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Fiscal Equalization and Political Conflict

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Fiscal Equalization and Political Conflict

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Abstract

In this paper we analyze the political viability of equalization rules in the context of a decentralized country. We explore the idea that when equalization rules are perceived as unfair, regions may initiate a political conflict. Regions are formed by identical individuals who, through lobbying, try to obtain a higher share from the (equalization) pool of resources. Political conflict is measured as the total contribution to lobbying. We conclude that the onset of conflict depends on the degree of publicness of the regional budget and the relative size of the regions. When regional budgets are used to provide pure public goods, full fiscal equalization is politically feasible. However, fiscal equalization is not immune to conflict when budgets are used to provide private goods or a linear combination of private and public goods. The likelihood of political conflict decreases as the regions become similar in size.

Key words: political conflict, lobbying, fiscal equalization, social decision rules

JEL classifications: D74, D31,H77, R51

1 Introduction

Fiscal equalization is a redistribution device which serves to correct vertical fiscal unbalances and to diminish horizontal inequity[1] between regions. It also works as an insurance (risk sharing)[2] mechanism. Fiscal equalization schemes are used in many countries: two well documented examples are the systems in place in Canada and in the German Länder (see, Boadway and Shah (2007), Boothe and Vaillancourt F (2007), Vaillancourt (1998), Werner (2008)).

The level of fiscal equalization determines the degree of solidarity between regional governments. In this sense, an *excessive* level of redistribution would be perceived as unfair, by the contributing regions, especially if they end up losing positions in the final (per capita resource) ranking. In fact, the literature on income distribution considers the reranking effect due to progressive transfers as undesirable. Moreover, the Principle of Transfers, also known as the Pigou-Dalton condition (Pigou, 1912; Dalton, 1920), establishes that any small transfer from a relatively *richer* individual to a relatively *poorer* individual which does not alter the order (ranking) in the income distribution is inequality reducing. Notice, though, that the preservation of the original ranking is a necessary condition.[3] Therefore, it seems quite reasonable that the same Principle of Transfers should also be applied when redistributing resources between regional governments in order to secure horizontal equity (as defined in footnote 1).

The objective of this paper is to analyze the political viability of fiscal equalization using a model of conflict following Ray (2009), which offers a generalization of the particular case of conflict games developed in Esteban and Ray (1999, 2008). Thus, we analyze the circumstances under which one region would be inclined to initiate political conflict when by doing so it would obtain a higher share of resources. We see political conflict as the reason why fiscal redistribution across regions sometimes violates the Pigou-Dalton principle.

Empirical evidence from Spain and Germany shows that fiscal equalization rules are indeed subject to political conflict. In Spain, reranking has led to the discontent of the relatively richer regions and, especially of Catalonia, which has been the leader of the decentralization process. Finally, the Catalan government demanded a full revision of the financing system (including the equalization scheme) in the framework of the new Catalan Constitutional Law (2006). In the case of Germany, the equalization law (Finanzausgleichsgesetz, 1993) was impugned before the Federal Constitutional Court (FCC) by the Länder of Baden-Württemberg, Bavaria and Hesse. As a result, the degree of equalization was reduced, moving to a partial equalization scheme (Fenge and Weizsäcker, 2001).

[1] According to the Canadian Constitution Act, 1982, Section 36 (2); the purpose of equalization is to ensure "that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation". This is the definition of horizontal equity between subcentral government units (e.g., provinces, regions, municipalities, etc.).

[2] See, e.g., Persson and Tabellini (1996).

[3] See, Lambert (2001) for more on this.

In this paper political conflict is analyzed through a game where two regions seek to maximize their share of resources devoted to fiscal equalization. The population of each region is considered a group of players with identical preferences. Thus, each region could behave as a lobby group whose residents are enforced to make some contribution to lobbying. The level of political conflict is measured as the total amount of resources expended on lobbying.

We consider that the Central Government (CG) is due to implement a vertical equalization grant (Q) between two regions indexed by 1 and 2. We define our benchmark as the case where the CG distributes Q to achieve full equalization of *standard* [4] per capita revenues. We think this is a reasonable assumption since in most equalization systems full equalization is used as the reference distributional criterion[5]. Thus, we will refer to full equalization as the peace solution. Notwithstanding, regions could decide to invest in lobbying in order to modify that distributional rule for their best interest. We refer to this as the conflict solution. Under conflict the equalization system would depart from full equalization and the share obtained by each region from the common pool of (equalization) resources will depend on their lobbying effort and effectiveness. Thus, as a result of lobbying different distributional criteria could emerge, including some involving ranking reversals.

The timing of the game is as follows. In the first stage, each region decides whether to toe the line or whether to reject full equalization. If they decide not to agree, the policy maker of each region enforces individual contributions to finance lobbying. The total amount of resources spent in each region determines its share of the pool Q. Thus, if either region disagrees, each side receives conflict payoffs. Otherwise, they receive peace payoffs defined by full equalization. We obtain that the emergence of political conflict depends on the degree of publicness of the regional budget. When regional budgets are used to provide pure (regional) public goods, full equalization is politically stable. However, full equalization is not immune to political conflict when budgets are used to provide private goods, or a linear combination of public and private goods, which is a more realistic scenario. The likelihood of political conflict decreases as the regions become similar in size.

The main result derived from the analysis is that full equalization is not immune to lobbying (conflict) when regional budgets are not purely public in nature. Moreover, the model provides a rationale for the definition of partial equalization rules as the result of political conflict.

Our analysis relates to the literature on social conflict (Esteban and Ray, 1999, 2008, 2009; Esteban and Schneider, 2008) and on the viability of political systems and social decision rules (Esteban and Ray, 2001a, 2001b, 2008). Our

[4] We use the term, *standard* revenues, to refer to those revenues obtained by regional governments when exerting a *standard* fiscal effort. The use of a *standard* fiscal effort is a common feature of equalization grants since it reduces the strategic decisions by regional governments. Usually, the *standard* fiscal effort is exogenously determined by the central government, or is calculated as the average tax rate. For instance, in the Canadian equalization system the average tax rate of the thirteen provinces is used as indicator of *standard* fiscal effort.

[5] See, Boadway and Shah (2007), Shah (2007).

paper is similar in spirit to Wärneryd (1998) who studies the endogenous formation of jurisdictions under political conflict over resources. From a technical point of view our paper belongs to the literature on group contests, e.g., Baik (2008). It also relates to secession literature as secession can be considered a proxy for conflict when the desire for secession is resisted (see, e.g., Buchanan and Faith, 1987).

The paper is organized in four sections. Following this introduction, a standard model of conflict is presented. Section 3 focuses on analyzing the immunity of fiscal equalization for different budget compositions. Finally, section 4 concludes offering some reflections about the political implications of the results obtained.

2 A model of political conflict

The model follows closely Ray (2009). Let us consider two regions, labeled 1 and 2, which compete over resources. Each region is composed by N_i identical individuals, such that $N_1 + N_2 = N$ total population.

Consider now that the CG is due to implement a vertical equalization grant of Q euros using population as the indicator of regional needs. A frequent indicator of regional needs is population, since it is very simple and easy to compute. See, for example, the regional equalization systems of Canada and Germany (Boadway, 2007; Werner, 2008).[6] Let us use full equalization as our benchmark or *peace* solution. Later on we will define more precisely the payoffs under peace.

When regions do not agree with full equalization they might decide to invest into lobbying in order to increase their share of resources Q. The obtained share by each region depends on its lobbying effort, i.e., on the resources invested in lobbying. The share for region i is defined as,[7]

$$p_i = \frac{R_i}{R} \tag{1}$$

where $R_i = n_i r_i$ is the amount of resources devoted to lobbying in region i, being n_i the proportion of population and r_i the individual contributions (monetary and time resources). Furthermore, we assume that there is no free-riding so that r_i are the individual contributions to lobbying enforced by the political leader in each region.[8] Social conflict is defined as the total amount of resources spent on lobbying, $R = n_1 r_1 + n_2 r_2$. Then, we could interpret p_1 and

[6] However, there exist more complex methods to estimate regional needs taking into account, for instance, population age, poverty, etc. See, e.g., Boothe and Vaillancourt (2007) and Shah (2007) for a thorough analysis and examples.

[7] See, Skaperdas, (1996) and Münster (2009)

[8] To take into account within group free-riding, we should introduce in the model the notion of *effective* relative size of the group allowing for rescaling. See, Esteban and Ray (2001 a) and Kolmar & Rommeswinkel (2010).

$(1-p_1)$ as the share of Q obtained by region 1 and 2 in case of conflict.[9]

The cost of lobbying for each individual is expressed by the isoelastic function

$$c(r_i) = \frac{1}{\alpha} r_i^{\alpha}, \qquad \alpha > 1 \tag{2}$$

Where $c'(r_i) > 0$ and $c''(r_i) > 0$ and α is the cost elasticity.

Formally, once a region has initiated conflict, the objective of its political leader is to maximize the regional per capita payoff as follows

$$\underset{r_i}{Max.} \qquad u_i = p_i \Phi_i - c(r_i) \tag{3}$$

where Φ_i is the benefit of region i from conflict, and $c(r_i)$ is the per capita cost of lobbying defined in (2). Later on we will provide specific definitions for the benefit, Φ_i.

The F.O.C corresponding to regions 1 and 2 are defined respectively by expressions (4)and (5) as follows

$$\Phi_1 n_1 n_2 = R^2 \left(\frac{r_1^{\alpha-1}}{r_2} \right) \tag{4}$$

$$\Phi_2 n_2 n_1 = R^2 \left(\frac{r_2^{\alpha-1}}{r_1} \right) \tag{5}$$

Dividing (4) by (5) and rearranging terms, we obtain the relative efficacy of lobbying by region 1 as

$$\varphi = \frac{r_1}{r_2} = \left(\frac{\Phi_1}{\Phi_2} \right)^{\frac{1}{\alpha}} \tag{6}$$

To fully define the conflict equilibrium solution we need to find the associated regional payoffs. Then, taking for example region 1, from expression (4) we define,

$$r_1^{\alpha} = \Phi_1 p_1 p_2 \tag{7}$$

Now using (7) we can express the per capita payoff of region 1 as

$$u_1 = p_1 \Phi_1 - \frac{1}{\alpha} r_1^{\alpha} = \Phi_1 \left(p_1 - \frac{1}{\alpha} p_1 p_2 \right) \tag{8}$$

Taking into account that $p_2 = (1-p_1)$ and rewriting (8) we obtain

[9] We could also think of Q as the prize of a lottery where with probability p_1 region 1 wins and with probability $(1-p_1)$ is region 2 that obtains the prize Q.

$$u_1 = \Phi_1 \left(k p_1 + (1-k)\, p_1^2 \right) \tag{9}$$

where $k \in (0,1)$ since $k = \frac{\alpha-1}{\alpha}, (1-k) = \frac{1}{\alpha}$ and $\alpha > 1$.

Finally, combining equations (1) and (6) we can express the budget share under conflict of region 1 as,

$$p_1 = \frac{n_1 \varphi}{n_1 \varphi + (1 - n_1)} \tag{10}$$

Thus equations (6) , (9) and (10) define the equilibrium solution under conflict corresponding to region 1. The equilibrium condition for region 2 is defined in a similar fashion.

3 Equalization rules immune to conflict

Regions will initiate conflict when in doing so they expect to obtain a profit with respect to the *peaceful* agreement (full equalization). Considering that under peace every region receives $q = \frac{Q}{N}$ per inhabitant, region i would initiate conflict if and only if

$$p_i \Phi_i - c(r_i) > q \tag{11}$$

Condition (11) depends on the nature of Φ_i. We consider the extreme cases of private and public regional budgets and the general case where regional budgets are used to provide a linear combination of pure public and private goods. In concrete terms, we analyse the following scenarios:

- Private regional budgets. By this we mean that regional budgets are spent on providing rival public goods; in the extreme case we might think of monetary transfers. Since public goods are rival, the utility derived from them depends on population size.

- Public regional budgets. By this we mean that there is no congestion or rivalry in the provision of public goods and therefore the derived utility is independent of population size. Externalities between regions in the provision of public goods are not considered, this means that *publicness* is a local property.

- Private and public regional budgets. This is the general case, where regional budgets are expressed as a linear convex combination of pure public goods and private goods. This means that public goods are not purely public and they suffer of some degree of congestion.

3.1 Private regional budgets

When regional budgets are used to provide private goods or rival public goods, the per capita value for members of region i under conflict is defined by $\Phi_i = \frac{q}{n_i}$, $q = \frac{Q}{N}$ and $i = 1, 2$. Thus, using (9) and (11) the condition for region i initiating conflict is

$$\frac{q}{n_i}\left(kp_i + (1-k)\,p_i^2\right) > q \tag{12}$$

where

$$p_i = \frac{n_i^k}{n_i^k + (1-n_i)^k} \tag{13}$$

and $k \in (0,1)$ since $k = \frac{\alpha-1}{\alpha}$, $(1-k) = \frac{1}{\alpha}$ and $\alpha > 1$.

Since

$$\frac{\partial p_i}{\partial n_i} = k\frac{\left(n_i\left(1-n_i\right)\right)^{k-1}}{\left(\left(1-n_i\right)^k + n_i^k\right)^2} > 0,$$

more populated regions have a higher probability of winning.

Proposition 1 *Assume that regional budgets are used to provide private goods. Thus, there exists a certain* $n_i^* \in \left(0, \frac{1}{2}\right)$ *such that regions with a population share* $n_i \leq n^*$ *will be likely to instigate political conflict. Furthermore, this threshold decreases in the cost elasticity* α.

Proof 1. Simplifying, condition (12) reduces to $\left(kp_i + (1-k)\,p_i^2\right) - n_i > 0$. This condition is positive for small values of n_i and negative for large values of n_i. In concrete terms, for $n_i = \frac{1}{2}$, $p_i = \frac{1}{2}$ and (12) reduces to $k > 1$. However, this condition never holds since $k \in (0,1)$. Consequently, $\left(kp_i + (1-k)\,p_i^2\right) - n_i < 0$ for $n_i \geq \frac{1}{2}$. Then, since $\left(kp_i + (1-k)\,p_i^2\right) - n_i$ crosses the axis only once and from above, we conclude that condition $\left(kp_i + (1-k)\,p_i^2\right) - n_i > 0$ can only hold for $n_i \leq n_i^*$ where $n_i^* \in \left(0, \frac{1}{2}\right)$. The particular value n_i^* depends on k. For example, for the particular case of $\alpha = 2$, $n_i^* = \frac{1}{4}$ and for $\alpha = 6$, n_i^* is nearly zero.

In fact, the intersection point n_i^*decreases with k converging to zero as k increases. See that

$$\frac{\partial}{\partial \alpha}\left(k\left(\frac{n_i^k}{n_i^k + (1-n_i)^k}\right) + (1-k)\left(\frac{n_i^k}{n_i^k + (1-n_i)^k}\right)^2 - n\right) \gtrless 0 \quad \text{for} \quad n_i \gtrless \frac{1}{2}$$

To show that there is an unique intersection point, check that

$$\frac{\partial}{\partial n_i}\left(k\left(\frac{n_i^k}{n_i^k+(1-n_i)^k}\right)+(1-k)\left(\frac{n_i^k}{n_i^k+(1-n_i)^k}\right)^2-n\right)<0$$

The proof is now complete. ■

This result implies that with private regional budgets full equalization leads to a peaceful solution if and only if regions do not differ too much in terms of population size.

There are two forces driving this result. One force is the size of the region and the other is the nature of the regional budget. The large region has a higher advantage in fighting since the same individual lobbying effort has a bigger impact ($\frac{\partial p_i}{\partial n_i}>0$) . On the other hand, the small region has a larger incentive The small region has a larger incentive to instigate conflict since the value of the contested prize (Q) is private in nature. In the model, the second effect dominates the first and the payoff from conflict is larger for the small region. This is the reason why only the small region could decide to go to conflict when the prize is private. This is an instance of "group size paradox" (Olson, 1965)[10].

Notice that the critical value n_i^* depends also on α. Thus, *caeteris paribus,* n_i^* decreases as α increases, and the probability of political conflict also falls. Figure 1 shows the difference between the payoffs under conflict and under peace, represented by C on the y-axis, for different values of $\alpha = (2, 4, 10, 100)$. Any region will be willing to initiate political conflict if the payoff of doing so is higher than the payoff under peace. This corresponds to positive values of C in figure 1. Thus, figure 1 shows that only small regions will be likely to initiate political conflict. Below $n_i = 0.5$ higher curves correspond to lower values of α, implying that the intersection point with the x-axis (n_i^*) decreases as α increases, tending rapidly to zero.

In this section we have argued that when regional budgets are used to provide private goods (in the extreme case, monetary transfers), small regions are more inclined to initiate political conflict, if we define the *peaceful* agreement as full equalization. Next we analyse the other polar case when the budget is used to provide pure public goods.

3.2 Public regional budgets

Let us suppose that regional budgets are used exclusively to provide pure public goods. To simplify, consider that to produce one unit of any public good one unit of the budget is required. We define the per capita utility derived from the public good as Ω. Thus, the per capita payoff of conflict is defined as $\Phi_i = \Omega$. The payoff corresponding to the *peaceful* agreement (full equalization) is defined as Ωn_i. This definition implies that region i does not take into account the positive externalities derived from the provision of pure public goods in region j. This is

[10] I thank Johanness Münster for pointing this out.

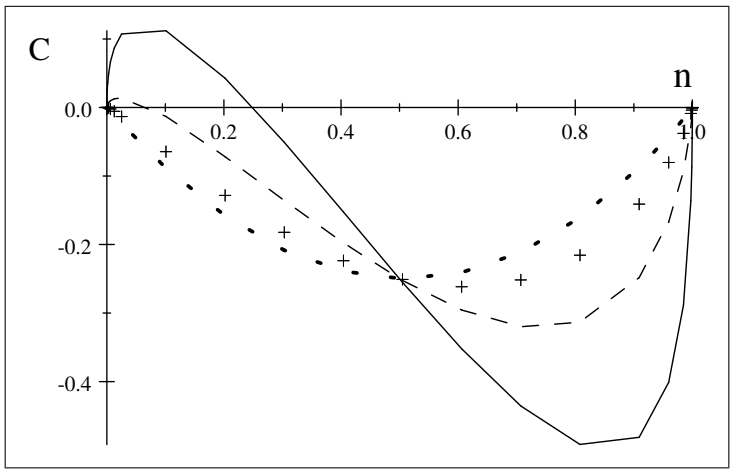

Figure 1: *Conflict equilibrium condition for different values of* α

equivalent to considering that the benefits obtained from pure public goods are regionally delimited.

Then, using (9) and (11) and simplifying, the condition for region i initiating conflict is,

$$\Omega\left(kp_i + (1-k)\,p_i^2\right) > \Omega n_i \tag{14}$$

where

$$p_i = n_i \tag{15}$$

Proposition 2 *Assume that regional budgets are used to provide pure public goods. Then, no region has an incentive to initiate political conflict.*

Proof 2. To prove proposition 2, see that from (6) we know that $r_1 = r_2$. Now, using (1) we can rewrite $p_i = sn_i$ $(i = 1, 2)$ where $s = \frac{r_1}{R} = \frac{r_2}{R}$. Then as $p_1 + p_2 = 1$ we obtain that $s = 1$ and consequently that $p_i = n_i$. Finally, substituting p_i by n_i in (14) and simplifying, the equilibrium condition for conflict (14) reduces to $n_i > 1$ which is impossible since by definition $n_i \in (0, 1)$. This implies that conflict will never occur and therefore the proportional rule is immune to political conflict. ■

This result implies that with regional public goods full equalization (proportional sharing rule) always leads to a peaceful solution. Therefore, full equalization would be immune to political conflict since the maximum shared of Q that each region could obtained under conflict would be equal to its population share. This is in stark contrast with the previous case where the smaller region had a relatively advantage in conflict since it had larger incentives to win. Here, on the contrary, since the prize is purely public this is not longer the case.

4 Private and public regional budgets

Let us consider now the general case where regional budgets are used to provide a linear convex combination of both rival and pure public goods. Thus, the per capita payoff of region i under conflict, is defined as,

$$\Phi_i = \left[\lambda \frac{q}{n_i} + (1-\lambda)\,\Omega\right]$$

Where $\lambda \in [0,1]$ refers to the proportion of the budget assigned to provide rival public goods. Thus, $(1-\lambda)$ refers to the proportion of the budget attached to pure public goods provision or, in other words, the degree of publicness of the budget. This proportion λ is exogenous. We discuss the possibility of endogenizing λ in the conclusion section. Likewise, the payoff corresponding to the *peaceful* agreement (full equalization) is defined as $\lambda q + (1-\lambda)\,\Omega\, n_i$. Thus, using (9) and (11) the condition for region i initiating conflict is

$$\left(\lambda \frac{q}{n_i} + (1-\lambda)\,\Omega\right)\left(k p_i + (1-k)\,p_i^2\right) > \lambda q + (1-\lambda)\,\Omega n_i \tag{16}$$

where

$$p = \frac{n_i\left(\frac{\lambda\frac{q}{n_i}+(1-\lambda)\Omega}{\lambda\frac{q}{1-n_i}+(1-\lambda)\Omega}\right)^k}{n_i\left(\frac{\lambda\frac{q}{n_i}+(1-\lambda)\Omega}{\lambda\frac{q}{1-n_i}+(1-\lambda)\Omega}\right)^k + (1-n_i)} \tag{17}$$

To simplify let us assume $\alpha = 2$ and $q = \Omega$. Then (17) becomes

$$p_i = \frac{n_i\left(\frac{\frac{\lambda}{n_i}+(1-\lambda)}{\frac{\lambda}{1-n_i}+(1-\lambda)}\right)^{\frac{1}{2}}}{n_i\left(\frac{\frac{\lambda}{n_i}+(1-\lambda)}{\frac{\lambda}{1-n_i}+(1-\lambda)}\right)^{\frac{1}{2}} + (1-n_i)} \tag{18}$$

Taking partial derivatives we obtain that $\frac{\partial p_i}{\partial n_i} > 0$. This implies, *caeteris paribus*, that more populated regions have higher share of resources. However, $\frac{\partial p_i}{\partial \lambda} > 0$ for $n_i \in \left(0, \frac{1}{2}\right)$ and $\frac{\partial p_i}{\partial \lambda} < 0$ for $n_i \in \left(\frac{1}{2}, 1\right)$. Thus, the share of resources achieved by the small region increases when the proportion of private goods in the budget also increases. In contrast, the share of resources obtained by the large region increases when the proportion of pure public goods increases. This is because the small region is more effective when the budget is private since its value of the budget is higher. This is not the case for the large region, since being large decreases the value of the budget when it is private in nature. Moreover, increasing the publicness of the prize benefits the large region because its comparative disadvantage with respect to the small region diminishes.

Proposition 3 *Assume that regional budgets are used to provide a linear convex combination of private goods and pure public goods. Thus, for $\alpha = 2$ and $q = \Omega$, there exists a certain $n^* \in \left(0, \frac{1}{2}\right)$ such that regions with a population share $n_i \leq n^*$ will launch into political conflict*

Proof 3. The proof of proposition 3 is as follows. First, see that condition (16) simplifies to $\left(kp_i + (1-k)\, p_i^2\right) - n_i > 0$, where p_i is defined by (18). This condition is positive for small values of n_i and negative for large values of n_i, crossing only once the interval $n_i \in (0,1)$. For $n_i = \frac{1}{2}$, $p_i\left(\frac{1}{2}\right) = \frac{1}{2}$ and the equilibrium conflict condition, $\left(kp_i + (1-k)\, p_i^2\right) - n_i > 0$, becomes $k > 1$. Since by definition $k \in (0,1)$ this condition never holds and therefore it should be the case that $\left(kp_i + (1-k)\, p_i^2\right) - n_i < 0$. Thus, regions with a population share $n_i \geq \frac{1}{2}$ will not wish to engage in conflict. Finally, we conclude that there must be a value $n_i^* \in \left(0, \frac{1}{2}\right)$ for which $\left(kp_i + (1-k)\, p_i^2\right) - n_i = 0$, and that $\left(kp_i + (1-k)\, p_i^2\right) - n_i < 0$ for $n_i < n_i^*$. Consequently, regions with $n_i < n_i^*$ will have an incentive to initiate conflict. ■

This implies that when regional budgets are not purely public, full equalization would be accepted only if regions have similar population sizes. Otherwise, the small region will obtain a higher payoff investing on lobbying to depart from such a distributional criterion.

This result is the consequence of two driving forces: the size of the region and the degree of publicness. On one side, the large region has an advantage on fighting since the same individual lobbying effort has a bigger impact. On the other hand, the small region has a larger incentive to win as the degree of privateness increases. On the contrary, when the level of publicness is high then the relative advantage of the smaller region not longer holds and that avoids conflict. This can be seen in the graph below which depicts the relationship between the population conflict threshold n^* and the degree of privateness λ for $\alpha = 2$. As the level of privateness increases the population interval for which conflict takes place increases.

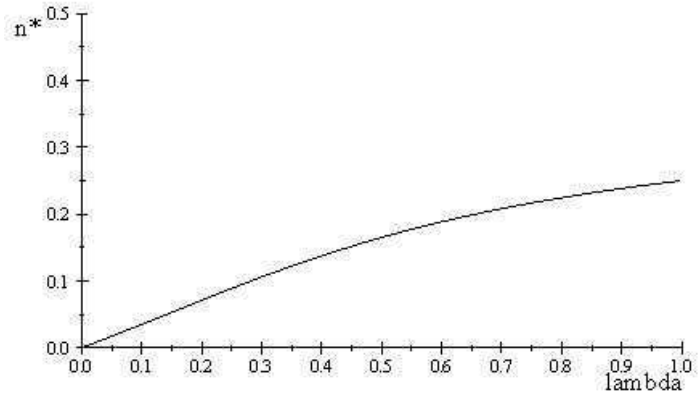

Figure 2: *Population thresholds and degree of privateness*

5 Conclusions

We analysed the political viability of fiscal equalization using a standard model of conflict, as in Ray (2009). We showed that the initiation of political conflict depends on the degree of publicness of the regional budget. When regional budgets are used to provide pure public goods, proportional equalization is immune to political conflict. This implies that full equalization would be politically feasible in this case. However, fiscal equalization is not immune to political conflict when regional budgets are used to provide private goods or a linear convex combination of pure public goods and private goods. In both these settings there exists a population share $n_i^* < \frac{1}{2}$ such that a region with $n_i < n_i^*$ would be inclined to spend resources on lobbying in order to achieve a higher share of resources. Consequently, partial equalization and ranking reversals can be explained as the result of lobbying (political conflict). In this regard, we should further explore the use of political conflict as a bargaining mechanism to establish new sharing rules as in Powell (2004) and Wagner (2000).

From the analysis, it is clear that small regions are more likely to instigate political conflict when budgets are private. This is because, in this case, they are more effective relative to their size since per capita payoffs from conflict are higher the smaller the group. In contrast, when budgets are public, the size of the group does not affect the prize and the effectiveness advantage of being small disappears. This is why there is less risk of political conflict when the publicness of regional budgets increases.

Throughout the analysis we assumed that the parameter of privateness λ is exogenous. However, intuitively if regions could decide the budget composition, i.e., the publicness of the prize, the small region would prefer a higher level of privateness following the logic above. The case of the large region is not so straightforward. On the one hand, the value of the budget increases with the level of privateness ($\frac{\partial \Phi_i}{\partial \lambda} > 0$ since by assumption $q = \Omega$). On the other hand, the relative advantage of the small region also increases with λ. Therefore, the large region would prefer a higher level of publicness than the small one.

We also assumed the no existence of externalities across regions. We could take externalities into account by considering that public goods are not locally delimited. In addition, we could introduce spillovers by considering that regions are altruistic or envious as in Konrad (2004). We explore this setting in a companion paper (Cubel, 2011).

One possible extension would be to consider that individual efforts instead of being substitutes were complements, then the large region would be the one prone to conflict although proposition 1 would still be robust. In fact, as Münster (2009) points out there is not restriction about the sort of relationship between efforts (complementarity or substitutability) in the standard axioms of the contest success functions. Thus, we could explore further how different definitions of the contest success function would affect our results [11]. We leave this for further research.

[11] I specially thank Johanness Münster for this comment.

Furthermore, the results obtained relate to the literature on majority voting (see, e.g. Tullock, 1959) and provide an intuitive argument for decentralizing the provision of public services. The argument would go as follows. When the degree of publicness of regional budgets is high, it is more efficient to centralize the provision of public goods in order to take advantage of the economies of scale. However, when rivalry (congestion) is high, the risk of political conflict increases in inverse proportion to regional size. Therefore, to reduce the cost of lobbying, the decentralization of pure public goods is recommended since they offer a lower risk of political conflict. We have thus outlined two operating forces in opposite directions which would define the optimal size of the jurisdiction in a similar fashion as in the generalized version of the Oates theorem of decentralization (1972)[12]. We should explore further this argument using a more complex framework as in Lockwood (2008).

Additional insights might emerge from the introduction of risk aversion in the maximization problem of regional political leaders. We could do this using the concept of political bias as in Jackson and Morelli (2006). Thus, the probability of engaging in political conflict would also depend on the private benefit (or cost) that the political party in power would obtain from conflict. Finally, we should explore the political viability of equalization rules taking into account the possibility that discontented regions threaten secession (see, e.g. Spalaore, 2008; Haimanko *et al*, 2005; Le Breton and Weber, 2003 a, b).

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[12] Oates (1972), however, does not consider lobbying costs. Instead, he argues that the cost of belonging to the same group increases with the size of the group (n). Thus, he defines the optimal population size of the group (jurisdiction) as the one that maximizes the net effect derived from the economies of scale plus the cost of belonging to the group.

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