). Then
\[ \frac{P(aE_i, cN_i)}{P(bE_i, dN_i)} > \frac{P(E_i, N_i)}{P(E_i, N_i)} \tag{11} \]
if \( a \geq b \) and \( c \geq d \), which will be true if condition (ii) holds. Furthermore
\[ \frac{P(aE_i, cN_i)}{P(bE_i, dN_i)} - \frac{P(E_i, N_i)}{P(E_i, N_i)} \]
increases as \( \frac{N_i}{N_k} \) decreases, as noted above.

Since \( G \) depends on the relative pressures of the interest groups, if \( \frac{P_j^s(\cdot)}{P_j^l(\cdot)} > \frac{P_k^s(\cdot)}{P_k^l(\cdot)} \), then \( |G_i^* - G_b^s| < |G_i^* - G^f| \). Since preferences for \( G \) are single-peaked, then \( U_j^s > U_j^l \).

If lobbying shifts from the local government to the state, both interest groups will increase in size. This result shows that, for a given state-wide distribution of types of individuals, shifting the focus of the lobbying from the local to the state level will increase the relative influence of the smaller group, as long as the increase in the size of the smaller group is no less than the increase in the size of the larger group. This in turn implies that the smaller is one local interest group, relative to the other local interest group, the greater is the gain that its members can obtain by lobbying the state government for a mandate.

The next result examines how payoffs to different lobbying strategies respond to changes in the state-wide distribution.
Proposition 3. A ceteris paribus increase in \( \frac{N_j^s}{N^s_k} \) will increase \( U_j^s \) and \( \bar{U}_j \), and decrease \( U_k^s \) and \( \bar{U}_k \).

This states that an increase in the size of the (potential) state-wide coalition will increase the payoffs to either group from lobbying at the state level.

PROOF. First, recall that \( \frac{\partial e_i^*}{\partial N_j} \geq 0 \); therefore an increase in \( N_j \) is sufficient for an increase in \( P_i \).

In (11), the terms \( a, c \) and \( b, d \) measure the increases in size of groups \( j \) and \( k \), respectively, when state-wide coalitions are formed. Their magnitudes will depend on the number and expenditures of type \( j \) and \( k \) individuals in the state. In particular,

\[
\begin{align*}
a &= \frac{E_j^s}{E_j^t}, \quad c = \frac{N_j^s}{N_j^s}, \quad b = \frac{E_k^s}{E_k^s}, \quad d = \frac{N_k^s}{N_k^s}.
\end{align*}
\]

Therefore, for any given distribution of types in jurisdiction \( f \), the relative pressure produced by interest group \( j \) at the state level increases in \( E_j^s \) and \( N_j^s \), and decreases in \( E_k^s \) and \( N_k^s \). Therefore, an increase in \( N_j \) must increase the pressure on the state government produced by group \( j \), relative to that produced by group \( k \). Since \( G \) depends on relative pressures, and since preferences are single peaked, the increase in \( P_j^s \) relative to \( P_k^s \) implies an increase in \( U_j^s \).

Further, since \( G_j^s \) depends only on \( P(E_j^s, N_j^s) \) exceeding \( \bar{P} \), an increase in \( N_j^s \) implies a reduction in the \( E_j^s \) required to achieve \( \bar{P}^s \). Therefore \( \bar{U}_j \) increases since \( j \)'s after-lobbying income increases.

This result shows that for individuals living in a given jurisdiction, an increase in the number of like-minded individuals living in other jurisdictions in the state will have a positive effect on the payoffs achieved by lobbying the state, since the state-wide coalition thus formed will be larger.
Finally, consideration is given to the case of mandates financed, at least in part, by state funding.\(^{27}\) We ask: Will the imposition of a reimbursement rule affect the probability of a mandate being imposed? First, a reimbursement rule is defined.

**Definition 2.** A reimbursement rule requires that, in the event of a mandate, some fraction \(\theta\) of the cost of \(G\) is financed by state taxes.

It is assumed that, if the state is to provide reimbursement, \(G^s\) is the same in per capita terms, and the reimbursement rate \(\theta\) is the same, in all jurisdictions in the state. To generalize the model to incorporate reimbursement, rewrite the budget constraint for individual \(i\), living in jurisdiction \(f\), as follows

\[
Y_i = \left[ \theta \frac{N_i^s}{N_f^f} T_i^s + (1 - \theta) T_i^f \right] G + P_x x_i + e_i, \tag{12}
\]

where \(T_i^f\) is \(i\)'s tax share under local financing and \(T_i^s\) is \(i\)'s tax share under state financing. The term \(\frac{N_i^s}{N_f^f}\) serves to scale up the state tax share to reflect the cost imposed on \(f\)'s residents by reimbursement of the costs of provision of the mandated good in the other local jurisdictions. It is assumed that the state is also required to balance its budget; thus

\[
T_j^s N_j^s + T_k^s N_k^s = 1.
\]

The implications of reimbursement may be more easily seen by defining a fiscal benefit function for \(i\), which measures the consequences of state versus local financing of \(G\). Letting \(FB_i\) measure \(i\)'s fiscal benefit,

\[
FB_i = \left[ \theta \frac{N_i^s}{N_f^f} T_i^s + (1 - \theta) T_i^f \right] G - T_i^f G, \text{ or}
\]

\(^{27}\)See, for example, ACIR (1978); GAO (1988); Horte (1990); Wnuk (1992); and Hirsch and Osborne (1994).
\[ FB_i = \theta \left[ \frac{N^S}{N^f} T_{i_i}^s - T_i^f \right]. \]  

(13)

From (13), if both the state and local taxes are flat rate, then there is no fiscal benefit.\(^{28}\) However if \(i\) pays a proportionately lower share of state taxes than she does of local taxes, and if \(f\) is no smaller than average, then \(i\) will obtain some benefit by state financing. The magnitude of the benefit will depend on \(\theta\) as well as the tax shares and jurisdiction size.

This definition provides the structure required for the final results.

**Proposition 4.** If \(\frac{N^S}{N^f} T_j^s < T_j^f\) and \(\frac{N^S}{N^f} T_k^s > T_k^f\), then an increase in \(\theta\) will increase \(U_j^s\), \(\bar{U}_j\) and \(\bar{U}_j\), and decrease \(U_k^s\), \(\bar{U}_k\) and \(\bar{U}_k\).

One special case of an increase is from \(\theta = 0\) to \(\theta = 1.0\), which represents the imposition of a general reimbursement rule, as it is usually discussed. Note that the reimbursement rule does not affect the payoffs accruing to either type in the event that neither lobbies the state.

**PROOF.** Under reimbursement, the price for a unit of \(G\) changes to

\[ p_i^G = \theta \frac{N^S}{N^f} T_i^s + (1 - \theta) T_i^f + \frac{1}{\frac{\partial G}{\partial P_i} \frac{\partial e_i}{\partial \theta}}. \]

Given the assumption regarding the relative magnitude of state and local tax shares,

\[ \frac{\partial p_j^G}{\partial \theta} = \frac{N^S}{N^f} T_j^s - T_j^f < 0 \quad \text{and} \quad \frac{\partial p_k^G}{\partial \theta} = \frac{N^S}{N^f} T_k^s - T_k^f > 0. \]

By maximization, \(U_j^s\), \(\bar{U}_j\) and \(\bar{U}_j\) will increase and \(U_k^s\), \(\bar{U}_k\) and \(\bar{U}_k\) will decrease. \(\square\)

This result shows that additional gains to lobbying the state may be obtained if the state tax structure differs from the local tax structure and if there is a reimbursement rule. These gains

\(^{28}\) If taxes are flat rate, then \(T_i^s = \frac{1}{N^s}\) and \(T_i^f = \frac{1}{N^f}\).
derive from the financing of the public good, rather than greater influence over the public output
decision, as was the case in the earlier results. Finally, any reimbursement rule will have
differential effects on individuals of type $i$, depending on the relative size of their local
jurisdiction.

**Proposition 5.** If $\frac{N^s_i}{N^j_i} T^s_i < T^f_j$ and $\frac{N^s_i}{N^j} T^s_i > T^f_j$, and $\Theta > 0$, a ceteris paribus increase in $N^f$ will increase $U^s_j$, $\bar{U}^f_j$, and $\hat{U}_j$, and decrease $U^s_k$, $\bar{U}_k$, and $\hat{U}_k$.

This result follows directly from the proof to Proposition 4. This result is a consequence
of the fact that, for a given $\Theta$, the larger is the jurisdiction, the larger is the amount of local
financing replaced by state financing. Thus, individuals who benefit from such a replacement
gain more, and individuals who lose, lose more, in a large jurisdiction than in a small
jurisdiction.

The results of changes in the four factors discussed above are summarized in Table 3.
Changes in the relative sizes of the interest groups in jurisdiction $f$ and across the state as a
whole have symmetric effects for the two interest groups; a change that increases the payoff from
a particular strategy for one group decreases the payoff from that strategy for the other group.
This is also true for imposition of a reimbursement rule, if the share of state taxes is different
than the share of local taxes.
### TABLE 3
EFFECTS OF EXOGENOUS CHANGES ON PAYOFF MAGNITUDES

<table>
<thead>
<tr>
<th></th>
<th>( \frac{N_i'}{N_i^f} ) decreases</th>
<th>( \frac{N_i^s}{N_i^s} ) increases</th>
<th>( \frac{N_i^s}{N_i^f} T_i^s &lt; T_i' ) increases</th>
<th>( \theta ) increases</th>
<th>( N_i^f ) increases</th>
</tr>
</thead>
<tbody>
<tr>
<td>( U_j^s )</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>( \tilde{U}_j )</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \hat{U}_j )</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( U_j^l )</td>
<td>-</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( U_k^s )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( \tilde{U}_k )</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>( \hat{U}_k )</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>( U_k^l )</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: If the changes in the exogenous variables noted in columns 2 and 3 are reversed, the effects are reversed. The effects in columns 4 and 5 are reversed if \( \frac{N_i^s}{N_i^f} T_i^s < T_i' \).

### Comparative Statics

In order to derive comparative static results, it is necessary to fix some initial equilibrium. Since the focus of this research is on the occurrence of mandates, it is assumed that the initial equilibrium is one in which neither group lobbies at the state level; in other words, in which there are no mandates. Then exogenous factors are permitted to change and the consequences of those changes on the initial equilibrium are deduced.

Although the existence of an equilibrium in which there are no mandates is observable, the underlying utility levels are not. Thus, such an observation could be an equilibrium of games 1, 3, 7a, or 7b. For each of these possible initial states, the effects of changes in each of the
variables identified in Table 3 are examined. These effects are described as transitions from the initial game to a new game defined by different relationships among the payoffs. For each of the possible new games, the equilibrium strategy choices are determined and the results presented in Table 4. These new equilibria may be in either pure or mixed strategies; in the case of the latter, Table 4 shows how changes in the exogenous variable affect the equilibrium mixing probabilities.29

<table>
<thead>
<tr>
<th>Initial equilibrium</th>
<th>Possible new equilibria if $\frac{N_j^f}{N_k^f}$ decreases</th>
<th>Possible new equilibria if $\frac{N_j^s}{N_k^s}$ increases</th>
<th>Possible new equilibria if $\frac{N_j^s}{N_k^f} &lt; \frac{T_j^s}{T_j^f}$ and $\vartheta$ increases</th>
<th>Possible new equilibria if $\vartheta$ increases</th>
<th>Possible new equilibria if $\vartheta$ increases</th>
</tr>
</thead>
<tbody>
<tr>
<td>({s_j^L, s_k^L}) (1, 3, 7a, 7b)</td>
<td>({s_j^S, s_k^L}) (5b, 9b)</td>
<td>({s_j^S, s_k^L}) (5b, 9b)</td>
<td>({s_j^S, s_k^L}) (5b, 9b)</td>
<td>({s_j^S, s_k^L}) (5b, 9b)</td>
<td>({s_j^S, s_k^L}) (5b, 9b)</td>
</tr>
<tr>
<td>({s_j^S, s_k^S}) (3, 6b)</td>
<td>({s_j^S, s_k^S}) (3, 6b)</td>
<td>({s_j^S, s_k^S}) (3, 6b)</td>
<td>({s_j^S, s_k^S}) (3, 6b)</td>
<td>({s_j^S, s_k^S}) (3, 6b)</td>
<td>({s_j^S, s_k^S}) (3, 6b)</td>
</tr>
<tr>
<td>({s_j^L, s_k^L}) (1, 3, 7b)</td>
<td>({s_j^L, s_k^L}) (1, 3, 7b)</td>
<td>({s_j^L, s_k^L}) (1, 3, 7b)</td>
<td>({s_j^L, s_k^L}) (1, 3, 7b)</td>
<td>({s_j^L, s_k^L}) (1, 3, 7b)</td>
<td>({s_j^L, s_k^L}) (1, 3, 7b)</td>
</tr>
<tr>
<td>(p_j^S) increases, (p_k^S) decreases (3)</td>
<td>(p_j^S) increases, (p_k^S) decreases (3)</td>
<td>(p_j^S) increases, (p_k^S) decreases (3)</td>
<td>(p_j^S) increases, (p_k^S) decreases (3)</td>
<td>(p_j^S) increases, (p_k^S) decreases (3)</td>
<td>(p_j^S) increases, (p_k^S) decreases (3)</td>
</tr>
<tr>
<td>(p_j^S) increases, (p_k^S) increases (10b)</td>
<td>(p_j^S) increases, (p_k^S) increases (10b)</td>
<td>(p_j^S) increases, (p_k^S) increases (10b)</td>
<td>(p_j^S) increases, (p_k^S) increases (10b)</td>
<td>(p_j^S) increases, (p_k^S) increases (10b)</td>
<td>(p_j^S) increases, (p_k^S) increases (10b)</td>
</tr>
</tbody>
</table>

Note: The numbers in parentheses refer to the games in Tables 1 and 2.

One possibility which is not represented in Table 4 is that the change in payoff magnitudes is not large enough to induce a change in strategies. It is logically possible, however, for changes in the exogenous factors to change the game to another with the same solution; for example, a shift from game 1 to game 7b. This case is shown in the table. Of course, since the

29The explicit derivations of these transitions in equilibria are given in Appendix A.

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games are defined in terms of utilities, this case is observationally indistinguishable from the case of no transition at all.

If there is an observable transition in the game, or a switch to a new equilibrium, it will involve \( j \) switching her strategy from lobbying the local government to lobbying the state government. In some cases, \( k \) may also switch strategies as well. For instance, if the initial equilibrium is in game 7a, a decrease in \( \frac{N_j}{N^j_k} \) will not affect one of the inequalities which define that game, \( U^L_k > \hat{U}_k \); any combination of the other three inequalities may switch. If only \( U^L_j > \hat{U}_j \) switches, the new game is 9b, and only \( j \) switches her strategy to lobby the state. If \( U^L_j > \hat{U}_j, \hat{U}_j > U^S_j \) and \( \hat{U}_k < U^S_k \) switch, the result is game 6b, in which both \( j \) and \( k \) change their strategies to lobby the state. If \( U^L_j > \hat{U}_j \) and \( \hat{U}_j > U^S_j \) switch, the new game is 10b. In this game there is only a mixed strategy equilibrium; by (10), the changes in \( U^S_j, \hat{U}_j \) and \( U^L_j \) will increase \( p^S_j \), the probability of \( j \) lobbying for a mandate, and will decrease \( p^S_k \), the probability of \( k \) lobbying for a mandate.

As shown in Table 3, the consequences of a decrease in \( \frac{N^S_j}{N^S_k} \) differ from a decrease in \( \frac{N^S_j}{N^S_k} \) somewhat; in the former case, \( U^L_j \) decreases and \( U^L_k \) increases while in the latter, \( \hat{U}_j \) increases and \( \hat{U}_k \) decreases. However, this difference has no effect on the transitions reported in Table 4 because all that matters in the case of pure strategies is the relative magnitudes of \( U^L_i \) and \( \hat{U}_i \). In the case of mixed strategies, as shown in Appendix A, changes in \( U^L_i \) and \( \hat{U}_i \) have identical, but opposite-signed effects on the equilibrium mixing probabilities. The results in the last two columns are identical, since if there is a reimbursement rule (i.e., if \( \theta > 0 \)) both an increase in the reimbursement rate and in the jurisdiction size have qualitatively the same effect on the payoffs.
IV. SUMMARY AND CONCLUSIONS

The literature offers three competing explanations for the occurrence of mandates: lobbying by special interest groups, the correction of interjurisdictional spillovers, and fiscal illusion. The latter two explanations each require an unpalatable restriction on model specification and neither seems to offer a promising starting point for analysis. The model developed in this paper, which extends the work of Hoyt and Toma (1989, 1991, 1993), permits analysis in terms of utility maximizing individuals, and can explain the occurrence of mandates without resort to special restrictions on the type of public goods or bounds on individual rationality.

The model provides clear predictions as to the level of government that an individual will choose to lobby if exogenous factors such as the distributions of type of individuals or preferences and financing institutions differ. This is important because it provides an explanation for the variation in the frequency of mandates observed across the states. The model makes four predictions. First, as the size of a local interest group decreases, relative to the size of the other interest group, the former will be more likely to choose to lobby the state rather than the local government. Second, as the number of like-minded individuals across the state increases, the more likely it is that an individual of that type will be better off lobbying at the state rather than the local level. Third, if the state government is responsible for paying for some portion of the cost, and if the state and local tax structures differ such that the individual bears a smaller portion of the state burden than they do of the local burden, then the imposition of such a rule may make the individual sufficiently better off that they prefer to lobby the state for a mandate. This result is particularly interesting in its contrast to other literature which recommends state reimbursement
as a mechanism for reducing the frequency of mandates. Finally, if \( \frac{N^S}{N^f} T_j^s < T_j^f \), the imposition of a mandate with reimbursement will provide greater incentive for type \( j \) to lobby the state as \( N^f \) increases.

There are several extensions that might be made in future research. The model could consider the case of interjurisdictional externalities imposed by one local government on another. The existence of externalities will not necessarily lead to a mandate to correct for it; an externality is a necessary but not sufficient condition for a mandate. The model could admit mobility across jurisdictions. With perfect mobility and costless jurisdictional realignment, there would be no mandates since each jurisdiction would comprise identical individuals. When moving is costly or boundaries are fixed, perfect sorting will not occur, but it may be that mobility is a lower cost alternative to purchasing political influence. Finally, the problem could be generalized to a world of many unique individuals, many public goods and many overlapping interest groups, although that would likely require a different model.
APPENDIX A

DERIVATION OF COMPARATIVE STATIC RESULTS

First note the following partial derivatives of (10):

\[
\frac{\partial p_k^s}{\partial U_j^s} = -\frac{(U_j^s - \bar{U}_j)}{(U_j^s - \bar{U}_j + U_j^L - \bar{U}_j)^2}
\]

(B.1)

\[
\frac{\partial p_k^s}{\partial \bar{U}_j} = -\frac{(U_j^s - \bar{U}_j)}{(U_j^s - \bar{U}_j + U_j^L - \bar{U}_j)^2}
\]

(B.2)

\[
\frac{\partial p_k^s}{\partial U_j^L} = \frac{(U_j^s - \bar{U}_j)}{(U_j^s - \bar{U}_j + U_j^L - \bar{U}_j)^2}
\]

(B.3)

\[
\frac{\partial p_k^s}{\partial \bar{U}_j} = \frac{(U_j^L - \bar{U}_j)}{(U_j^s - \bar{U}_j + U_j^L - \bar{U}_j)^2}
\]

(B.4)

It is assumed that initially individuals are playing one of four games: 1, 3, 7a or 7b. Then, based on the results demonstrated in the test, the effect of the exogenous changes noted in Table 3 on the payoffs are examined. For each initial game, all possible new games are determined and the equilibria associated with each are identified. If a game has a mixed strategy equilibrium, equations (B.1)-(B.4) are used to determine how the equilibrium mixing probabilities change as a result of the changes in the payoffs to different strategies.

A. Decrease in \(\frac{N_k^I}{N_j^I}\).

If the initial game is 1, then neither inequality in \(U_j^L > \bar{U}_j\) or \(\bar{U}_j > U_j^s\) will change. This leaves three possibilities: (1) both inequalities \(U_k^L > \bar{U}_k\) and \(\bar{U}_k > U_k^s\) will change and the result is game 9b; (2) only inequality \(U_k^L > \bar{U}_k\) changes and the result is game 5b; or only inequality \(\bar{U}_k > U_k^s\) changes and the result is game 7b. The equilibria associated with these games are reported in Table 4.
If the initial game is 3, then inequalities $U_j^L > U_j$ and $U_k < U_j^S$ will not change. This leaves three possibilities: (1) both inequalities $U_k^L > U_k$ and $U_j < U_j^S$ change and the result is game 9b; (2) only inequality $U_k^L > U_k$ changes and the result is game 6b, or (3) only inequality $U_j < U_j^S$ changes and the result is game 7b. Since game 3 has a mixed strategy equilibrium, another possibility is that none of the inequalities switch, but the mixing probabilities change. In this case, the $p_i^S$ and $p_j^S$ increases and decreases, respectively, from (B.1) and (B.3). The changes in $p_i^S$ and $p_j^S$, and the pure strategy equilibria associated with these new games are reported in Table 4.

If the initial game is 7a, then only inequality $U_j^L > U_j$ cannot change. Thus there are seven possibilities: (1) all three inequalities $U_k^L > U_k$, $U_k > U_k^S$ and $U_j < U_j^S$ switch and the result is game 6b; (2) inequalities $U_k^L > U_k$ and $U_k > U_k^S$ switch, the result is game 10b; (3) inequalities $U_k^L > U_k$ and $U_j < U_j^S$ switch, the result is game 3; (4) inequalities $U_k > U_k^S$ and $U_j < U_j^S$ switch, the result is game 1; (5) only inequality $U_k^L > U_k$ switches, the result is game 9b; (6) only inequality $U_k > U_k^S$ switches, the result is game 5b; or (7) only inequality $U_j < U_j^S$ switches, the result is game 7b. There are mixed strategy equilibria associated with both games 3 and 10, changes in the $p_i^S$ and $p_j^S$ are determined as above by referring to (B.1) and (B.3).

If the initial game is 7b, then neither $U_j^L > U_j$, $U_k > U_k^S$ nor $U_j < U_j^S$ can change. Therefore the only possible transition is for $U_k^L > U_k$ to switch; the result is game 9b. The changes in $p_i^S$ and $p_j^S$, and the pure strategy equilibria associated with these new games are reported in Table 4.
B. Increase in $\frac{N^s_k}{N^s_j}$

These derivations are the same as given for A, above. The consequences of a decrease in $\frac{N^s_k}{N^s_j}$ differs from a decrease in $\frac{N^s_j}{N^s_i}$ somewhat; in the former case, $U^L_k$ decreases and $U^L_j$ increases while in the latter, $U^L_k$ increases and $U^L_j$ decreases. However, this difference has no effect on the transitions because all that matters in the case of pure strategies is the relative magnitudes of $U^L_i$ and $U^L_j$. In the case of mixed strategies, changes in $U^L_i$ and $U^L_j$ have identical, but opposite-signed effects on the equilibrium mixing probabilities.

C. Increase in reimbursement share $\Theta$, if $\frac{N^s_k}{N^s_j}T^S_k < T^L_k$ and $\frac{N^s_j}{N^s_i}T^S_j > T^L_j$.

If the initial game is 1, $U^L_j > \bar{U}_j$ cannot switch. There are seven possibilities: (1) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$, all switch, the result is game 6b; (2) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$ switch, the result is game 9b; (3) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$ switch, the result is game 10b; (4) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$ switch, the result is game 3; (5) only $U^L_k > \bar{U}_k$ switches, the result is game 5b; (6) only $U^S_j > \bar{U}_j$ switches, the result is game 7b; or, (7) only $U^L_k > \bar{U}_k$ switches, the result is game 7a. Note that in games 3 and 10b, $\frac{\partial p^S_k}{\partial U^S_j} < 0$, $\frac{\partial p^S_k}{\partial U^S_j} < 0$, $\frac{\partial p^S_j}{\partial U^S_j} > 0$; thus the effect on $p^S_j$ is uncertain. It is also true that the effect on $p^S_j$ is uncertain, since $\frac{\partial p^S_j}{\partial U^S_j} < 0$, $\frac{\partial p^S_j}{\partial U^S_j} > 0$. The pure strategy equilibria associated with these new games are reported in Table 4.

If the initial game is 3, $U^L_j > \bar{U}_j$ cannot switch. There are seven possibilities: (1) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$ all switch, the result is game 5b; (2) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$ switch, the result is game 9b; (4) $U^L_k > \bar{U}_k$ and $U^S_j > \bar{U}_j$ switch, the result is game 1; (5) only $U^L_k > \bar{U}_k$ switches, the result is game 6b; (6) only $U^S_j > \bar{U}_j$ switches, the result is game 7b. The effect on $p^S_k$ and $p^S_j$, in the case of games
3 and 10b are as determined above for initial game 1; the pure strategy equilibria associated with these new games are reported in Table 4.

If the initial game is 7a, $U^L_j > \tilde{U}_j$ cannot switch. There are seven possibilities: (1) $U^L_k > \tilde{U}_k$, $\tilde{U}_k > U^S_k$ and $\tilde{U}_j > U^S_j$ all switch, the result is game 9b; (2) $U^L_k > \tilde{U}_k$ and $\tilde{U}_k > U^S_k$ switch, the result is game 6b; (3) $U^L_k > \tilde{U}_k$ and $\tilde{U}_j > U^S_j$ switch, the result is game 5b; (4) $\tilde{U}_k > U^S_k$ and $\tilde{U}_j > U^S_j$ switch, the result is game 7b; (5) only $U^L_k > \tilde{U}_k$ switches, the result is game 10b; (6) only $\tilde{U}_k > U^S_k$ switches, the result is game 3; or, (7) only $\tilde{U}_j > U^S_j$ switches, the result is game 1. The effect on $p^S_k$ and $p^S_j$, in the case of games 3 and 10b are as determined above for initial game 1; the pure strategy equilibria associated with these new games are reported in Table 4.

If the initial game is 7b, $U^L_j > \tilde{U}_j$ cannot switch. There are seven possibilities: (1) $U^L_k > \tilde{U}_k$, $\tilde{U}_k > U^S_k$ and $\tilde{U}_j > U^S_j$ all switch, the result is game 10b; (2) $U^L_k > \tilde{U}_k$ and $\tilde{U}_k > U^S_k$ switch, the result is game 5b; (3) $U^L_k > \tilde{U}_k$ and $\tilde{U}_j > U^S_j$ switch, the result is game 6b; (4) $\tilde{U}_k > U^S_k$ and $\tilde{U}_j > U^S_j$ switch, the result is game 7a; (5) only $U^L_k > \tilde{U}_k$ switches, the result is game 9b; (6) only $\tilde{U}_k > U^S_k$ switches, the result is game 1; or, (7) only $\tilde{U}_j > U^S_j$ switches, the result is game 3. The effect on $p^S_k$ and $p^S_j$, in the case of games 3 and 10b are as determined above for initial game 1; the pure strategy equilibria associated with these new games are reported in Table 4.

**D. Increase in $N^f$ if $\Theta > 0$ and $\frac{N^S_f}{N^f} T^S_k < T^f_k$ and $\frac{N^S_f}{N^f} T^S_j > T^f_j$.**

These derivations as exactly as given for C, above.
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