Does Centralization Affect the Number and Size of Lobbies?

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Abstract

Previous research has shown that the effect of fiscal centralization is to reduce lobbying. However empirical evidence suggests that this is not always the case. This paper attempts to explain the empirical evidence in a two-jurisdiction political economy model of endogenous lobby formation and policy determination. We measure lobbying in two ways: (i) the number of lobbies formed under the two settings and (ii) their impact on policy decisions. We show that, contrary to the predictions of the preference dilution effect, the effect of centralization on lobbying are ambiguous with respect to both measures of lobbies.

1. Introduction

This paper studies the effect that policy centralization has on lobbying. Previous research has shown that if countries "merge," (i.e., move to centralized policy choices) the effect is to reduce lobbying. The reason for this result, known in the literature as the "preference dilution effect," is that, given that preference heterogeneity increases under centralization, there is a smaller role in determining policy for politically important groups in each of the countries, and this renders decision making less responsive to factional interests, which dilutes the incentive to lobby, (see among others de Melo, Panagariya, and Rodrik 1993). This kind of argument was also used by Madison (1787/1987) in The Federalist Papers in support of a "well constructed Union" of American States.[1]

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[1]The smaller the society, the fewer probably will be the distinct parties and interests composing it; the fewer the distinct parties and interests, the more frequently the majority

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However, there are many other theoretical explanations why centralization might in fact increase the effectiveness of lobbying. For example, a decentralized system of policy making allows for competition among jurisdictions. Under a centralized system, on the other hand, policy makers are essentially monopolists and if a special interest manages to capture the regulator, there might be no recourse for those parties that are adversely affected. Also, merging two jurisdictions and centralizing the policy making process might well have the effect of expanding the scope for lobbying. In particular a group in one jurisdiction may induce the central policy maker to redistribute resources away from parties in another jurisdiction; this type of redistribution will simply be not possible if the jurisdictions are completely independent.

Also empirical evidence suggests that centralization does not necessarily reduce lobbying: the United States has very strong lobby groups at the federal level, and the number of registered lobbies at the European Union (EU) level has rapidly increased in the past recent years. For example, according to Stubb (2008), there are currently between 15,000 and 20,000 lobbyists and around 2500 lobbies in Brussels trying to influence EU policies, and these figures are growing steadily and are second only to Washington. The European Commission, following the recommendations of the report, and realizing the growing influence of interest groups on European policy determination, is introducing a lobbyists' register and a code of conduct for interest representatives as part of a wider transparency initiative.

Moreover, in a recent empirical study Fisman and Gatti (2002) and Treisman (1999) found evidence of a negative correlation between decentralization and corruption. In Italy, after the "tangentopoli"[2] political scandal erupted into national politics in 1992, the number of voters in favor of decentralization grew exponentially; the Northern League, the newly born party whose main political manifesto was the division of Italy into three regions, gained more than 15% of votes in the North of Italy.

This paper attempts to provide an explanation for this evidence by developing a two-jurisdiction political economy model of endogenous lobby formation and public good provision under policy centralization and policy decentralization,[3] where the public good provision choices can be affected

be found of the same party; and the smaller the number of individuals composing a majority, and the smaller the compass within which they are placed, the more easily will they concert and execute their plans of oppression. Extend the sphere, and you take in a greater variety of parties and interests; you make it less probable that a majority of the whole will have a common motive to invade the rights of the other citizens; or if such a common motive exists, it will be more difficult for all who feel it to discover their own strength and to act in unison with each other (Madison, 1787/1987).

[2]Translation from Italian: town of bribes.

[3]The role played by the level of government responsible for a policy decision in affecting the policy outcome has been broadly studied since Oates (1972). Recent works on centralization and policy outcomes in a political economy framework are due to Besley and Coate (2003) and Lockwood (2002).

by the pressure of endogenously formed lobbies.[4] In particular, we address the following questions. Are citizens more likely to organize a lobby if policy decisions are taken at a central or local level? And, once a lobby exists, "under which setting" does it have more influence on policy?

Despite the fact that this is an important political issue, and still an open question, very few studies have concentrated on this specific issue of the relationship between lobbies and the level of the government in charge of policy decision, Bardhan and Mookerjee (2000), Bordignon, Colombo, and Galmarini (2008), and Brou and Ruta (2006). These studies are, somehow, complementary to this one because they completely abstract from the distribution of preferences both within and between jurisdictions, which is, instead, the main focus of this paper (see Lockwood 2006 for a survey).

We model the political process following a simplified version of the citizen-candidate approach due to Besley and Coate (1997), and Osborne and Slivinski (1996), where policy makers are elected citizens who select the policy choice that maximizes their utility. We describe lobbies' behavior using the menu-auction[5] model of Bernheim and Whinston (1986) and Dixit, Grossman, and Helpman (1997). However this paper differs from these models in two respects. First, for simplicity, we do not model candidate entry but we assume that there is an "exogenous" set of candidates available. Second, the menu auction approach models the activity of "exogenous" lobby groups, that try to influence the policy choice toward their preferred policy choice by offering contributions to the policy-maker; the novelty in this paper is that lobbies are not taken as given but the "lobby formation stage" is modeled as well.[6]

Our model is very stylized; there are two jurisdictions, and in each jurisdiction a local public good is provided. In any jurisdiction, there are three different groups with low, medium, and high preferences for the local public good, with the medium preference group being the largest. Policy decisions can be centralized or decentralized. In the first case there exists only one policy-maker elected by residents in the two jurisdictions; in the latter case each jurisdiction selects a government which decides the policy independently from the other government. After elections determine the identity of

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[4]The role of lobbies in affecting policy outcomes has been recognized both by political scientists and economists and it has lead to a vast literature. Recently economists have started investigating the process of lobby formation (Felli and Merlo 2006, Leaver and Makris 2006, Mitra 1999) and its relationship with the political process (Besley and Coate 2001, Felli and Merlo 2006).

[5]Felli and Merlo (2006) use the citizen- candidate model to explore lobby formation. However the focus of their paper is on the bargaining process between lobbyists and policy maker and its consequences on policy outcomes.

[6]Besley and Coate (2001) study the impact of lobbies on political competition and policy outcome combining the citizen-candidate model with the menu-auction model, but in a model with endogenous entry of candidates and with respect to the central level of government only.

the policy-maker, citizens may form a lobby with citizens of their group and "bribe" the policy maker.

We measure the extent of lobbying in two ways: (i) the number of lobbies formed under centralization and decentralization and (ii) their impact on the policy decision. We then compare the outcomes under policy centralization and policy decentralization along these two dimensions.

The main results emerging from our analysis are as follows. We show that within a jurisdiction, lobby formation depends on heterogeneity of preferences and on group size, as well on groups' costs of lobby formation. Lobbies will form when preference heterogeneity between groups is high, when groups are large and when fixed costs are low. However in equilibrium, the more lobbies form the smaller will be their effect on policy. Interestingly, the policy-maker need not be from the majority moderate preference group when preference heterogeneity is intermediate, but is a moderate when heterogeneity is high or low.

We compare political equilibria under policy decentralization and policy centralization under two additional assumptions designed to ensure a "level playing field" between fiscal regimes. First, the per capita cost of lobby formation is assumed to be the same in both fiscal regimes, and second, the total population is assumed "large," so that the influence of the elected politician on policy is negligible in both fiscal regimes. Under these assumptions, we first find that the two fiscal regimes have the same numbers of lobbies per jurisdiction and the same policy distortions when the two regions are identical.

However, when the two regions are heterogeneous, with differing numbers of nonmoderates in each, we find that the effect of centralization on lobbying is ambiguous with respect to both measures of lobbies, contrary to the predictions of the preference dilution effect. Proposition 2 shows that in that case, centralization has an ambiguous effect on the number of lobbies per jurisdiction, depending on the degree of heterogeneity. Specifically, when the dispersion of preferences within jurisdictions is relatively low, the average number of lobbies per jurisdiction is higher under decentralization, and the reverse is true when the dispersion of preferences is relatively high.

In a similar way, Proposition 4 shows that with different numbers of nonmoderates in the two regions, centralization has an ambiguous effect on the number of lobbies per jurisdiction, depending on the degree of heterogeneity. Specifically, when the dispersion of preferences within jurisdictions is relatively low, the average policy deviation per jurisdiction is higher under centralization, and the reverse is true when the dispersion of preferences is relatively high.

The paper is organized as follows. Section 2 sets up the model. Section 3 characterizes the equilibrium with lobbying in any particular jurisdiction. The main results on the effect of centralization on lobbying are in Section 4. Welfare analysis and possible extensions are in Section 5.

2. The Model

2.1. The Economic Environment

There are two jurisdictions A and B with the same population size n. Residents in region $j = A, B$ are identical in their income (normalized to unity) and consume a private good, x, and a local public good, g_j, but they differ with respect to their preferences over the public good, as described below.

Output, y, is identical in each region and is produced from labor, which is inelastically supplied by each individual in an amount equal to unity. The production technology is assumed to be linear in total labor inputs, and without loss of generality, units are normalized so that the wage rate is unity. It follows that $y = n$. Output is used for private consumption and for the provision of the public good. The marginal rate of transformation between private consumption and the public good in production is assumed to be, without loss of generality, equal to unity.

With decentralization, provision of the local public good in each region, g_j, $j = A, B$, is funded by a proportional income tax levied at rate t_j set by a local government, which is assumed to be the only fiscal instrument available.[7] The level of private consumption for an individual residing in jurisdiction j is then $x^i_j = 1 - t_j$, and public good provision $g_j = t_j n$.

With centralization we assume, there is a common tax rate $t = t_A = t_B$, for both jurisdictions, so the government budget constraint is $g_A + g_B = 2tn$. We also assume uniform provision of both local public goods, so $g = g_A = g_B = tn$. The assumption of uniform provision of local public goods under centralization is crucial to the analysis, but this is a standard assumption in the literature (see for example Lockwood 2008 for a detailed discussion). Allowing for nonuniform provision under centralization, in this model, implies that under centralization the elected policy maker will provide positive public goods only in the jurisdiction of residence, and zero in the other. This is an extreme and unrealistic outcome. Instead, assuming uniformity is convenient, because it implies that in the benchmark case without lobbying, centralization and decentralization are equivalent (see Section 3.1).

Each citizen i has quasi-linear preferences over private consumption, x^i, and public good, g, of the form

$$u_i(x^i, g) = x^i - \frac{1}{2}\left(g - \theta^i - \frac{1}{n}\right)^2, \quad \theta^i \in \Re, \tag{1}$$

[7] Although our model accounts for preference heterogeneity, preferences are unobservable and thus taxes cannot be conditioned on them, even though policy makers may have full information about the distribution of preferences.

where we have, without ambiguity, dropped the region subscript j. So, with citizens with higher θs have higher valuations of the public good. Substituting out the personal and government budget constraints $x^i = 1 - t,\ g = tn$, we get:

$$u_i(t) = 1 - t - \frac{1}{2}\left(tn - \theta^i - \frac{1}{n}\right)^2, \quad j = A, B,\ \theta^i \in \Re. \tag{2}$$

It is easily seen that the tax that maximizes (2) is $t = \theta^i/n$. So, given our assumptions so far, θ^i is $i's$ most preferred level of public good provision under both fiscal regimes.

Citizens are divided into three different *types* according to their public good preferences. Thus, for all $i, \theta^i \in \{\theta_L, \theta_M, \theta_H\},\ \theta_L < \theta_M < \theta_H$. If a citizen i has preference type $\omega = L, M, H$, his valuation of the public good is $\theta^i = \theta_\omega$. Note that we use superscripts to refer to the preference parameters of individuals, and subscripts to refer to the preference parameters of types. In the whole population, let the set of citizens of preference type ω be N_ω, and let the number be $\#N_\omega = n_\omega$.

Citizens are immobile across jurisdictions and live either in jurisdiction A or B. The set of citizens of type ω residing in jurisdiction A is N_ω^A and their number is n_ω^A, and, similarly, the set of citizens of type ω residing in jurisdiction B is N_ω^B and their number is n_ω^B. Moreover, we assume:

A1. *(Single-peakedness).* The largest group in both jurisdictions is the one formed by citizens with moderate policy preferences, type M, i.e., $n_M^j > n_L^j, n_H^j,\ j = A, B$.

A2. *(Symmetry).* The two extreme groups are of the same size in each jurisdiction ($n_L^j = n_H^j = n_E^j$, $j = A, B$), and have preferences the same distance, from the group in the middle, i.e., $\theta_M - \theta_L = \theta_H - \theta_M = \sqrt{\delta}$.

Thus, δ is a parameter measuring the variance of preferences within a jurisdiction.[8] These two assumptions ensure that the distribution of preferences in each jurisdiction, and thus in the economy as a whole, is single-peaked and symmetric. This greatly simplifies the analysis while still allowing for a rich set of possibilities. Specifically, the two regions can differ in the proportion of nonmoderates, i.e., $n_E^A \neq n_E^B$, and within any jurisdiction, the two extreme preference groups can differ in their costs of organization (see below). The consequences of relaxing A1 and A2 are discussed in Section 5.1 below.

The level of public good is decided by the policy maker in charge of the policy after a three stage political process. The first stage is *election*, where citizens choose the preferred candidate from among the set of (exogenous) candidates. The second one is *lobby formation*, where citizens decide whether

[8]It is easily checked that the variance of θ within jurisdiction j is $2n_E^j\delta$.

or not to form a lobby with citizens of the same type. The third one is *lobbying*, where lobbies (if any) offer (monetary) contributions to the policy maker in order to move policy toward the lobby's preferred choice. Finally, the "policy selection stage," where the elected policy makers choose policy, given contributions. We describe below the political process and lobbying in more details.

2.2. Elections

If the policy choice is decentralized, each jurisdiction elects a policy maker who will decide the level of the local tax; if it is centralized the two jurisdictions elect a common representative who will set a common tax rate for both jurisdictions. Unlike Besley and Coate (1997) and Osborne and Slivinski (1996), we do not model candidate entry but we assume that there is a single candidate for each type of citizen. All citizens have a vote they must use for one of the candidates, and the candidate with most votes is the winner.[9] Under decentralization the type of the winner in jurisdiction $j = A, B$ is denoted $P_j \in \{L, M, H\}$ and, under centralization, the type of the winner is denoted $P \in \{L, M, H\}$.

It is well-known that in this environment, with plurality voting, there are a large number of Nash equilibria at the voting stage, and standard refinements (e.g., excluding weakly dominated equilibria) do not reduce the equilibrium set by very much[10] (Dhillon and Lockwood 2004). So, in order to focus on lobby formation, we use a standard equilibrium selection criterion; we assume that citizens vote sincerely, i.e., they vote for the candidate who maximizes their utility, anticipating her policy choice if elected.

Of course, we have to ensure that sincere voting is a Nash equilibrium. The following assumptions are sufficient for this to be the case. First, if a citizen of type ω is indifferent between a candidate of type ω and some other candidate(s), he will vote for the candidate of type ω. This ensures that all citizens of type ω (except possibly for the candidate of type ω) will vote in the same way. The second assumption is that some group is large enough so that with sincere voting, no-one is pivotal. This simply requires[11] $n_M^j \geq 2n_E^j + 2,\ \ j = A, B$, which is stronger than A1: we will assume it in what follows.[12]

[9] The assumption made below rules out ties.

[10] Dhillon and Lockwood (2004) show that excluding weakly dominated strategies only eliminates the strategy of voting for the least preferred alternative.

[11] This condition is explained as follows. Suppose that all citizens of type ω except the candidate of type ω prefer a candidate of type v. Then, whatever the preferences of the remaining agents, the citizens of type ω will determine the outcome if they are more numerous than all the remaining agents, i.e., $N_\omega - 1 \geq \sum_{v \neq \omega} N_v + 1$.

[12] This is the condition for sincere voting in each district under decentralization. This implies an analogous condition under centralization.

2.3. Lobby Formation

Following Mitra (1999), we assume that members of either preference group in a jurisdiction can coordinate their behavior, i.e., preference group $\omega = H, L$ will form a lobby if the benefits of doing so exceed the costs. (If the two are equal, we assume that the lobby will form). The costs consist of the costs of forming an organization, establishing links with politicians, hiring professional lobbyists. Moreover, note that we allow this fixed cost K_ω to differ across groups because of different organizational ability. In what follows, without loss of generality, we will assume that citizens of type H have lower costs of lobby formation compared with citizens of type L, i.e., $K_H \leq K_L$. We also make the following assumptions, which, along with A1, A2, keep the analysis tractable:

A3. *(No moderate lobbies).* K_M is so high that moderate voters $i \in N_M$ never organize into a lobby.

A3 ensures that we can focus just on lobbying by "extremist" preference groups. This, along with assumption A1, captures the idea[13] that minorities lobby because their preferences are not taken into account by the "tyranny of the majority."

For future reference, define Λ, Λ_A, Λ_B to be the sets of lobbies that form in the case of centralization (Λ) and in jurisdictions A, B in the case of decentralization. Also, as lobbies are also preference groups, we economize on notation by denoting a generic lobby as ω. Given the lobby formation rule above, the members of the lobby $\omega = H, L$ are the set $S_\omega = N_\omega / \{P\}$, if $P \in N_\omega$ and $S_\omega = N_\omega$ otherwise. So, if a lobby forms, its size $s_\omega = \#S_\omega$ is equal to n_ω if the policy maker is not a type ω and $n_\omega - 1$ otherwise.

Our assumption that members of the preference group can coordinate to form a lobby[14] is a standard one (Mitra 1999, Brou and Ruta 2006). In the absence of some rule, and when the fixed cost of lobby formation is large enough, the free-rider problem is so severe that lobbies never form in equilibrium, an uninteresting possibility (see Leaver and Makris 2006 for more discussion on this point).

2.4. Lobby Contributions and Policy Choice

Assume lobby ω has decided to form. Any member of this lobby makes a contribution $(C_\omega + K_\omega)/s_\omega$, where C_ω/s_ω is a payment to the policy-maker, and

[13]It does rule out completely symmetric preference groups, i.e., the case $K_L \neq K_H$, but that case is uninteresting anyway, because then equilibrium with one lobby never occurs, implying in turn that there cannot be any policy deviation in equilibrium.

[14]This kind of coordination among citizens during election is not possible, mainly because of the different nature of elections compared to lobbying decision. In the first case the vote is secret, so there is no way to verify it; in the second case there is perfect information on lobbying decision by other citizens of the same type. We thank an anonymous referee for pointing this out.

K_ω/s_ω is his share of the fixed cost. W.l.o.g., we assume that all lobby members make the same contribution. So, the sum of utilities of lobby members, which is also the lobby's objective function is:

$$\Pi_\omega = s_\omega\left(1 - t - \frac{1}{2}\left(tn - \theta_\omega - \frac{1}{n}\right)^2\right) - C_\omega - K_\omega. \tag{3}$$

We follow Bernheim and Whinston (1986) Dixit, Grossman, and Helpman (1997), and Besley and Coate (2001) in assuming that each lobby chooses a payment schedule that maximizes the utility of their members, taking as given the payment schedules offered by other lobbies and anticipating the policy maker's policy choice. Since we can have multiple equilibria in this game, we focus on truthful equilibria;[15] these equilibria always exist and are unique, and have the attractive characteristics of being both efficient and coalition proof (see Dixit, Grossman, and Helpman 1997).

From Dixit, Grossman, and Helpman (1997), Proposition 3, a truthful (or compensating) contribution schedule for lobby ω is

$$C_\omega(t, u_\omega) = \max\left\{0,\ s_\omega\left(1 - t - \frac{1}{2}\left(tn - \theta_\omega - \frac{1}{n}\right)^2\right) - K_\omega - u_\omega\right\}, \tag{4}$$

where u_ω is a constant representing the lobby net utility. These constants are solved for in equilibrium,[16] giving an equilibrium contribution schedule $C_\omega(t)$; see Section 3.2 below.

Finally, the policy-maker's utility, given contributions $C_\omega(t)$ is

$$1 - t - \frac{1}{2}\left(tn - \theta_P - \frac{1}{n}\right)^2 + \sum_{\omega\in\Lambda} C_\omega(t). \tag{5}$$

The optimal tax $t(P, \Lambda)$, maximizes this expression.

3. Political Equilibrium

In this section, we characterize political equilibrium. In the following discussion, we do not need to distinguish between centralization and decentralization, as we focus on equilibrium *within* a political jurisdiction. So, this characterization is a preliminary step; the main focus of interest of the paper is comparison of fiscal regimes, in Section 4 below. We begin with the benchmark case when lobbying is not possible.

[15]A truthful payment function for principal i rewards the agent for every change in the action exactly the amount of change in the principal welfare, provided that the payment both before and after the change is strictly positive. See Dixit, Grossman, and Helpman (1997, p. 759).

[16]We do not explicitly do this in the paper; we rely intead on a characterization of $C_\omega(t)$ from Dixit, Grossman, and Helpman (1997). See Appendix A1.

3.1. The Benchmark: Political Equilibrium without Lobbying

Since there is no *ex ante* policy commitment, the preferences of the elected policy maker will determine the policy; a type θ_ω candidate chooses the tax that maximizes her utility function, (5), setting $C_\omega(t) = 0$. This is easily calculated to be $t = \frac{\theta_\omega}{n}$. Moving to the voting stage, given our assumptions of sincere voting, the outcome must be that in any jurisdiction, the elected policy-maker has the preferences of the largest group in that jurisdiction, type M, both under decentralization and centralization. So when lobbying is not taken into account, centralization and decentralization produce the same outcome; an elected representative of type M, and a tax $t = \frac{\theta_M}{n}$.

3.2. Lobby Contributions and Policy Choice

As we have quasi-linear preferences, following Dixit, Grossman, and Helpman (1997), we know that $t(P, \Lambda)$ maximizes the weighted sum of policy-maker and lobby member utilities, not taking into account any contributions. This gives the equilibrium tax as

$$t(P, \Lambda) = \frac{\theta_P + \sum_{\omega \in \Lambda} s_\omega \theta_\omega}{n\left(\sum_{\omega \in \Lambda} s_\omega + 1\right)}. \tag{6}$$

This is a very simple formula; the equilibrium tax is a weighted average between the policy maker's and the lobbyists' ideal tax rates, $\frac{\theta_P}{n}$ and $\frac{\theta_\omega}{n}$, with the weights on the latter being the number of members of each lobby, s_ω.

Also, following Dixit, Grossman, and Helpman (1997), we use the well-known fact that the equilibrium contribution $C_\omega(t)$ must compensate (i) the policy-maker from moving to t from $t_{-\omega} = t(P, \{\Lambda/\omega\})$, i.e., the tax that would be chosen by the policy-maker if all lobbies but ω form; and (ii) the remaining lobbies from moving to t from $t_{-\omega}$. In Appendix A1, it is shown that given our symmetry assumptions, this formula for $C_\omega(t)$ simplifies to

$$C_\omega(t) = \frac{n^2}{2}(t - t_{-\omega})^2 \left(1 + \sum_{\nu \in \Lambda/\{\omega\}} s_\nu\right). \tag{7}$$

Finally, define

$$C_\omega(P, \Lambda) \equiv C_\omega(t(P, \Lambda)) = \frac{n^2}{2}(t(P, \Lambda) - t(P, \{\Lambda/\omega\})^2 \left(1 + \sum_{\nu \in \Lambda/\{\omega\}} s_\nu\right) \tag{8}$$

to be equilibrium contributions by lobby ω given that the policy-maker is P and a set of lobbies Λ form in equilibrium.

3.3. Lobby Formation

Now consider the lobby formation stage. In this section, we characterize $\Lambda^*(P)$, the set of lobbies that form, given any policy-maker of type P. From (3), the payoff to a type ω from policy-maker P, if lobbies Λ form is

$$\Pi_\omega(P, \Lambda) = 1 - t(P, \Lambda) - \frac{1}{2}\left(t(P, \Lambda)n - \theta_\omega - \frac{1}{n}\right)^2 - \frac{1}{s_\omega}[C_\omega(P, \Lambda) + K_\omega]. \tag{9}$$

Again from (3), if lobby ω does not form, a type ω gets instead an utility equal to

$$\Pi_\omega(P, \Lambda/\{\omega\}) = 1 - t(P, \Lambda/\{\omega\}) - \frac{1}{2}\left(t\,(P, \Lambda/\{\omega\})\,n - \theta_\omega - \frac{1}{n}\right)^2. \tag{10}$$

By Assumption A3, we only need consider the lobbying decisions faced by the two extreme groups H, L. As they move simultaneously, the two groups play the following 2×2 matrix game for every possible policy maker of type P, where F, N denote forming and not forming a lobby, respectively, and the row player is the group of citizens of type L and the column player is the group of type H.

	N	F
N	$\Pi_L(P, \{\emptyset\}), \Pi_H(P, \{\emptyset\})$	$\Pi_L(P, \{H\}), \Pi_H(P, \{H\})$
F	$\Pi_L(P, \{L\}), \Pi_H(P, \{L\})$	$\Pi_L(P, \{L, H\}), \Pi_H(P, \{L, H\})$

The payoffs in this game are given explicitly in (9), (10).

This game is analyzed in Appendix A3, where it is shown that whatever P, either the pure strategy equilibrium outcome of this game is unique, or if it is not unique, the only multiple equilibria are (N, N) or (F, F). To deal with this case, we select between equilibria (N, N) or (F, F) using Harsanyi and Selten's (1988, lemma 5.4.4. I) risk dominance selection criterion.[17] It turns out that this criterion always selects the two-lobby equilibrium (F, F).

Also in Appendix A3, it is shown that the equilibrium outcomes in the lobby formation game can be written as a function of underlying parameters δ, K_ω, n_E measuring preference heterogeneity, fixed costs, and number of extremists, as follows. First, when $P = M$, we show

[17]See Harsanyi and Selten (1988), lemma 5.4.4. I

$$\Lambda^*(M) = \begin{cases} \{\emptyset\} & \text{if } \delta < \min\left\{\dfrac{2K_H(1+n_E)}{n_E^2}, \dfrac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}\right\} \\ \{H\} & \text{if } \min\left\{\dfrac{2K_H(1+n_E)}{n_E^2}, \dfrac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}\right\} \le \delta < \dfrac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)} \\ \{L, H\} & \dfrac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)} \le \delta. \end{cases} \tag{11}$$

This is intuitive. When preference heterogeneity is small, i.e., δ small, no lobbies will form in equilibrium. When preference heterogeneity is intermediate, only an H-lobby might form as $K_H \le K_L$. Otherwise, both lobbies will form. It is easily checked that the conditions on δ, K_L, K_H for each of the three equilibria are mutually exclusive. Also, note an H-lobby forms (i.e., the relevant interval for δ is nonempty) iff $K_H < K_L \frac{1+n_E}{1+2n_E}$, so that the two preference groups must be sufficiently asymmetric in their costs of formation.

In the case $P = L$, we can write the equilibrium outcomes in the lobby formation game

$$\Lambda^*(L) = \begin{cases} \{\emptyset\} & \text{if } \delta < \dfrac{K_H(1+n_E)}{2n_E^2} \\ \{H\} & \text{if } \dfrac{K_H(1+n_E)}{2n_E^2} \le \delta < \dfrac{K_L(1+n_E)^2}{n_E(n_E-1)^2} \\ \{L, H\} & \text{if } \dfrac{K_L(1+n_E)^2}{n_E(n_E-1)^2} \le \delta. \end{cases} \tag{12}$$

Note now that there are always some values of δ for which the H-lobby forms in equilibrium. Finally, in the case of $P = H$

$$\Lambda^*(H) = \begin{cases} \{\emptyset\} & \text{if } \delta < \dfrac{K_L(1+n_E)}{2n_E^2} \\ \{L\} & \text{if } \dfrac{K_L(n_E+1)}{2n_E^2} \le \delta < \dfrac{K_H(1+n_E)^2}{n_E(n_E-1)^2} \\ \{L, H\} & \delta \ge \max\left\{\dfrac{K_H(1+n_E)^2}{n_E(n_E-1)^2}, \dfrac{K_L}{n_E}\right\}. \end{cases} \tag{13}$$

This has a similar interpretation to (11), (12). But note from (13) that if the interval $[\frac{K_H(1+n_E)^2}{n_E(n_E-1)^2}, \frac{K_L}{n_E}) \equiv D_{MS}$ is not empty, the case $\delta \in D_{MS}$ is not covered. If $\delta \in D_{MS}$, it turns out that there is no pure-strategy equilibrium. The reason is that for δ in this range, the H group only wants to lobby if the L group does, but the L group only wants to lobby if the H group does not. As shown in

Appendix A3, in this case, the probabilities that the H and L groups decide to lobby are

$$p_L = \frac{K_H(1+n_E)^2}{\delta n_E(n_E-1)^2},\; p_H = \frac{2n_E}{(n_E-1)} - \frac{K_L(1+n_E)}{n_E\delta(n_E-1)}. \tag{14}$$

Unfortunately, we cannot simply rule out this case by assuming K_H, K_L are such that D_{MS} is empty; the reason is that this is a rather strong assumption[18] that severely restricts the degree of cost asymmetry between groups, and rules out a political equilibrium with a single lobby forming. This in turn rules out any policy deviation in equilibrium, which is rather uninteresting. Rather, we will show later that if cost asymmetry is sufficiently large, this point is never reached in equilibrium, i.e., an H-type is never elected when $\delta \in D_{MS}$.

3.4. Voting

Note that by A1, we only need consider the voting behavior of the M-types, as this will completely determine the voting outcome. At the first stage of the game, $i \in N_M$ votes sincerely among the set of candidates, anticipating lobbying and policy choice, i.e., he anticipates payoff $\Pi_M(P, \Lambda^*(P))$ from policy-maker P. By (11)–(13), this payoff $\Pi_M(P)$ is uniquely defined, for all P. So citizens of type M will vote for a candidate of type P^* if $\Pi_M(P^*, \Lambda^*(P^*)) \geq \Pi_M(P, \Lambda^*(P))$, $P = M, L, H$.

All M voters (except the policy-maker, if she is of type M) only care about policy deviation, as they neither pay nor receive contributions in equilibrium. In fact, using (9),

$$\begin{aligned}\Pi_M(P, \Lambda^*(P)) &= 1 - t(P, \Lambda^*(P)) - \frac{1}{2}\left(t\left(P, \Lambda^*(P)\right)n - \theta_M - \frac{1}{n}\right)^2 \\ &= A - \left(t(P, \Lambda^*(P)) - \frac{\theta_M}{n}\right)^2,\end{aligned} \tag{15}$$

where A is a constant. So, $\Pi_M(P, \Lambda^*(P))$ depends only on the square of the distance between type $M's$ optimal policy choice ($t^* = \frac{\theta_M}{n}$) and the equilibrium policy choice $t(P, \Lambda^*(P))$. Call this absolute distance $D(P, \Lambda(P)) = |t^* - t(P, \Lambda)|$ the "policy deviation." Note now that the policy deviation is zero when no lobbies form, or when both lobbies form. In the other possible cases, using (6), we have

$$\begin{aligned} D(L, \{H\}) &= D(H, \{L\}) = \frac{\sqrt{\delta}(n_E-1)}{n_E+1} \\ D(M, \{H\}) &= \frac{\sqrt{\delta}n_E}{n_E+1},\; D(H, \{\emptyset\}) = D(L, \{\emptyset\}) = \sqrt{\delta}. \end{aligned} \tag{16}$$

[18] D_{MS} empty requires $K_H \geq \frac{(n_E-1)^2}{(n_E+1)^2}K_L$ which says that $K_H \simeq K_L$ for a large population.

So, combining (16), (15), it is easy to check that the following relationships hold

$$\begin{aligned}\Pi_M(M, \{\emptyset\}) &= \Pi_M(P, \{L, H\}) \text{ with } P = L, M, H \\ &> \Pi_M(L, \{H\}) = \Pi_M(H, \{L\}) > \Pi_M(M, \{H\}) \\ &> \Pi_M(H, \{\emptyset\}) = \Pi_M(L, \{\emptyset\}). \end{aligned} \tag{17}$$

We have assumed that in the event of indifference, M types will all vote for an M representative. So, (17) says that the only situation under which the majority group will vote for an extreme representative is when M-voters anticipate one lobby forming, in which case they vote for an extreme representative of the opposite type to counterbalance the lobby. Equation (17) will be used repeatedly below.

3.5. Characterization of Political Equilibrium

Here, we establish some properties of equilibrium which apply both to centralization and decentralization. Again, in this subsection, we do not need to distinguish between centralization and decentralization, as long as it is understood that the latter refers to the outcome in a single district, and the former in the entire economy. In what follows, we describe the political equilibrium simply by a triple of the form $\{P, \Lambda, t(P, \Lambda)\}$.

We focus on parameter ranges where mixed strategies in the lobby formation subgame are not played in equilibrium. This is simply because comparison of fiscal regimes becomes intractable if random numbers of lobbies are being formed in one or both regimes. Our first result says that when heterogeneity between groups in the cost of lobbying is small, the equilibrium always has a moderate policy-maker and zero or two lobbies:

LEMMA 1: *Assume $K_H \geq K_L \frac{1+n_E}{1+2n_E}$ (low group asymmetry). Then, if $\delta < \overline{\delta} \equiv \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}$, the equilibrium has a moderate policy maker and no lobbies, i.e., $\{M, \{\emptyset\}, t(M, \{\emptyset\})\}$. If $\delta \geq \overline{\delta}$, the equilibrium has a moderate policy maker and two lobbies, i.e., $\{M, \{L, H\}, t(M, \{L, H\})\}$.*

The intuition is as follows. When preference heterogeneity between groups, measured by δ, is low and/or the fixed costs of lobby formation, K_ω, are high enough for both lobbies, voters anticipate that if an M-type is elected, he will not be lobbied. Thus, by (17), moderate voters most prefer to vote for their own preference type. Conversely, when preference differences, are large, both lobbies will form if an M-type is elected, and anticipating this, voters in the decisive M group will vote for a moderate, again by (17).

Our second result says that when groups are sufficiently asymmetric, an equilibrium with any number of lobbies is possible, and the elected candidate may be of any type, a richer set of outcomes than the case of low group asymmetry. Moreover, as preference heterogeneity within the jurisdiction rises, i.e., as the extremists differ more and more in their preferences, the number of lobbies rises. This is intuitive; the higher the preference difference, the higher the benefit of being able to influence the choice of policy of the elected representative.

LEMMA 2: *Assume* $K_H \leq \frac{4(n_E-1)^3}{(n_E+1)^3 n_E} K_L$ *(high group asymmetry). Then: (i) if* $\delta < \underline{\delta} \equiv \frac{2K_H(1+n_E)}{n_E^2}$, *the equilibrium is* $\{M, \{\emptyset\}, t(M, \{\emptyset\})\}$; *(ii) if* $\underline{\delta} \leq \delta < \delta' \equiv \frac{K_L}{n_E}$, *the equilibrium is* $\{L, \{H\}, t(L, \{H\})\}$; *(iii) if* $\delta' \leq \delta < \overline{\delta}$ *the equilibrium is* $\{H, \{L, H\}, t(H, \{L, H\})\}$; *(iv) if* $\delta > \overline{\delta}$ *the equilibrium is* $\{M, \{L, H\}, t(M, \{L, H\})\}$.

Note that equilibrium is unique in case of both low and high asymmetry. Comparing this outcome to the benchmark described in Section 3.1, we see that there are two differences. First, with high asymmetry between groups, the policy-maker may be an extremist. Second, if the policy-maker is an extremist, the lobby can influence the outcome. But if the policy-maker is a moderate, due to the symmetry assumption A1, from (6), ever if lobbying occurs, the two lobbies offset each other and the tax is the same as without lobbying, i.e., $t(M, \{H, L\}) = \frac{\theta_M}{n}$.

Finally, we note that the condition $K_H \leq \frac{4(n_E-1)^3}{(n_E+1)^3 n_E} K_L$ is required to rule out the possibility of randomization over lobby formation on the equilibrium path; under this condition, when $\underline{\delta} \leq \delta < \delta'$, which is the range of values where randomization occurs conditional on the election of an H, it can be shown (see the proof of Lemma 2) that the moderate voters always prefer to elect an L-type instead and avoid randomization. This condition does come at a cost; it can easily be checked that $\frac{4(n_E-1)^3}{(n_E+1)^3 n_E} < \frac{1+n_E}{1+2n_E}$ for all $n_E \geq 1$, so there is a range of parameters corresponding to "intermediate" group asymmetry, i.e., where $\frac{4(n_E-1)^3}{(n_E+1)^3 n_E} < \frac{K_H}{K_L} < \frac{1+n_E}{1+2n_E}$ which we do not consider in our analysis.

Note finally that when only one lobby forms in equilibrium, it will always be the one opposing the policy maker and that the policy maker will be extreme. This result is consistent with Austen-Smith (1994), where if a lobby forms, it will be the one which disagrees with the policy maker's *ex ante* policy preferences, but is in contrast with Leaver and Makris (2006), where, because of free-riding within groups, the only possible lobby is the one sharing the same *ex ante* preferences as the policy maker.

4. The Effect of Centralization on Lobbying

4.1. The Number of Lobbies under Centralization and Decentralization

The purpose of this section is to compare the number of lobbies under the two fiscal regimes. To avoid the trivial result that lobbying increases under centralization because fixed costs are shared among more citizens, we assume that per capita fixed costs do not change with the fiscal regime. We do this by assuming that the fixed costs of lobby formation for groups H, L under decentralization are $K_H,\ K_L$ and $2K_H,\ 2K_L$ under centralization. In the real world this can be thought as an increase in the coordination costs among citizens of the same group because of geographical distance for example.

Moreover, we also wish to avoid results driven mechanically by the fact that there are more lobbyists (relative to the single policy-maker) under centralization; this tends to make the benefit of lobbying larger for either interest group, and thus make lobbying more likely under centralization.[19] The way that we do this is to allow the population n in each region to become large, while keeping the proportion of extremists n_E^j/n, $j = A, B$ in each region constant at ν_E^j. To streamline the exposition, and without loss of generality, we will assume that if the two jurisdictions are different, jurisdiction A has more extremists. In this case, jurisdiction preference differences are described by an $0 \leq \varepsilon \leq \nu_E$ such that $\nu_E^A = \nu_E - \varepsilon$, $\nu_E^B = \nu_E + \varepsilon$. We also keep per capita lobby formation costs constant at k_ω, i.e., $K_\omega = nk_\omega$; for this to be consistent with the conditions in Lemmas 1 and 2 as $n_E \to \infty$, we must thus assume that $k_H > \frac{k_L}{2}$ in the low asymmetry case, and $k_H = 0$ (i.e., the H-group can lobby costlessly) in the high asymmetry case. To state results cleanly, we will refer to the *limit case* as the one where $n = \infty$; this simply describes a situation where the policy-maker is of zero "size" relative to the population.

In the limit case, we first have the following equivalence result.

PROPOSITION 1: *Assume the two jurisdictions have the same preference distributions, i.e., $\varepsilon = 0$. Then, in the limit case, the outcome under the two fiscal regimes is equivalent. In particular, (i) with low asymmetry, equilibrium under either fiscal regime has zero lobbies per jurisdiction if $\delta < \frac{k_L}{\nu_E}$, and two lobbies per jurisdiction if $\delta \geq \frac{k_L}{\nu_E}$; (ii) with high asymmetry, equilibrium under either fiscal regime has one lobby per jurisdiction if $\delta < \frac{k_L}{\nu_E}$, and two lobbies per jurisdiction if $\delta \geq \frac{k_L}{\nu_E}$.*

This is not surprising. Under the assumptions made, under decentralization, each jurisdiction is, in the limit, a scaled-down version of the single jurisdiction under centralization. Note in this case that either zero, one, or two lobbies can form in equilibrium.

The interesting question is what happens when the two jurisdictions have different preference distributions. We can show that irrespective of whether groups are highly asymmetric or not, the fiscal regimes can be ranked in the same way with respect to the average number of lobbies per jurisdiction.

PROPOSITION 2: *Assume the two jurisdictions have different preference distributions, i.e., $\varepsilon > 0$. Then, in the limit case, with both low and high asymmetry, (i) if*

[19]One might regard this as a reasonable description of reality if one believes that there are economies of scale in the delivery of government services, i.e., government is smaller relative to the electorate in larger jurisdictions. There is certainly some evidence that this is the case (Tresch and Zlate 2007).

$\frac{k_L}{\nu_E+\varepsilon} \leq \delta < \frac{k_L}{\nu_E}$*, the average number of lobbies per jurisdiction is higher under decentralization; (ii) if* $\frac{k_L}{\nu_E} \leq \delta < \frac{k_L}{\nu_E-\varepsilon}$*, the average number of lobbies per jurisdiction is higher under centralization; (iii) otherwise, the average number is the same.*

The explanation for this is the following. Consider the case of low preference asymmetry, for example. The interpretation of $\frac{k_L}{n_E+\varepsilon}$ (resp. $\frac{k_L}{n_E-\varepsilon}$) is that it is the critical value at which the equilibrium in jurisdiction A (resp. B) switches from no lobbies to two lobbies. Then, if $\frac{k_L}{n_E+\varepsilon} \leq \delta < \frac{k_L}{\nu_E}$, there are two lobbies in jurisdiction A under decentralization, and none in B, and no lobbies under centralization. So, the average number of lobbies under decentralization is greater. If $\frac{k_L}{\nu_E} \leq \delta < \frac{k_L}{n_E-\varepsilon}$, there are two lobbies in jurisdiction A under decentralization, and none in B, but now two lobbies under centralization. So, the average number under centralization is greater. Outside these ranges, the average number in both fiscal regimes is obviously the same.

Finally, it is worth noting that the "preference dilution effect" referred to in the introduction is only partially confirmed by Proposition 2. In particular, part (ii) of the proposition states the opposite, i.e., that the number of lobbies per jurisdiction will be higher with centralization.

4.2. Policy Deviation under Centralization and Decentralization

We now compare equilibrium policy deviation under centralization and decentralization. The first point is that from Lemma 1, with low group asymmetry, there is no policy deviation in equilibrium. This is because from (6), $t(M, \emptyset) = t(M, \{H, L\}) = \theta_M/n$. So, in what follows, we restrict attention to the high group asymmetry case.

Now define $D_D^j(P, \Lambda), D_C(P, \Lambda)$ to be the policy deviations under decentralization in $j = A, B$ and centralization, respectively. Moreover, using Lemma 2, we can summarize policy deviations associated with political equilibrium as follows:

$$\begin{aligned} D_D^j(P, \{\emptyset\}) &= D_D^j(P, \{L, H\}) = \\ D_C(P, \{\emptyset\}) &= D_C(P, \{L, H\}) = 0, \quad P = L, M, H \\ D_D^j(L, \{H\}) &= \frac{\sqrt{\delta}\left(n_E^j - 1\right)}{n_E^j + 1}, \; D_C(L, \{H\}) = \frac{\sqrt{\delta}\,(2n_E - 1)}{2n_E + 1}. \end{aligned} \tag{18}$$

It is clear from (18) that in comparing policy deviations, there is the obvious problem that under decentralization, there can be a different equilibrium policy deviation in each of the two regions, whereas there is a single deviation under centralization.

This problem is manageable, however, if we consider the limit case where $n = \infty$, as in the previous subsection. Then, from (18), letting $n_E \to \infty$, it is easy to check that if only one lobby forms in a jurisdiction, the policy deviation in that jurisdiction will be equal to $\sqrt{\delta}$; otherwise, the policy deviation is equal to zero. So, it is then possible to compare "average policy deviations per jurisdiction" across regimes. That is, the average under centralization can be $\sqrt{\delta}$ or 0, and under decentralization, $\sqrt{\delta}$, $\sqrt{\delta}/2$, or 0. We can then prove an equivalence result analogous to Proposition 1 above:

PROPOSITION 3: *Assume in the limit case, that the two jurisdictions have the same preference distributions, i.e., $\varepsilon = 0$. Then the outcomes under the two fiscal regimes are equivalent. In particular, equilibrium under either fiscal regime has policy deviation $\sqrt{\delta}$ in every jurisdiction if $\delta < \frac{k_L}{\nu_E}$, and policy deviation 0 in every jurisdiction $\delta \geq \frac{k_L}{\nu_E}$.*

The explanation for this is simple. By assumption, we are only considering the high asymmetry case. Thus, when $\delta < \frac{k_L}{\nu_E}$, in either fiscal regime, only the H-lobby forms, and thus, by (18), there is positive policy deviation in the direction of higher public good provision. But, if $\delta \geq \frac{k_L}{\nu_E}$, in either fiscal regime, both lobbies form, and thus, by (18), their efforts cancel out and the efficient level of the public good is provided.

Now we turn to the more interesting case of different preference distributions. Now we have:

PROPOSITION 4: *Assume, in the limit case, that the two jurisdictions have different preference distributions, i.e., $\varepsilon > 0$. Then, (i) if $\frac{k_L}{\nu_E+\varepsilon} \leq \delta < \frac{k_L}{\nu_E}$, the average policy deviation per jurisdiction is higher under centralization; (ii) if $\frac{k_L}{\nu_E} \leq \delta < \frac{k_L}{\nu_E-\varepsilon}$, the average policy deviation is higher under decentralization; (iii) otherwise, the average deviation is the same.*

This works as follows. Specifically, when $\frac{k_L}{\nu_E+\varepsilon} \leq \delta < \frac{k_L}{\nu_E}$, there is one lobby with centralization and one in region B with decentralization, but two lobbies in region A, implying that average distortion is $\sqrt{\delta}$ under centralization and $\frac{\sqrt{\delta}}{2}$ under decentralization. When $\frac{k_L}{\nu_E} \leq \delta < \frac{k_L}{\nu_E-\varepsilon}$, there are two lobbies with centralization and two lobbies in region A with decentralization, but one lobby in region B, implying that average distortion is 0 under centralization and $\frac{\sqrt{\delta}}{2}$ under decentralization. For all other values of δ, the number of lobbies is the same under both fiscal regimes. So, policy distortion can be higher or lower under centralization than under decentralization; it all depends on the amount of preference dispersion within a jurisdiction. Note that this result is again in contrast with the prediction of the preference dilution effect, says that centralization always reduces lobbying (de Melo, Panagariya, and Rodrik 1993).

5. Extensions

5.1. The Case of Extreme Majorities

So far, we have assumed that the extreme preference groups are of equal size and are smaller than the moderates. How are the results presented in the previous sections affected by relaxing these assumptions? Continue to assume for the moment that the moderates the largest group, but that (for example), there are more L-types than H-types in each jurisdiction. Under the assumptions made in Section 4, i.e., in the asymptotic case, if the jurisdictions are identical, then fiscal regimes will still be equivalent. But, suppose now that the relative number of L-types and H-types varies across jurisdictions. Then, in the region where the L-types are less numerous, they are less likely to lobby, reinforcing the effect of $K_H \leq K_L$. By contrast, in the region where the L-types are more numerous, they are more likely to lobby, offsetting the effect of $K_H \leq K_L$. Overall, I conjecture that this additional asymmetry is unlikely to change the main finding that with heterogenous regions, there may be either more or less lobbying with decentralization.

Now consider what happens if the largest group is extremist rather than moderate. First of all, note that the policy choice under the benchmark would now correspond to the policy choice preferred by an extremist and therefore, any non lobby-free equilibrium will generate policy moderation, in the sense that the policy choice implemented will be somewhere between the two extreme ideal policies.

Note also that we cannot rule out the possibility of an equilibrium without lobbies but different from the benchmark equilibrium (which cannot happen when the largest group is moderate). This can occur, for example, when the plurality group votes for the moderate candidate and no lobby forms, rather then voting for an extreme candidate who will be lobbied. This means that the simple threat of lobbying has changed the voting strategies of the plurality group toward a policy closer to the moderate minorities. This is similar to the finding of Felli and Merlo (2006) that in general the possibility of lobbying moves the policy choice toward moderation, even when no lobby forms in equilibrium.

Moreover, since the distance between the plurality group and at least one of the minority group is larger when the largest group is an extremist than when it is a moderate, we should expect in this scenario, *ceteris paribus*, that the equilibrium is less likely to be lobby-free, so that both one and two lobbies are more likely to form.

Let us now focus on the comparison between decentralization and centralization outcomes. With identical preference distributions in the two jurisdictions, moving from decentralization to centralization will unambiguously cause an increase in lobbying, which in turn will move the policy toward the center. When preferences are different across jurisdictions, clearly it is possible that the equilibrium under the benchmark corresponds to the policy choice preferred by the moderate group, because of preference aggregation.

5.2. Lobbying, Centralization, and Welfare

Is lobbying a good or a bad thing? When every citizen is either a lobbyist or a policy maker the policy choice corresponds to the optimal policy choice chosen by a benevolent dictator, who maximizes the sum of citizens welfare. So in principle, if we abstract from redistribution issues (the contribution paid by the lobbyists to the policy maker) and if the fixed costs of lobby formation are not too high, lobbying is a good thing that should be encouraged. But this is an ideal world.

For example, consider the case discussed in detail in this paper of moderate majorities, and symmetric preference distribution; the policy choice corresponds, without lobbying, to the preferred policy choice of the moderate group, which in our setting coincides with the optimal policy choice for the society as a whole. So any equilibrium with lobbying will be in principle worse off for the society, even if there is no effect on policy in equilibrium. In the case of two lobby equilibria, the policy choice corresponds to the social optimum, however, there is a waste equal to the fixed costs of lobby constitution. In addition lobby members have to pay contributions without achieving any benefit from that, because the policy maker is able to capture all their surplus. If only one lobby forms in equilibrium the policy choice does not coincide with the optimal policy, and the majority of the society (i.e., the moderate group plus the nonlobbying extremist group) will be worse off.

But, if we consider the case of extreme majorities, instead, lobbying can be a good thing, since any non lobby-free equilibrium will be more moderate than the outcome under the benchmark, and this is in particular true when a moderate policy maker is elected and no-lobby form.

What can we say about lobbying, centralization and welfare? In the simplest case of two identical jurisdictions centralizing policy, centralization and decentralization are equivalent both with respect to policy deviation and number of lobbies.

If the two jurisdictions have different preference distributions, a set of possibilities can occur as depicted in Proposition 4. When centralization causes more policy deviation then the majority of citizens in both jurisdictions will unambiguosly prefer decentralization, so a referendum on centralization will be rejected. When centralization causes less policy deviation then centralization is weakly preferred by one jurisdiction and the two regimes are indifferent for the other, so the outcome of a referendum on centralization will depend on the voting rules.

A similar question is investigated in Lockwood (2008), who focuses on the robustness of Decentralization Theorem when lobbying is taken into account; he found examples where decentralization welfare-dominates centralization with externalities and identical preferences across regions and; where, instead, centralization welfare-dominates decentralization with no externalities and different preferences across regions.

6. Discussion and Conclusion

This paper has analyzed the relationship between the level of centralization of policy decisions and lobby formation. We have developed a formal framework where we combine the citizen–candidate model with the menu-auction model of lobbying, extended to endogenous lobbying. We have discussed the relationship between our results and existing results in the lobbying literature, and their implications (de)centralized policy decision-making.

In the first part of the paper we have presented and analyzed the model of endogenous lobbying formation and policy choice. We have shown that lobby formation depends on the amount of preference heterogeneity between groups(measured by δ, n_E) as well on groups' cost of organization. In particular lobbies will form when preference heterogeneity between groups is high, when groups are large and when fixed costs are low. When there is enough heterogeneity in groups' cost of organization, only the lower cost lobby will form. The majority moderate group may, in equilibrium, elect an extremist to counter-balance lobbying by an extremist from the other preference group; in that event, lobbing does affect policy in equilibrium.

Our findings relate to an existing literature. On the one hand, Besley and Coate (2001) and Leaver and Makris (2006) found that lobbying never affects policy. In the first case, Besley and Coate in their citizen–candidate model with exogenous lobbies, suggest that the reason is that citizens can predict lobbying activity and completely offset their influence by strategically voting for a candidate of a different type; of course this is possible when the set of possible candidates is wide enough for this choice. In the second case, the authors suggest that free-riding prevents lobbies from forming, so that no contributions are due in equilibrium, and this situation corresponds to the one where only the friendly lobby will form. On the other hand, Felli and Merlo (2006) argue with this result and demonstrate that lobbying always matters. They show that an "extremist" candidate is elected and implements a "centrist" policy, which differs from the median voter preferred outcome.

In the second part, we have analyzed the model focusing the comparison of political equilibria under policy decentralization and policy centralization, we have looked at two different measures of lobbies: the number of lobbies and their effect on policy. We have shown that, contrary to the predictions of the preference dilution effect, which suggest that centralization will imply less lobbying, the effect of centralization on lobbying are ambiguous with both measures of lobbies. So the arguments presented in the past in support of the preference dilution effect are not robust to our specification.

There is still a lot to be done to develop a more completed picture of the effect of policy centralization on lobbying. First, in this model we only have accounted for preference heterogeneity among consumers, a more sophisticated representation of the reality could improve the analysis: for example, we could introduce different factor owners or different income distributions. Second, we assume that citizens vote sincerely over the set of candidates. It would be interesting to explore strategic voting and endogenous lobbying. Finally, centralization and decentralization are here depicted in a very stylized way, it would probably be worthwhile to take into account different concepts of centralization like the existence of different levels of government at the same time.

Appendix

A.1. Derivation of the Truthful Contributions

Following Dixit, Grossman, and Helpman (1997), we use the well-known fact that the equilibrium contribution must compensate (i) the policy-maker from moving to t from $t_{-\omega} = t(P, \{\Lambda/\omega\})$, i.e., the tax that would be chosen by the policy-maker if all lobbies but ω form; and also compensate (ii) the remaining lobbies from moving to t from $t_{-\omega}$. So,[20] the equilibrium contribution by lobby ω must be

$$\begin{aligned}
C_\omega(t) &= \left\{\left(1 - t_{-\omega} - \frac{1}{2}\left(t_{-\omega}n - \theta_P - \frac{1}{n}\right)^2\right)\right. \\
&\qquad \left. - \left(1 - t - \frac{1}{2}\left(tn - \theta_P - \frac{1}{n}\right)^2\right)\right\} \\
&\qquad + \sum_{\nu\in\Lambda/\{\omega\}} s_\nu \left\{\left(1 - t_{-\omega} - \frac{1}{2}\left(t_{-\omega}n - \theta_\nu - \frac{1}{n}\right)^2\right)\right. \\
&\qquad\qquad \left. - \left(1 - t - \frac{1}{2}\left(tn - \theta_\nu - \frac{1}{n}\right)^2\right)\right\} \\
&= (t - t_{-\omega})n\left[\frac{n}{2}(t + t_{-\omega})(1 + s_v) - \left(\theta_P + \sum_{\nu\in\Lambda/\{\omega\}} s_v\theta_v\right)\right] \\
&= (t - t_{-\omega})n\left[\frac{n}{2}(t + t_{-\omega})(1 + s_v) - \left(1 + \sum_{\nu\in\Lambda/\{\omega\}} s_v\right)nt_{-\omega}\right] \\
&= \frac{n^2}{2}(t - t_{-\omega})^2\left(1 + \sum_{\nu\in\Lambda/\{\omega\}} s_\nu\right),
\end{aligned}$$

where in the first line, the term in the first curly brackets is the loss to the policy-maker, and the term in the second curly brackets is the loss to the other lobby(s). In the third line, we use $t_{-\omega} = \frac{(\theta_P + \sum_{\nu\in\Lambda/\{\omega\}} s_v\theta_v)}{(1+\sum_{\nu\in\Lambda/\{\omega\}} s_v)n}$ from (6). Lines two and four follow from the previous lines just by manipulation.

[20]This implicitly defines u_ω via the fact that $C_\omega(t)$ must also be equal to the RHS of (4). In fact, out ultimate objective is to obtain $C_\omega(t)$, not u_ω, so we do not bother with this calculation.

A.2. Derivation and Properties of $\Delta_\omega(P, \Lambda), \delta^\omega(P, \Lambda)$

Let the gain to forming a lobby for a group of type ω be

$$\Delta_\omega(P, \Lambda) = \Pi_\omega(P, \Lambda) - \Pi_\omega(P, \Lambda/\{\omega\}) \tag{A1}$$

given a policy maker P, and given a set of lobbies $\Lambda/\{\omega\}$ formed by other citizens. Using (6), (8), after simplification, (A1) becomes

$$\begin{aligned}\Delta_\omega(P, \Lambda) &= \frac{n^2}{2}\left[t(P, \Lambda/\{\omega\}) - t(P, \Lambda)\right]^2 \frac{1+\sum_{\nu\in\Lambda} s_\nu}{s_\omega} - \frac{K_\omega}{s_\omega}\\ &= \frac{1}{2}\frac{s_\omega}{\left(1+\sum_{v\in\Lambda} s_v\right)}\left[\frac{\theta_P + \sum_{\nu\in\Lambda/\omega} s_v\theta_v}{\left(\sum_{v\in\Lambda/\omega} s_v + 1\right)} - \theta_\omega\right]^2 - \frac{K_\omega}{s_\omega}.\end{aligned} \tag{A2}$$

To proceed, we focus on the case $P = M$. Other cases are very similar. From (A2), using $\theta_H = \theta_M + \delta, \theta_L = \theta_M - \delta$, and from A1, $s_\omega = n_\omega = n_E$, $\omega = H, L$, we get

$$\Delta_\omega(M, \{\omega\}) = \frac{n_E}{2(1+n_E)}\delta - \frac{K_\omega}{n_E},\ \Delta_\omega(M, \{H, L\}) = \frac{n_E(1+2n_E)}{2(1+n_E)^2}\delta - \frac{K_\omega}{n_E}. \tag{A3}$$

So, from (A3), there is unique $\delta^H(M, \Lambda)$, such that $\Delta_\omega(M, \Lambda) \geq 0 \Longleftrightarrow \delta \geq \delta^\omega(M, \Lambda)$, i.e., it pays group ω to lobby iff $\delta \geq \delta^\omega(M, \Lambda)$. Specifically, from (A3):

$$\delta^\omega(M, \{\omega\}) = \frac{2K_\omega(1+n_E)}{n_E^2},\ \omega = H, L, \delta^\omega(M, \{L, H\}) = \frac{2K_\omega(1+n_E)^2}{n_E^2(1+2n_E)}. \tag{A4}$$

In the same way, we can calculate

$$\begin{aligned}\delta^H(L, \{H\}) &= \frac{K_H(1+n_E)}{2n_E^2},\ \delta^H(L, \{L, H\}) = \frac{K_H}{n_E}\\ \delta^L(L, \{L, H\}) &= \frac{K_L(1+n_E)^2}{n_E(n_E-1)^2}.\end{aligned} \tag{A5}$$

Note that we set $\delta^L(L, \{L\}) = \infty$ as $\Delta_L(L, \{L\}) < 0$ for $\delta \in \Re$. Finally, we have

$$\delta^H(H, \{L, H\}) = \frac{K_H(n_E + 1)^2}{n_E(n_E - 1)^2}, \ \delta^L(H, \{L, H\}) = \frac{K_L}{n_E}$$
$$\delta^L(H, \{L\}) = \frac{K_L(n_E + 1)}{2n_E^2}. \tag{A6}$$

Note that we set $\delta^H(H, \{H\}) = \infty$ as $\Delta_H(\delta; H, \{H\}) < 0$ for $\delta \in \Re^+$.

A.3. The Lobby Formation Subgame

We first consider the case $P = M$. There is a Nash equilibrium (N, N) of the lobbying subgame if $\Pi_\omega(M, \{\omega\}) < \Pi_\omega(M, \{\emptyset\}),\ \omega = H, L$. Recall that $\Delta_\omega(P, \Lambda) = \Pi_\omega(P, \Lambda) - \Pi_\omega(P, \Lambda/\{\omega\})$ for $\omega \in \Lambda$. Then, the conditions for a Nash equilibrium (N, N) are $\Delta_\omega(M, \{\omega\}) < 0,\ \omega = H, L$. From Appendix A2, we can write this condition in terms of δ as $\delta < \delta^\omega(M, \{\omega\}), \omega = H, L$. Finally, from (A4), as $K_H \leq K_L$, a Nash equilibrium (N, N) exists if $\delta < \frac{2K_H(1+n_E)}{n_E^2}$.

By a similar argument, there is a Nash equilibrium in pure strategies with only lobby H forming, (N, F) if $\delta^H(M, \{H\}) \leq \delta < \delta^L(M, \{L, H\})$, where the critical values of δ are defined in (A4). This reduces to $\frac{2K_H(1+n_E)}{n_E^2} \leq \delta < \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}$. Finally, there is a Nash equilibrium (F, F) iff $\delta \geq \delta^L(M, \{H, L\}), \delta^H(M, \{H, L\})$, which again using (A4), reduces to $\delta \geq \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}$.

So, multiple equilibria $(N, N),\ (F, F)$ exist if $\frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)} \leq \delta < \frac{2K_H(1+n_E)}{n_E^2}$. In this case, we apply the risk dominance equilibrium selection criterion of Harsanyi and Selten (1988). In this set up lobbying by both group is the risk dominant equilibrium if

$$\Delta_\omega(M, \{\omega, v\})\, \Delta_v(M, \{\omega, v\}) > \Delta_\omega(M, \{\omega\})\, \Delta_v(M, \{v\}).$$

However, from (A3), this reduces to

$$(AB - C_H)(AB - C_L) > (B - C_H)(B - C_L)$$
$$A = \frac{1 + 2n_E}{1 + n_E} > 1,\ B = \frac{n_E}{2(1 + n_E)}\delta,\ C_\omega = \frac{K_\omega}{n_E}$$

which always holds as $A > 1$. So, we conclude that (i) the outcome is (F, F) whenever $\frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)} \leq \delta$; (ii) (N, N) whenever $\delta < \min\{\frac{2K_H(1+n_E)}{n_E^2}, \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}\}$, and (iii) (N, F) otherwise. This completes the derivation of formula (11) giving $\Lambda^*(M)$.

Derivations of $\Lambda^*(L)$ in (12), and $\Lambda^*(H)$ in (13) closely follow the above derivation, and are thus omitted to save space (details are available on request from the author). The final step is to obtain (14) when $\delta \in D_{MS}$.

Probability p_H must make the L-group indifferent between lobbying and not, i.e.,

$$(1 - p_H)\Pi^L(H, \{\emptyset\}) + p_H \Pi^L(H, \{H\})$$
$$= (1 - p_H)\Pi^L(H, \{L\}) + p_H \Pi^L(H, \{L, H\}).$$

Rearranging, using the notation in (A1) gives

$$p_L = \frac{\Delta^H(H, \{H\})}{\Delta^H(H, \{H\}) - \Delta^H(H, \{L, H\})}. \tag{A7}$$

Now, by substituting (A2) into (A7), we get p_H in (14). The probability p_L is derived similarly.

A.4. Proofs of Lemmas and Propositions

Proof of Lemma 1: If a policy maker of type M is elected, from (11), the equilibrium will have no lobbies if

$$\delta < \min\left\{\frac{2K_H(1+n_E)}{n_E^2}, \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}\right\} = \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)} = \overline{\delta},$$

where the first equality follows from $K_H \geq K_L \frac{1+n_E}{1+2n_E}$. So, from (17), if an M-type votes for the M candidate, he gets the maximum possible payoff. Given the tie-breaking rule (that voters will vote for their own type if indifferent about the outcome), all M-types will vote for the M candidate, and so $\{M, \{\emptyset\}, t(M, \{\emptyset\})\}$ is the unique political equilibrium.

Similarly, if a policy maker of type M is elected, from (11), the equilibrium will have two lobbies if $\delta \geq \overline{\delta}$. So, from (17), if an M-type votes for the M candidate, he gets the maximum possible payoff. Given the tie-breaking rule (that voters will vote for their own type if indifferent about the outcome), all M-types will vote for the M candidate, and so $\{M, \{H, L\}, t(M, \{H, L\})\}$ is the unique political equilibrium. ■

Proof of Lemma 2:

(i) Note that if $K_H \leq \frac{4(n_E-1)^3}{(n_E+1)^3 n_E} K_L$, then $\frac{K_L}{n_E} \geq \frac{2K_H(1+n_E)^2}{n_E(1-n_E)^2}$, for all $n_E \geq 1$. Then, from (13) if $\delta \geq \delta' = \frac{K_L}{n_E}$, two lobbies form if a type H is elected. Also, note by direct calculation, using $K_H \leq \frac{4(n_E-1)^3}{(n_E+1)^3 n_E} K_L$, that $\underline{\delta} < \delta' < \overline{\delta}$. Finally, note that if $K_H \leq \frac{4(n_E-1)^3}{(n_E+1)^3 n_E} K_L$, $\frac{2K_H(1+n_E)}{n_E^2} \leq \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}$, so that if an M is elected, no lobby will form if $\delta < \underline{\delta} = \frac{2K_H(1+n_E)}{n_E^2}$.

(ii) Assume $\delta < \underline{\delta}$. Given the inequalities in (i), it is clear that if $\delta < \underline{\delta}$, if an M-type is elected, no lobbies form, so M-type voters will always elect an M-type, by (17).

(iii) Assume $\underline{\delta} \leq \delta < \delta'$. Then, if M or L is elected, lobby H forms. By (17), the M-type voter prefers to elect L rather than M. It remains to show that the M-type voter prefers to elect L rather than H. If L is elected, the moderate voter gets $\Pi_M(L, \{H\})$. If H is elected, δ is always in the range where randomization over lobby formation occurs, so the expected payoff to voting for H is

$$E\Pi^M = p_L p_H \Pi^M(H, \{L, H\}) + (1 - p_L) p_H \Pi^M(H, \{H\}) + (1 - p_H) p_L \Pi^M(H, \{L\}) + (1 - p_L)(1 - p_H)\Pi^M(H, \{\emptyset\}).$$

After a long and tedious computation (see the attached not-for-publication appendix), available on request from the author, it can be shown that $\Pi_M(L, \{H\}) - E\Pi^M$ is proportional to

$$f(\delta) = 4n_E^3 b^2 \delta^2 - 2a^3 n_E^2 K_H \delta + a^3 b K_L K_H,$$

where $a = n + 1$, $b = n - 1$. This is a convex quadratic in δ with a minimum at $\delta_{\min} = \frac{a^3 K_H}{4n_E b^2}$. So, the M-type always prefers to vote for an L-type rather than an H-type for all $\delta \in D_{MS}$ if $f(\delta_{\min}) \geq 0$. It can easily be checked that this reduces to $K_H \leq \frac{4(n_E-1)^3}{(n_E+1)^3 n_E} K_L$.

(iv) Assume $\delta' \leq \delta < \overline{\delta}$. If M or L is elected, only one lobby forms from (11) and (12) respectively. But, as $\delta \geq \delta'$, if H is elected, two lobbies will form. So, by (17), the M-type voters prefer to vote for H.

(v) Assume $\delta \geq \overline{\delta}$. If M is elected, two lobbies form from (11). So, from (17) and the tie-breaking rule, M-type voters vote for M. ■

Proof of Proposition 1: Equivalence of fiscal regimes is obvious. To prove the remainder, assume fist low asymmetry. From Lemma 1, the critical value of δ at which the equilibrium switches from zero to two lobbies is $\overline{\delta} = \frac{2K_L(1+n_E)^2}{n_E^2(1+2n_E)}$. Using $n_E = n\nu_E$, $K_\omega = nk_\omega$, we can always write $\overline{\delta}$ in a jurisdiction with population n, per capita lobbying costs k_L and share of extremists ν_E as

$$\overline{\delta} \equiv \frac{2nk_L(1 + n\nu_E)^2}{(n\nu_E)^2(1 + 2n\nu_E)}. \tag{A8}$$

Taking the limit in (A8) as $n \to \infty$, we get $\lim_{n\to\infty} \overline{\delta} = \frac{k_L}{\nu_E}$. Now assume high asymmetry. From Lemma 2, the critical value of δ at which the equilibrium switches from one to two lobbies is $\delta' = \frac{K_L}{n_E}$. So, Taking the limit as $n \to \infty$, we get $\lim_{n\to\infty} \delta' = \frac{k_L}{\nu_E}$. ■

Proof of Proposition 2: We prove this only for the low asymmetry case. The proof for the high asymmetry case is identical. First, by an argument similar to that in Proposition 3, the interpretation of $\frac{k_L}{\nu_E+\varepsilon}$ (resp. $\frac{k_L}{\nu_E-\varepsilon}$)

is that it is the critical value at which the equilibrium in jurisdiction A (resp. B) switches from no lobbies to two lobbies. Then, if $\frac{k_L}{\nu_E+\varepsilon} \leq \delta < \frac{k_L}{\nu_E}$, there are two lobbies in jurisdiction A under decentralization, and none in B, and no lobbies under centralization. So, the average number under decentralization is greater. If $\frac{k_L}{\nu_E} \leq \delta < \frac{k_L}{\nu_E-\varepsilon}$, there are two lobbies in jurisdiction A under decentralization, and none in B, but now two lobbies under centralization. So, the average number under centralization is greater. Outside these ranges, the average number in both fiscal regimes is obviously the same. ■

Proof of Proposition 3: Equivalence of fiscal regimes is obvious. To prove the rest of the Proposition, we use Lemma 2. Using $n_E = n\nu_E$, $K_\omega = nk_\omega$, $k_H = 0$ in the formulae in Lemma 1 and 2, it is clear that in the limit case, $\underline{\delta} = 0$, $\overline{\delta} = \infty$, and $\delta' = \frac{k_L}{\nu_E}$. So, it then follows from Lemma 2 that if $\delta < \frac{k_L}{\nu_E} = \delta'$, only the H-lobby forms, and so from (18), policy deviation is $\sqrt{\delta}$ in every jurisdiction, and if $\delta \geq \frac{k_L}{\nu_E}$, both lobbies form, and so from (18), policy deviation is 0 in every jurisdiction. ■

Proof of Proposition 4: Note that the fraction of extremists is ν_E under centralization, and $\nu_E + \varepsilon$, $\nu_E - \varepsilon$ under decentralization in regions A, B respectively. So, by an argument similar to Proposition 3, we see the following. Under centralization, if $\delta < \frac{k_L}{\nu_E}$, only the H-lobby forms, and so policy deviation is $\sqrt{\delta}$, and if $\delta < \frac{k_L}{\nu_E}$, both lobbies form, and so policy deviation is 0. Under decentralization, in region A, if $\delta < \frac{k_L}{\nu_E+\varepsilon}$, only the H-lobby forms, and so policy deviation is $\sqrt{\delta}$, and if $\delta < \frac{k_L}{\nu_E+\varepsilon}$, both lobbies form, and so policy deviation is 0. Under decentralization, in region B, if $\delta < \frac{k_L}{\nu_E-\varepsilon}$, only the H-lobby forms, and so policy deviation is $\sqrt{\delta}$, and if $\delta < \frac{k_L}{\nu_E-\varepsilon}$, both lobbies form, and so policy deviation is 0.

Putting these together, we see that when $\frac{k_L}{\nu_E+\varepsilon} \leq \delta < \frac{k_L}{\nu_E}$, there is one lobby with centralization and in region B with decentralization, but two lobbies in region A, implying that average distortion is $\sqrt{\delta}$ under centralization and $\frac{\sqrt{\delta}}{2}$ under decentralization. When $\frac{k_L}{\nu_E} \leq \delta < \frac{k_L}{\nu_E-\varepsilon}$, there are two lobbies with centralization and in region A with decentralization, but one lobby in region A, implying that average distortion is 0 under centralization and $\frac{\sqrt{\delta}}{2}$ under decentralization. For all other values of δ, the number of lobbies is the same under both fiscal regimes. ■

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