Lobbying and Rent-Seeking for Public Goods in a Fiscally Centralized System *

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ABSTRACT. – We analyze a centralized system as one in which a political authority finances by general taxation two local public goods each one associated with a particular region. Because individuals in the two regions have different preferences, they engage in rent-seeking activities to influence centralized policy-making in their preferred direction. Several results emerge from the analysis and in particular rent-seeking is shown to be increasing in taste heterogeneity and in the degree of spillovers.

Biens collectifs, groupes de pression et recherche de rente dans un système fiscal centralisé

RÉSUMÉ. – Nous analysons une économie à deux régions avec un système politique centralisé, c'est-à-dire un système dans lequel une autorité politique finance par taxation uniforme les deux biens collectifs locaux, associés aux deux régions. Comme les habitants des deux régions sont supposés avoir des préférences différentes, ils s'engagent dans des activités de recherche de rente de façon à influencer le processus de décision politique dans leurs directions préférées. Plusieurs résultats émergent de notre analyse. Nous montrons en particulier que la recherche de rente s'accroît avec l'hétérogénéité des préférences et l'importance des externalités.

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1 Introduction

Economic policy is, at least partially, driven by a political contest between interest groups. This contest often involves a struggle between one group that defends a certain policy and other groups that challenge it by fighting for other policies. The public sector level is typically subject to such a struggle. The outcome of the contest depends on the lobbying or rent-seeking efforts of the interest groups, which depend in turn on their preferences and stakes.

In this paper a political economy model is set up to analyze the influence of heterogeneity preferences on public good provision and on rent-seeking or lobbying of interest groups. More precisely, we consider a union consisting of two equally sized regions that differ with respect to their intensity of preferences for public good consumption relative to private consumption. The level of public good in each region produces positive cross-boundary externalities for the other region and total public expenditures are funded by general taxation at the union level.

Traditionally, the literature on fiscal federalism and distributive politics describes centralization as a system in which a central authority chooses a uniform level of public good for each district and total public spending is financed from general revenues (OATES [1972]; WEINGAST, SHEPSLE and JOHNSON [1981]). The choice between a centralized system and a decentralized system depends on weighting the benefits of internalizing externalities with the costs of policy uniformity (OATES' [1972] Decentralization Theorem). However, there are many examples of public goods provided unequally by a central government in a centralized system.[1] In addition, as emphasized recently by LOCKWOOD [2002] and BESLEY and COATE [2003], it is unclear why a central government cannot differentiate the levels of public spending according to the heterogeneous tastes in each district. In the present paper, we also depart from the assumption of policy uniformity. A central government can allocate different levels of local public goods to the different regions. In this framework, decision-making by benevolent governments makes centralization of decision-making efficient, since it respects the preferences of citizens at the local level, while optimally internalizing spillovers. However, from a political economy perspective, the operation of centralized systems may be inefficient.

The main argument is the following. Because the costs of the local public goods are shared and because of the inter-regional heterogeneity, a conflict of interest arises between citizens of different regions. They may disagree both about the level of public spending as well as its allocation between the regions. This conflict of interest plays out in a political process which is assumed to take the form of a lobbying game. We indeed assume that people in the two regions are politically organized in interest groups in order to influence the policy and public good provision in their preferred direction. The process of policy decision-making is represented as a simple two-stage game:

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1. Examples include spending on parks, highway or museums by the government in France.

In the first stage, each region exerts simultaneously and independently of each other, rent-seeking pressure on the central government. In the second stage, the government decides policy *i.e.* chooses the level of local public good in each region by maximizing the weighted sum of the welfare of both regions. The respective weight of each region is determined by its lobbying efforts or rent-seeking expenditures in the first stage of the game.

When the two regions have access to the same rent-seeking technology to the extent that every unit spent in such activities by any region has the same marginal influence then, in equilibrium, the influence of one region exactly cancels out the influence of the other region irrespective of the degree of inter-regional heterogeneity and of inter-regional public good externalities. Because the regions neutralize each other in the political process, aggregate influence is therefore always equal to 0 and the government supplies the same level of public goods as without rent-seeking. Still, the levels of influence activities and consequently individual welfare depend upon spillovers produced by the local public goods and differences in preferences for public spending.

We first consider the limit case in which the two local public goods completely spillover from one region to the other. Thereby, public goods do not have local specific benefits and people, in both regions, only care about the total level of public spending in the union. In that case, regions engage in rent-seeking activities only if they do not have the same preferences for public good consumption. We will also show that rent-seeking expenditures of each region are increasing in the degree of preference heterogeneity. Consequently, an increase in the polarization of preferences exacerbates political conflicts to the extent that it increases the level of rent-seeking expenditures and decreases individual welfare without affecting the overall disposition of the policy of the government. The intuition is that the greater differences in the preferences, the stronger is the conflict of interest and the more each region has to spend to counteract the influence of the other.

When public goods produce positive but incomplete spillovers, taste heterogeneity also intensifies rent-seeking activities and competition for political influence. But in contrast with the previous case of public goods with complete spillovers, the two regions are always active even though they have the same preferences for public good consumption. Moreover, the level of influence activities of each region is increasing both in the home and other region's preference parameter. Indeed, because public goods have local specific benefits and are financed by general taxation, the regions have incentives to engage in lobbying activities to extract more of the common resources. These incentives operate independently of interregional heterogeneity and are stronger the higher the valuation of any region for public good consumption. Finally, an important result of the present paper (point (*iii*) of Proposition 2) is that the level of rent-seeking activities and the intensity of competition for political influence are positively associated with the strength of the externalities. This is because when public goods produce more spillovers, the government is perceived to be less reluctant to respond to the pressure by one particular region precisely because a public good associated with a particular region will also benefit the other region. Therefore, in the eyes of the two regions, the marginal benefit of rent-seeking and of political influence increases. Since its marginal cost is independent of the degree of

spillovers, the equilibrium level of rent-seeking expenditures increases. Thus, from an efficiency point of view and in contrast with the traditional literature on fiscal federalism, higher spillovers do not necessarily help the case for centralization. We finally show that rent-seeking pressures for public goods with incomplete spillovers are likely to be more important than for public goods with complete spillovers. This is because when public goods produce local specific benefits, the regions disagree not only about the level of public spending in the union but also about its allocation between them.

LOCKWOOD [2002] and BESLEY and COATE [2003] also present a political economy vision of the costs of centralization. In Besley and Coates's paper, public spending under centralization is determined by a legislature of locally elected representatives. Centralized provision is inefficient because the vote of a local representative with strong preference for public spending is a commitment that allows each region to extract more of the available tax revenues for its own projects. The drawback of decentralized provision, on the other hand, is that externalities are not internalized.[2] In this paper, we present an alternative mechanism: When spillovers increase, it raises the relative benefits of centralized decision-making but it also exacerbates the intensity of political competition between the regions.

The present paper is also closely related to the analysis by COUGHLIN, MUELLER and MURELL [1990a,b]. In a probabilistic voting model, they study how government size responds to a change in the influence of interest groups and they show that in general the public sector level increases with the political influence of interest groups. In our analysis, because in equilibrium aggregate influence is always equal to zero, the size of the government does not respond to political influence. However, we derive the costs of political influence by one interest group relative to the other and therefore the intensity of political competition as a function of the degree of heterogeneity between the regions and also as a function of the type of public goods (*i.e.* public goods with complete or incomplete spillovers). In a word, we pay less attention to the impact of lobbying on policy formulation and more attention on the factors that determine the intensity of competition for political influence and on the resulting individual welfare.

The remainder of the paper is organized as follows. Section 2 presents the model. In Section 3, we analyze the special case of rent-seeking for public goods with complete spillovers while in Section 4 we consider the case of influence activities for public goods with incomplete spillovers. Section 5 discusses the collective action problem in the lobbying process and suggests some extensions. The last Section concludes.

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2. Strategic voting would hold even without inter-regional heterogeneity (See also CHEIKBOSSIAN [2000]). In BESLEY and COATE's paper, the heterogeneity of policy preferences only plays a role for evaluating the costs of centralization relative to decentralization.

2 The model

2.1 The economic environment

Consider an union of two equally sized region (indexed by $j = A, B$) with the region size normalized to 1. Within each region all individuals have identical endowments y_j and consume a private good and a public good or service. The per capita or level of public spending g_j in the jth region is decided by a central authority and is funded by a general and uniform lump-sum tax. The tax is non-distortionnary and the unit cost of providing the public good is equal to 1. The level of private consumption for an individual in region j is then $x_j = y_j - \dfrac{1}{2}(g_A + g_B)$.

Within each region, individuals have identical preferences but populations may differ across regions with respect to their preferences for private and public consumption. These preferences are represented by a quasilinear utility function

$$(1) \qquad v_j = x_j + \frac{\theta_j}{1-\alpha} \left(g_j + \beta g_k \right)^{1-\alpha}, \quad j = A, B.$$

where $\alpha \in (0,1)$.[3] We also assume that exogenous income y_j is sufficiently high to always allow positive consumption of the private good. This implies together with quasi-linearity of preferences that there are no wealth effects. $\theta_j > 0$ is a taste parameter which represents how individuals of region j value public consumption relative to private consumption. The positive spillovers experienced by residents in a certain region is assumed to be proportional to the level of the public good in the other region by a factor $\beta \in (0,1)$. Spillovers are assumed to be bilateral and symmetric. This is a natural hypothesis since g_j and g_k represent two levels (possibly different) of a same public good. When $\beta = 1(0)$ we are in the Samuelson case of a pure public good at the national (regional) level.

This formulation provides a very simple stylized and tractable representation of inter-regional public goods spillovers and of cross-region heterogeneity. In particular, it implies a constant value for the elasticity of the marginal valuation for the public good equal to α. Also, under this formulation, both goods are normal and the marginal rate of substitution is increasing in θ_j.

The only assumptions we make about the distribution of taste parameters are as follows:

A1: (i) $\theta_A \geqslant \theta_B > 0$; (ii) $1 \geqslant \widehat{\theta} > \beta^\alpha \geqslant 0$ with $\widehat{\theta} \equiv \theta_B / \theta_A$.

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3. We borrow this specification to ALESINA, ANGELONI and ETRO [2001] and to REDOANO and SCHARF [2003].

Individuals in both regions want a positive level of the public good. Without any loss of generality, region A is the high-preference region and region B the low-preference region. (ii) is a necessary condition for (strictly) positive equilibrium levels of public spending in both regions.

2.2 The political environment

The conflict concerning the desired level of public goods may give both regions incentives to organize themselves in interest groups in order to influence centralized policy-making through rent-seeking or lobbying activities. To model political influence of rent-seeking, we use a simple two-stage policy game. In the first stage, each region exerts rent-seeking pressure on the government, taking the pressure of the other region as given. In the second stage, the government selects the levels of public expenditures by maximizing a weighted sum of the welfare of both regions. The respective weights ϕ_A and ϕ_B are determined by the level of rent-seeking expenditures of regions A and B in the first stage of the game.[4] Let W be the objective function of the government *i.e.*

(2)
$$W = \phi_A v_A + \phi_B v_B.$$

Each interest group j can raise its political weight ϕ_j by rent-seeking expenditures. Let the weight $\phi_j \equiv \phi\left(r_j\right)$ for $j = A, B$ be a twice differentiable function of the rent-seeking expenditures r_j spent by the representative individual of group j which has the following standard properties:

A2: (i) For all r_j; $\phi'\left(r_j\right) > 0$ and $\phi''\left(r_j\right) < 0$. ($ii$) $\lim_{r_j \to 0} \phi'\left(r_j\right) = \infty$. ($iii$) $\lim_{r_j \to \infty} \phi'\left(r_j\right) = 0$. ($iv$) $\phi\left(0\right) = 0$.

For example, one permissible class of functions is $\phi\left(r_j\right) = (1/\gamma)\, r_j^{\gamma}$ where $0 < \gamma < 1$ is the elasticity of the rent-seeking function. Condition (i) states that political influence is assumed to be an increasing and concave function of

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4. COUGHLIN, MUELLER and MURELL [1990a,b] provide theoretical foundations for assuming such an objective function. The argument is the following. Two political candidates compete for votes in a forthcoming election. They are uncertain about the ideological preferences of the individuals and this uncertainty is characterized by a stochastic bias term in favour of one of the candidates. Voters are distributed into different interest groups composed of individuals with the same policy preferences and the same distribution of the bias term. In such a setting, both candidates choose their policy platforms as if they would maximize a weighted social welfare function. Indeed, because political candidates share the same preferences (*i.e.* to maximize the probability of winning) and because they have access to the same technology to convert one unit of tax into expected votes, they end up finding the same policy announcements optimal. The probabilistic assumption makes this policy the one which corresponds to a weighted average of groups' ideal policies. The weight of each group of voters is inversely related to the degree of uncertainty concerning the bias term of the members of this group. Following LORZ [2001], rent-seeking can be introduced into this political setting in a way that interest groups spend resources to reduce the uncertainty of the candidates which in turn increases their weights in the objective function of the government.

rent-seeking expenditures. In other words, there are decreasing returns to the scale of expenditures. From conditions (*ii*) and (*iii*) marginal influence can vary between 0 and infinity. The last condition needs a remark. When $r_j = 0$ the influence function is set equal to 0. However, without any lobbying activities from the regions, the government is assumed to maximize the arithmetic sum of the welfare functions of both regions.[5]

Note that both regions have access to the same rent-seeking or lobbying technology in the sense that the marginal influence of every unit spent in such activities is the same for the two regions. In addition, we rule out for the moment the free-rider problem in political influence and we postpone to Section 5 the problem of asymmetric sizes and of asymmetric rent-seeking technologies.

3 Lobbying for local public goods with complete spillovers

Consider the limit case where local public goods completely spillover from one region to the other. One can think of public goods that are local by nature, for example military infrastructures, but that entail the same benefits for all regions of the union. One can also think of public goods as pollution removal programs that entail the same benefits for everybody but valued differently by different localities. In this case, because public goods do not have any local specific benefits, people only care about the total level of public spending.

To solve for the subgame perfect equilibrium of the policy game, the solution of the second stage is derived first. Inserting (1) (with $\beta = 1$) into (2) and maximizing (2) with respect to g_A and g_B gives the following first-order conditions

$$(3) \qquad \frac{\partial W}{\partial g_A} = \frac{\partial W}{\partial g_B} = -\frac{1}{2} (\phi_A + \phi_B) + (\phi_A \theta_A + \phi_B \theta_B) [g_A + g_B]^{-\alpha} = 0.$$

The two first-order conditions collapse into a single condition that determines aggregate public expenditures. This is because public goods do not have local specific benefits so that the government only cares about total public good provision. The total level of public goods that is chosen by the policy maker is therefore

$$(4) \qquad g_A^* + g_B^* = \left[\frac{2 (\phi_A \theta_A + \phi_B \theta_B)}{\phi_A + \phi_B} \right]^{\eta}.$$

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5. We do this for expositional felicity only. We can indeed replace the weight ϕ_j of the jth region in the objective function of the government by $1 + \phi_j$ without affecting the analysis and the results.

where $\eta = 1/\alpha > 1$. The equilibrium level of public goods is increasing in both taste parameters. Equation (4) also shows how the political weights of both interest groups influence the equilibrium level of public spending in the second stage of the policy game. An increase in the political weight of region or group j will indeed affect the level of public goods according to

$$(5) \qquad \frac{d\left(g_A^* + g_B^*\right)}{d\phi_j} = \frac{2^{\eta} \eta \phi_k \left(\phi_A \theta_A + \phi_B \theta_B\right)^{\eta-1} \left(\theta_j - \theta_k\right)}{\left(\phi_A + \phi_B\right)^{\eta+1}}, \quad j \neq k.$$

As a result

$$(6) \qquad \frac{d\left(g_A^* + g_B^*\right)}{d\phi_j} \gtreqless 0 \quad \text{as} \quad \theta_j \gtreqless \theta_k, \quad j = A, B; \quad j \neq k.$$

In other words, the equilibrium level of public spending increases (decreases) in the political weight of the interest group which values public good consumption more (less) than the other group. If both regions have the same preferences, then political strength by any one of them does not have any influence on this equilibrium level. Thus, political influence depends crucially on taste heterogeneity. More precisely, because individuals in both regions have to bear the same tax burden, the influence of each region over the level of public goods depends on whether or not it values public consumption more than the other. For example, people in region B (the low-preference region) have an incentive to influence the policymaker towards a lower level of public good and of taxation.

Let us turn to the first stage of the policy game. Region j can raise its political weight ϕ_j by rent-seeking expenditures. Specifically, each region maximizes income minus rent-seeking expenditures *i.e.* $w_j = v_j - r_j$.[6] The following first-order conditions, with $g_A^* + g_B^*$ and $d\left(g_A^* + g_B^*\right)/d\phi_j$ given by (4) and (5) respectively, have to be satisfied;

$$(7) \qquad \frac{dw_j}{dr_j} = \frac{dv_j}{d\left(g_A^* + g_B^*\right)} \frac{d\left(g_A^* + g_B^*\right)}{d\phi_j} \frac{d\phi_j}{dr_j} - 1 = 0.$$

Calculating $dv_j/d\left(g_A^* + g_B^*\right)$ with v_j given by (1) and using (4) gives the following first-order conditions for the equilibrium level of rent-seeking expenditures;

$$(8) \qquad \frac{d\left(g_A^* + g_B^*\right)}{d\phi_j} \frac{d\phi_j}{dr_j} \left(\frac{\phi_k \left(\theta_j - \theta_k\right)}{2\left(\phi_A \theta_A + \phi_B \theta_B\right)}\right) = 1, \quad j \neq k.$$

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6. A unit cost which is linear in rent-seeking activities is standard in the literature. See however ESTEBAN and RAY [2001] for a criticism of such an hypothesis.

As a result, the level of rent-seeking expenditures r_j that is optimally chosen by group j when it acts as if the pressure exerted by the other group is unaffected by its behavior, is implicitly defined by

$$(9) \qquad \frac{d\phi_j}{dr_j} = \frac{2\left(\phi_A\theta_A + \phi_B\theta_B\right)}{\phi_k\left(\theta_j - \theta_k\right)} \left[\frac{d\left(g_A^* + g_B^*\right)}{d\phi_j}\right]^{-1}, \quad j \neq k.$$

Inserting (5) into (9) we find that

$$(10) \qquad \frac{d\phi_j}{dr_j} = \frac{\left[\phi_A\theta_A + \phi_B\theta_B\right]^{2-\eta}\left[\phi_A + \phi_B\right]^{\eta+1}}{2^{\eta-1}\eta\left[\phi_k\left(\theta_j - \theta_k\right)\right]^2}, \quad j \neq k.$$

Equation (10) characterizes the optimal level of rent-seeking expenditures of group j given that of the other group. Therefore, it implicitly describes a system of two reaction functions. Solving this system, we obtain the NASH equilibrium in rent-seeking expenditures r_A^* and r_B^*.

Note that the two reaction functions are quite similar. Indeed, only the second right-hand-side term of the denominator differs from one best response to the other. More specifically, we can express the ratio of the two implicit reaction functions in the following way

$$(11) \qquad \frac{d\phi_A/dr_A}{d\phi_B/dr_B} = \left(\frac{\phi\left(r_A^*\right)}{\phi\left(r_B^*\right)}\right)^2.$$

It follows that in equilibrium, given assumptions **A2**, both groups spend the same level of rent-seeking expenditures. Therefore, the two regions have exactly the same influence on policy-making *i.e.* $\phi_A = \phi_B = \phi$ and aggregate influence is 0. In other words, *in equilibrium, the influence of one region exactly cancels out the influence of the other group*. This is reminiscent of the literature on special interest politics along the lines of the seminal work by BECKER [1983] and parallels one of the main findings of the recent literature which analyses lobbying as a common agency game. In particular, GROSSMAN and HELPMAN [1994] apply the common agency framework developed by BERNHEIM and WHINSTON [1986] to analyze trade policy. They show that the politician, as common agent, implements the optimal trade policy (*i.e.* free trade for a small open economy) when all interest groups, as principals, offer campaign contributions to influence policy.[7]

It is also worth pointing out that the result is driven by the fact that both regions have access to the same rent-seeking technology to the extent that every unit of lobbying expenditures by any region has the same marginal influence. Analyzing the symmetric rent-seeking equilibrium is considerably less complicated than analyzing the asymmetric equilibrium (see however

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7. For a review of the most recent literature, see GROSSMAN and HELPMAN (2001).

Section 5). This is because it has the nice feature that the government chooses its policy as it would maximize aggregate welfare.

Total public good provision is therefore,

$$(12) \qquad g_A^* + g_B^* = (\theta_A + \theta_B)^\eta,$$

and the equilibrium level rent-seeking influence of each region is implicitly defined by

$$(13) \qquad \widehat{\phi}\left(r*\right) \equiv \frac{\phi'(r*)}{\phi(r*)} = \frac{4\left(\theta_A + \theta_B\right)^{2-\eta}}{\eta\left(\theta_A - \theta_B\right)^2}$$

For example, when $\phi(r) = (1/\gamma)\, r^\gamma$ we have $\widehat{\phi}\left(r^*\right) = \gamma/r^*$ and r^* is thus given by the inverse of the right-hand term of (13) times γ the elasticity of the influence function.

How does the level of rent-seeking activities depend on the heterogeneity of policy preferences? The answer can be shown to hinge on the relative values of taste parameters. Indeed, consider that the sum of taste parameters is constant such that total public spending is also constant (see equation (12)). By inspection of (13), we thus obtain.

> PROPOSITION 1: *When the size of the public sector remains constant (i.e. $\theta_A + \theta_B$ is constant), the equilibrium rent-seeking influence of each region when public goods produce complete spillovers is: (i) equal to 0 when $\theta_A = \theta_B$; (ii) strictly positive and increasing with the polarization of preferences i.e. with the (Euclidean) distance between θ_A and θ_B when $\theta_A \neq \theta_B$.*

The proof of these results is straightforward. When $\theta_A = \theta_B$, given assumptions **A2**, $r_A^* = r_B^* = 0$. When $\theta_A \neq \theta_B$, r^* is strictly positive. Moreover, because ϕ is concave $\widehat{\phi}$ is a decreasing function and therefore r^* increases in the Euclidean distance between θ_A and θ_B for a given level of aggregate public spending.

When everyone has identical tastes, because the public sector level and the tax rate is the same for everyone, there is no conflict of interests and therefore no incentives to exert rent-seeking pressure. With heterogeneity of preferences, the high-preference region seeks to increase the public sector level; the low-preference region seeks to reduce it. The larger the polarization of preferences is (as measured by the Euclidean distance between θ_A and θ_B), the higher the conflict of interest and the higher the level of influence activities even though the size of the public sector remains at a constant level.

This result is in contrast to the traditional literature on rent-seeking. Following TULLOCK's seminal work (TULLOCK [1980]), there is a huge literature on the theory of rent-seeking for private prizes but few papers on rent-seeking for public goods.[8] There are two important differences between

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8. Exceptions are KATZ, NITZAN and ROSENBERG [1990], BAIK [1993], RIAZ, SHOGREN and JOHNSON [1995] or NTI [1998].

this type of literature and our analysis. First, we view rent seeking as a mean to increase political influence relative to other interest groups which in turn can affect the policy of the government and public good provision and not as a mean of winning a particular (public or private) prize. Second and more importantly, we introduce explicitly into the analysis the source of the funds with which the public goods are financed. Hence, while the literature typically suggests that homogeneity among the contenders tends to intensify the competition (see for example GRADSTEIN [1995] or NTI [1999]) we show on the contrary, that heterogeneity exacerbates lobbying and rent-seeking for public goods.

To sum up, the influence of one region exactly cancels out the influence of the other region, and the government supplies the same level of public goods as without rent-seeking. The political game is thus zero-sum in influence and negative-sum in rent-seeking expenditures. Even though an increase in polarization of preferences does not affect the political equilibrium and therefore the equilibrium level of public spending, it exacerbates the competition for political influence by increasing the level of unproductive rent-seeking expenditures. A proportional reduction in efforts by both politically active regions would reduce the overhead cost of the political process without affecting the overall disposition of government policy as well as the size of the public sector.

This suggests that in a multi-regional state, the political effort of every particular group to obtain preferential treatment for itself tends to threaten the interest of other groups. Consequently, each group is inclined to overinvest in the production of political influence. The conflict thereby engendered may be peaceful, as in well functioning democracies where groups lobby legislatures for particular favors, or may be violent as in countries in which government functions poorly or has been captured by one group and used to exploit others.

4 Lobbying for Local public goods with incomplete spillovers

Consider now that local public goods produce incomplete positive spillovers. Specifically, the parameter β (in equation (1)) which captures the spillover effect of local public spending is weakly positive but strictly lower than 1. Public spending in each region is still financed by general taxation and the unit cost of providing the public good is equal to 1.

As in the previous section, we first characterize the solution of the second stage of the policy game. The government maximizes a weighted sum given by (2) of the indirect utility function of all individuals given by (1) with respect to g_A and g_B. By solving $dW/dg_j = 0$, we obtain the following first-order conditions

$$(14) \quad \phi_j \theta_j \left(g_j + \beta g_k\right)^{-\alpha} + \beta \phi_k \theta_k \left(g_k + \beta g_j\right)^{-\alpha} = \frac{1}{2} \left(\phi_A + \phi_B\right), \quad j \neq k.$$

This system of first-order conditions reduces to

$$(15) \qquad g_j^* + \beta g_k^* = \left(\frac{2(1+\beta)\phi_j\theta_j}{\phi_A + \phi_B} \right)^{\eta}, \quad j \neq k.$$

where again $\eta = 1/\alpha > 1$. While public goods are financed by general taxation, *disposable* public consumption in region j is increasing in θ_j and is independent from the valuation for public good consumption in the other region. Observe also that the level of *disposable* public consumption, in both regions, is increasing in the size of the externality. The level g_j of public spending in the jth region is thus

$$(16) \qquad g_j^* = \frac{2^{\eta}(1+\beta)^{\eta-1}\left[(\phi_j\theta_j)^{\eta} - \beta(\phi_k\theta_k)^{\eta}\right]}{(1-\beta)(\phi_A+\phi_B)^{\eta}}, \quad j \neq k.$$

Furthermore, a marginal change of the political weight of group j will affect the equilibrium level of *disposable* public good according to

$$(17) \qquad \frac{d\left(g_j^* + \beta g_k^*\right)}{d\phi_j} = \frac{\eta\phi_k\phi_j^{\eta-1}\left[2(1+\beta)\theta_j\right]^{\eta}}{(\phi_A+\phi_B)^{\eta+1}} > 0, \quad j \neq k,$$

for region j and

$$(18) \qquad \frac{d\left(g_k^* + \beta g_j^*\right)}{d\phi_j} = -\frac{\eta\left[2(1+\beta)\phi_k\theta_k\right]^{\eta}}{(\phi_A+\phi_B)^{\eta+1}} < 0, \quad j \neq k,$$

for region k.

This implies that

$$(19) \qquad \frac{dg_j^*}{d\phi_j} > 0 \quad \text{and} \quad \frac{dg_k^*}{d\phi_j} < 0.$$

The equilibrium level of local public spending that is provided by the government in each region is increasing in the political influence of that region and decreasing in the political influence of the other region. This is because public goods have local benefits while the costs of these goods are equally shared between the two regions. Therefore, the higher the political influence of one region is, the higher its ability to shift the cost of local public spending onto the other region and the higher its ability to resist the financing requirement of local public spending in the other region. As a result, an increase in the political influence of region j causes, in the second stage of the game, a higher public sector level in region j and a lower public sector level in region k.

Thus, each region may want to push for an expansion of its own public sector level and to push for a decrease of the public sector level in the other region in order to reduce tax burden.

In the first stage of the policy game, both regions can raise their political influence by increasing their rent-seeking expenditures. Specifically, the jth region decides the level of its rent-seeking expenditures r_j so as to maximize utility net of rent-seeking expenditures *i.e.* $v_j - r_j$ with v_j given by (1). Calculating $\partial v_j / \partial r_j$ and using (15) yields the following first-order conditions:

(20)
$$\theta_j \left(\frac{\phi_A + \phi_B}{2(1+\beta)\,\phi_j \theta_j} \right) \frac{d\left(g_j^* + \beta g_k^*\right)}{d\phi_j} \frac{d\phi_j}{dr_j} - \frac{1}{2}\left(\frac{dg_j^*}{d\phi_j} + \frac{dg_k^*}{d\phi_j}\right)\frac{d\phi_j}{dr_j} = 1, j \neq k.$$

Using (17) and (18) and also observing that $(1+\beta)\left[\left(dg_j^* + dg_k^*\right)/d\phi_j\right]$ $= d\left(g_j^* + \beta g_k^*\right)/d\phi_j + d\left(g_k^* + \beta g_j^*\right)/d\phi_j$, one can find after some routine calculations the marginal influence of rent-seeking for group j given that of the other group. It is implicitly defined by

(21) $$\frac{d\phi_j}{dr_j} = \frac{\phi_j\,(1+\beta)^{1-\eta}\,(\phi_A + \phi_B)^{\eta+1}}{2^{\eta-1}\eta\phi_k\left[\phi_B\phi_A^{\eta-1}\theta_A^\eta + \phi_A\phi_B^{\eta-1}\theta_B^\eta\right]}, \quad j \neq k.$$

This expression parallels equation (10) for the case of public goods with incomplete spillovers. It represents equilibrium rent-seeking expenditures r_j, $j = A, B$, that are best responses to each other. Observe that the only terms that differ from one best response to the other are those in front of the brackets both in the nominator and in the denominator. We can thus express the marginal political effectiveness of one region relative to the other in the following way

(22) $$\frac{d\phi_A/dr_A}{d\phi_B/dr_B} = \left(\frac{\phi\left(r_A^*\right)}{\phi\left(r_B^*\right)}\right)^2.$$

Because both groups have the same influence function, (22) is satisfied by the same level r^* of rent-seeking expenditures of both regions. Consequently, they have the same influence on policy-making *i.e.* $\phi_A^* = \phi_B^* = \phi$. The regions neutralize each other in the political process and the government provides the same levels of local public goods as without rent-seeking that is

(23) $$g_j^* = \frac{(1+\beta)^{\eta-1}\left[\theta_j^\eta - \beta\theta_k^\eta\right]}{(1-\beta)}, \quad j \neq k.$$

When both regions have the same preferences, equilibrium levels of local public goods are also identical across regions. If they have different preferences, then the region with the higher-preference will have a higher level of local public spending.[9] This yields a level of disposable public goods in the jth region equal to

9. **A1** guarantees positive levels of local public good in both regions.

$$(24) \qquad g_j^* + \beta g_k^* = \left[(1+\beta)\,\theta_j\right]^{\eta}, \quad j \neq k.$$

The region with the higher-preference for public good consumption will also have a higher level of effective public consumption in equilibrium. This level is moreover increasing in the degree of spillover in both regions. The equilibrium rent-seeking influence of each region is implicitly defined by

$$(25) \qquad \widehat{\phi}\left(r^*\right) \equiv \frac{\phi'\left(r^*\right)}{\phi\left(r^*\right)} = \frac{4\,(1+\beta)^{1-\eta}}{\eta\left[\theta_A^{\eta} + \theta_B^{\eta}\right]},$$

Again, with $\phi(r) = (1/\gamma)\,r^{\gamma}$, r^* is given by the inverse of the right-hand term of (25) times γ the elasticity of the influence function. The following Lemma describes how r^* and total public spending varies with preference heterogeneity;

LEMMA 1. *When $\theta_A + \theta_B$ is constant, an increase in the (Euclidean) distance between θ_A and θ_B causes, in equilibrium, more rent-seeking activities and a higher level of aggregate public spending.*

We cannot make a strict parallel with the result obtained in the previous section. Indeed, suppose that $\theta_A + \theta_B$ is constant and consider an increase in the distance between the two parameters such that θ_A and θ_B are replaced by $\theta_A + \Delta$ and $\theta_B - \Delta$ respectively. It is then immediate to check that the derivative of $\widehat{\phi}\left(r^*\right)$ with respect to Δ is negative and therefore r^* is increasing in Δ (*i.e.* rent-seeking of each region increases with the (Euclidean) distance between θ_A and θ_B as it was the case for public goods with complete spillovers). However, the size of the public sector in the union is, in this case, increasing. Indeed, from equation (23), the aggregate level of public spending in the union is $g_A^* + g_B^* = (1+\beta)^{\eta-1}\left(\theta_A^{\eta} + \theta_B^{\eta}\right)$. Again replacing θ_A and θ_B by $\theta_A + \Delta$ and $\theta_B - \Delta$ respectively, it is immediate to check that the size of the public sector in the union increases with Δ.[10]

Thus, as in the previous section, when the sum of the marginal rates of substitution between public and private consumption is constant (*i.e.* $\theta_A + \theta_B$ is constant), an increase in the polarization of preferences between the regions exacerbates the political conflict and increases the equilibrium levels of rent-seeking activities. However, unlike in the case of public goods producing complete spillovers, an increase in the distance between θ_A and θ_B (with $\theta_A + \theta_B$ constant) also raises the size of the public sector in the union. This is because the marginal valuation for public good consumption is decreasing. As a result, the decrease in public spending for the low-preference region is lower than the increase in public spending for the high-preference region. In turn, an increase in the size of the public sector raises the stake of the political

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10. Let $\Theta = \theta_A^{\eta} + \theta_B^{\eta}$ and replacing θ_A and θ_B by $\theta_A + \Delta$ and $\theta_B - \Delta$ respectively, we have: $\partial\Theta/\partial\Delta = \eta\left[(\theta_A + \Delta)^{\eta-1} - (\theta_B - \Delta)^{\eta-1}\right] > 0$ (recall that $\theta_A \geqslant \theta_B$ by assumption). Then, $g_A^* + g_B^*$ is increasing in Δ and $\widehat{\phi}\left(r^*\right)$ is decreasing in Δ which implies that r^* is increasing in Δ.

game and therefore the marginal benefit of rent-seeking which leads to more influence activities.

The following proposition brings further insights about the properties of the symmetric rent-seeking equilibrium.

PROPOSITION 2: *The equilibrium rent-seeking influence of each region, when public goods produce incomplete spillovers is: (i) always strictly positive; (ii) increasing in both preference parameters θ_A and θ_B; (iii) increasing in the size of the externality β.*

The proof of these results is immediate and follows from inspection of (25). Indeed, because ϕ is concave, $\widehat{\phi}$ is a decreasing function and therefore r^* is increasing in θ_A, θ_B and β. We first interpret points (i) and (ii) of this proposition.

Unlike in the case of the provision of public goods with complete spillovers, rent-seeking expenditures are strictly positive even if both groups share the same preferences for public good consumption. This is because public goods have local specific benefits but are financed by general taxation at the centralized level. Hence, it gives an incentive for each region to push for an expansion of its own public sector level since the tax burden is shared between the regions. In other words, both regions have incentives to engage in rent-seeking activities to extract more of the common resources in the second stage of the game and this incentive operates independently of taste heterogeneity. In addition, rent-seeking is also increasing both in θ_A and θ_B. Again, because regions contribute equally to the national tax burden, both groups compete for public spending in their own region. Thereby, their incentives for rent-seeking are increasing both in the home and other region's taste parameter.

Point (iii) of the above proposition is more surprising. Indeed, we may think that the higher the level of inter-regional externalities of public spending, the lower the incentives to engage in a costly rent-seeking process. A higher value of β means that local specific benefits are of marginal importance. The distributional conflict between the regions to attract public spending would thus be mitigated, which would reduce the level of rent-seeking activities. However, as stated in point (iii) of Proposition 2, this intuition is misleading. The explanation is the following. Given the preference parameters θ_A and θ_B, increasing spillovers causes two different effects. First, individuals are richer since public goods produce more spillovers while the level of taxation remains unchanged. Second, in the eyes of the two regions, it makes the government more responsive to the political pressures. The government is indeed perceived to be less reluctant to respond to the pressure applied by one group or the other because the benefits of each local public good are more equally shared between the two regions. From the point of view of the regions, these two effects increase the marginal benefit of rent-seeking. Because the marginal cost of such activities does not depend on the size of the externalities, it intensifies the lobbying activities of the interest groups.

However, as in the case of public good with complete spillovers, rent-seeking causes a prisoner's dilemma situation for the regions. Because in equilibrium the regions have exactly the same influence, the government supplies the same quantities of local public goods as without rent-seeking. A

decrease in θ_A, θ_B or β would reduce the total cost of the political process without affecting the policy of the government.

The last question we want to investigate is the following. Are rent-seeking expenditures of each region higher when public goods produce incomplete spillovers than when they produce complete spillovers? The answer is the following:

PROPOSITION 3: *For any values of θ_A and θ_B; (i) If $\alpha \geqslant 1/2$ then, in equilibrium, rent-seeking expenditures of each region for public goods with incomplete spillovers are more important than for public goods with complete spillovers; (ii) If $\alpha < 1/2$, then there exists a $\underline{\beta} > 0$ such that for $\beta \geqslant \underline{\beta}$, rent-seeking expenditures of each region for public goods with incomplete spillovers are more important than for public goods with complete spillovers while the reverse is true for $\beta < \underline{\beta}$.*

Because ϕ is concave, $\widehat{\phi}$ is a decreasing function of r. Therefore, from equations (13) and (25), rent-seeking expenditures are more important for public goods with local specific benefits if

$$(26) \qquad (1 + \beta)^{1-\eta} / \left(\theta_A^{\eta} + \theta_B^{\eta} \right) \leqslant \left[(\theta_A + \theta_B)^{2-\eta} / (\theta_A - \theta_B)^2 \right].$$

(26) can be rewritten as: $(1 + \beta)^{\eta-1} \geqslant \left[(1 - \widehat{\theta}) / (1 + \widehat{\theta}) \right]^2 \left[(1 + \widehat{\theta})^{\eta} / (1 + \widehat{\theta}^{\eta}) \right]$ where $\widehat{\theta} \equiv \theta_B / \theta_A$. The left-hand term of this inequality is strictly higher than 1 for any $\beta \geqslant 0$ (because $\eta > 1$). The right-hand term is the product of two terms, one strictly lower than 1 and the other strictly higher than 1 for any value of $\widehat{\theta}$. One can easily check that the whole right-hand term is strictly lower than 1 for $\eta = 2$ or $\alpha = 1/2$. Since this term is increasing in η, then decreasing in α, we can conclude that the inequality is always satisfied for any $\alpha \geqslant 1/2$. When $\alpha < 1/2$, the inequality is satisfied for all $\beta \geqslant \underline{\beta}$ where $\underline{\beta}$ (by continuity) exists and is the value of $\beta > 0$ such that (26) is an equality.[11]

If the marginal valuation of public good consumption is relatively elastic or if spillovers are large enough, then the intensity of competition for political influence is higher when public goods produce incomplete spillovers than when they produce complete spillovers. The reason is that public goods with local specific benefits financed by general taxation, compared to the case of public goods with complete spillovers, increase the ability of the government to redistribute between heterogeneous regions. Therefore, when the marginal utility of public good consumption is not decreasing too rapidly, this increased ability of the government raises the marginal benefit of rent-seeking of the two regions. Because the marginal cost of rent-seeking does not depend on whether public goods spillover completely or not from one district to the other, rent-seeking

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11. Actually, one can find examples of higher equilibrium expenditures for public goods with incomplete spillovers even when both α and β are very low. For example, with the parameters $\widehat{\theta} = 0.75$ and $\alpha = 0.13$ Assumption 1 is satisfied and we have $\underline{\beta} = 0.05$.

expenditures are more important. In other words, the conflict of interest is more important than in the previous case since the two groups disagree not only about the total level of public expenditures but also about its allocation between the two regions. When the elasticity of the marginal valuation for public good consumption is relatively small (*i.e.* lower than $1/2$), this result still holds if public goods produce some positive spillovers (see footnote 11). In this case, when the spillover coefficient is higher than $\underline{\beta} > 0$, the utility of public good consumption is sufficiently high for the regions to try to exploit, in their preferred direction, the increased ability of the government. Again, the rent-seeking game causes a prisoner's dilemma for the regions and, in equilibrium, the policy of the government is unaffected. However, compared to the case of public goods with complete spillovers, there is now a decrease in welfare for all individuals for two reasons. First, public goods produce positive but incomplete spillovers and second resources invested in lobbying activities are more important.

Finally, Propositions 2 and 3 lead us to conclude that the common level of rent-seeking activities is discontinuous at $\beta = 1$ when $\alpha \geqslant 1/2$.[12] Indeed, in this case, when β approaches 1, rent-seeking activities drop to a level that is lower than the level that would prevail when public goods do not produce any spillovers (*i.e.* when $\beta = 0$). This is because as explained above, when public goods produce complete spillovers, the conflict is restricted to the aggregate level of public expenditures and of taxation. When $\beta < 1$, the conflict is bidimensional: The regions may disagree both about the level of public spending in the union (and therefore about the level of taxation) as well as its allocation between the regions.

A well known result of the traditional literature on fiscal federalism is the OATES' decentralization theorem which states that when spillovers are very important, a centralized system is preferable to internalize externalities. BESLEY and COATE [2003] have reached the same conclusion in a framework that allows a centralized system to provide different levels of public goods for different districts. In our analysis a fiscally centralized system internalizes externalities and can also provide different levels of public goods for different localities. However, we point out another problem of this type of system; increasing spillovers raises the relative benefits of internalizing externalities compared to a decentralized system but also exacerbates another distortion since it increases the competition for political influence and the level of unproductive rent-seeking expenditures.

5 Collective action, group size and asymmetric lobbying

Until now we have abstracted from any asymmetries between the regions except the one concerning the heterogeneity of preferences for public good valuation. Because the economic fundamentals, the rent-seeking technologies

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12. This lower bound on the concavity of the utility function is sufficient but not necessary for this conclusion.

and group sizes were assumed to be symmetric, the lobbying game was found to be zero-sum in influence which considerably simplified the analysis. What if one or some of these variables differ across regions?

When regions are unequally sized, the outcomes of the lobbying game depend on whether individuals make their rent-seeking expenditure decisions cooperatively or not. From the individual perspective, political pressure is indeed a public good which can be subject to the well-known free-rider or collective action problem: Each person would like to shirk his obligation and impose the cost of creating pressure on other members. As a result, collective effort typically falls below the group-optimal level (see OLSON [1965]). With groups of identical size, the costs of free-riding would be the same for the two regions and this would not affect the analysis and our results. This would not be the case with regions unequally sized.

More specifically, let n_A and n_B be the numbers of individuals in regions A and in region B respectively with total population now normalized to N. In this case, the government would maximize a weighted sum of the welfare of both groups with the weight of each group positively related to its political influence *and* to its size. Specifically, ϕ_j must be replaced by $n_j\phi_j$ for $j = A, B$ throughout the whole analysis while the size of the union is N instead of 2. In addition, the political influence of group j is $\phi_j \equiv \phi\left(r_j\right)$ where now r_j, the sum of rent-seeking expenditures of group j is such that

$$r_j = \sum_{i=1}^{n_j} t_i$$ with t_j being the individual contribution to the political pressure of region j. I have abstained from a full analysis of this asymmetry by reason of expositional felicity and because the added insights are limited. However, the following points are worth making.

First, with this specification, when individuals within each region decide the amount of political pressure cooperatively, the two regions still neutralize each other in the political process. Now, let us assume that individuals make their expenditure decisions non-cooperatively. Because the political pressure is a public good to the agents in the region, total group equilibrium expenditure is uniquely determined, but individual expenditure is not. We can look, however, for an equilibrium such that all individuals in a region make the same expenditures. We can also obtain the following marginal political effectiveness of one group relative to the other for public goods with complete spillovers *and* public goods with incomplete spillovers[13]

$$(27) \qquad \frac{d\phi_A/dr_A}{d\phi_B/dr_B} = \frac{n_A}{n_B}\left(\frac{\phi\left(r_A^*\right)}{\phi\left(r_B^*\right)}\right)^2.$$

If the two regions have access to the same rent-seeking technology, we have

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13. Intuitively, when individuals make their rent-seeking expenditures decisions cooperatively, the marginal influence of individual contribution is $n_j\phi'\left(r_j\right)$ while the individual marginal cost is 1. When individuals make their rent-seeking expenditures decisions non-cooperatively, the marginal influence of individual contribution is $\phi'\left(r_j\right)$ while the individual marginal cost is still 1. The details of the model when the regions are unequally sized and with or without within-group cooperation are given in an Appendix available upon request.

PROPOSITION 4: *When $n_A \neq n_B$ and individuals within each region make their rent-seeking expenditure decisions non-cooperatively, then in equilibrium: (i) the two regions have different political influences; (ii) the region with fewer individuals has the larger political influence on centralized decision-making.*

Because the two regions have access to the same influence $\phi(.)$ function, (27) cannot be satisfied by the same level of rent-seeking expenditures of both regions when $n_A \neq n_B$. Therefore $r_A^* \neq r_B^*$, which implies that $\phi(r_B^*) \neq \phi(r_A^*)$. The proof of point (ii) is also by contradiction. Assume, without loss of generality, that $n_A > n_B$ then (27) can be rewritten as it follows $\dfrac{\phi'(r_A^*)}{\phi'(r_B^*)} \cdot \left(\dfrac{\phi(r_B^*)}{\phi(r_A^*)}\right)^2 > 1$. Now assume that $r_A^* > r_B^*$. It implies that $\phi(r_A^*) > \phi(r_B^*)$ and $\phi'(r_B^*) > \phi'(r_A^*)$ which is in contradiction with the previous inequality. Therefore, if $n_A > n_B$, then $r_B^* > r_A^*$, which implies that in equilibrium $\phi(r_B^*) > \phi(r_A^*)$.

In contrast with the analysis of the previous sections, the two regions do not neutralize each other in the political process. Consequently, aggregate influence is no longer equal to 0 and the policy of the government depends on the relative political and rent-seeking influence of each region. Specifically, the region with fewer individuals has the larger political influence because the free-rider effect in lobbying is less important than in the other region. Therefore, the less populated region benefits from a larger relative weight compared to its relative size in the aggregate welfare of the government. This result is in accordance with the existing literature on the free-rider problem of collective action (see OLSON, [1965]). Empirical examples of policy and redistribution in favor of the minorities include, among others, post-independence India or South-Korea (see for example DATTA-CHAUDHURI, [1990]). LOHMANN [1998] also raises the well-known puzzle of industrialized economies exhibiting an agricultural bias even though farm output contributes only to 2-3% of G.D.P. The reverse is true for developing countries; governments intervene to lower the relative price of farm products thus taxing the countryside (the majority) and subsidizing urban consumers (the minority).

Finally, different group sizes can be interpreted as different lobbying technologies. Indeed, as pointing out by BECKER [1983], free-riding, in essence, increases the cost of producing political pressure. The marginal influence of a group can thus be negatively affected by the amount of resources devoted to control free-riding and this amount is likely to be more important the higher the size of the group. However, we probably need a micro-founded model of rent-seeking and of political influence to get further insights on the problem of free-rider within interest groups. A possible route would be to consider a repeated game. Starting from a within-group cooperation equilibrium, each individual decides whether to continue to cooperate to the lobbying effort of its group or to defect, with punishment being the infinite reversion to the within-group non-cooperative solution. This set-up would provide a micro-foundation to the free-rider problem associated with lobbying for public goods. MAGEE [2002] studies such a mechanism for the (endogenous) deter-

mination of trade policy and concludes that increasing the number of agents makes cooperation on lobbying efforts more difficult.

6 Concluding remarks

This paper has developed an alternative view of the drawbacks of centralization. Indeed, the source of inefficiency of centralized systems is not the uniform provision of local public goods as is typically assumed in the literature. It is the conflict between the citizens of different regions due to cost-sharing of local public spending and potential responsiveness of the government to the influence of regions. This conflict gives rise to rent-seeking activities and competition between regions for political influence. An important result of the paper is that higher spillovers do not necessarily help the case for centralization since higher spillovers also cause more rent-seeking activities.

We have limited, in this paper, the analysis of rent-seeking to the case of a fiscally centralized system. However, it would be interesting to analyze the impact of rent-seeking in other systems of government. The first step would be to compare the outcome in a centralized system to that of a purely decentralized system in which each region would choose independently from each other its own public sector level. Under decentralized policy-making, individuals will not engage in rent-seeking activities whenever they have the same preferences within the region. But under decentralization externalities are not internalized. The drawback of centralized policy-making, on the other hand, is that individuals within each region engage in rent-seeking activities. As spillovers increase, the relative benefits of the internalization of externalities increase but at the same time the rent-seeking contest is exacerbated. Because under decentralization individual welfare is independent of the degree of spillovers, the superiority of one system to the other depends on weighting the benefits of internalizing externalities with the costs of rent-seeking under centralization. This comparison would depend crucially both on the specification of the utility function (and in particular on the marginal utility of the public good) and on that of the rent-seeking or lobbying technology.

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