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ABSTRACT: In this paper we analyze the political viability of equalization rules in the context of a decentralized country. In concrete terms, we suggest that when equalization devices are perceived as unfair by one or more regions, political conflict may emerge as a result. Political conflict is analysed through a non cooperative game. Regions are formed by identical individuals who, through lobbying, try to impose their regional preferences on the rest of the country, and 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. When regional budgets are used to provide pure public goods, proportional equalization is politically feasible. However, no equalization rule is immune to conflict when budgets are used to provide private goods or a linear combination of private and public goods.

JEL Codes: D74, D31,H77, R51

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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 in decentralized countries.

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, if they end up losing positions in the final (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 (Sen, 1973), 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 note 1). Furthermore, it is in the general interest that the equalization device should be the result of the consensus of all the parts involved since a situation perceived as unfair by any of them could lead to political conflict and instability.[4]

The objective of this paper is to analyse the political viability of equalization rules using a model of conflict in the spirit of Ray (2009), which offers a generalization of the particular case of conflict games developed in Esteban and Ray (1999) and explored in detail by Esteban and Ray (2008). Thus, we analyze the circumstances under which one region would be inclined to initiate political conflict when equalization rules are perceived as unfair. Political conflict is analysed through a game where two regions seek to maximize their payoffs in a Nash framework. The population of each region is considered a group of players with identical preferences. Thus, each region is a lobby group whose residents make some contribution (effort) to lobbying to try to impose their regional preferences for equalization on the rest of the country. Political conflict is defined as the total amount of resources expended on lobbying.

In order to apply the standard model of conflict, we assume that there exists a vertical grant (S), coming from the Central Government (CG), which is to be distributed between two regions indexed by 1 and 2. The distribution of the grant S is organized in two phases. In the first phase, the CG distributes a

[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.

[4] For instance, we understand as political conflict a situation where a coalition (central) government loses the political support of a regional party in the Senate or in the Parliament due to a disagreement on the existing equalization system.

transfer of $H < S$ in order to achieve full equalization of per capita *standard* revenues.[5] In the second phase, the CG distributes $Q = S - H$. We assume that the criterion to distribute Q is not fixed but is the result of a social agreement. Thus, regions have different preferences regarding their favoured option. Consequently, each region behaves as a lobby group, defending its best choice in its negotiations with the CG.

We assume, as is customary in models of conflict, that each region obtains zero utility (benefit) when its best alternative is not chosen. We thus consider three different distribution principles for sharing Q between regions 1 and 2. In the first, we assume that every region receives a proportion of Q equal to its population share, n_i. This implies that full equalization of *standard* per capita revenues is finally achieved. In the second principle, we deem that Q goes in full to the *less deserving*[6] region. Thus, after equalization, disparities between regions diminish but are not fully cancelled out. This means that the ranking of regions, in terms of *standard* per capita revenues, is kept constant after equalization. This kind of equalization scheme is used in many countries: two well documented examples are the systems in place in Canada and in the German Länder (see, Boadway and Shand (2007), Werner (2008)).

Finally, under the third principle of distribution, we consider that Q goes in full to the *more deserving* region. The result then, is an over-redistribution in favour of the *more deserving* one which causes a reranking of regions. Thus, after equalization, the *more deserving* region has more per capita revenues than the initially *less deserving* region and, consequently, it is able to provide a higher level of public goods and services. The situation derived from the third distribution principle fits the Spanish case perfectly.[7] It is worth noting that the reranking effect characteristic of the Spanish equalization system is quite an exceptional case, although not unique:[8] up to 2000 the German Länder were living a situation in which excessive redistribution was also causing a reranking effect.[9]

[5] 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.

[6] We consider than one region is *more deserving* than the other. By this we mean than one region (the *more deserving*) needs a higher grant to provide the same level of public services than the *less deserving* region making a similar *standard* fiscal effort. One region might be *more deserving* because its tax base is smaller but also because it has larger needs (larger population, older population, more poverty, etc.) when providing public services.

[7] In Spain the equalization device between regional governments has always been characterized by progressive transfers that cause a reranking effect. This (long-lasting) situation has lead 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 has demanded a full revision of the financing system (including the equalization scheme) in the framework of the new Catalan Constitutional Law (2006).

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

[9] The equalization law (Finanzausgleichsgesetz, 1993) was impugned before the Federal

In the theoretical model, we assume that the solution under the *peaceful* agreement is full equalization between regions, in other words, proportional sharing of Q. Thus, we analyse the conditions under which regions would be inclined to instigate political conflict in a non cooperative frame. The timing of the game is as follows. In the first stage, individuals decide the resources they will expend on regional lobbying. The total amount of resources spent in each region determines the region's probability of imposing its preferences on the rest of the country. Accordingly, each region decides whether to toe the line or whether to show disagreement. If either region disagrees, each side receives "conflict payoffs". Otherwise, they receive "peace payoffs". 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 public goods, proportional equalization is politically viable. However, no equalization rule is 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.

Our analysis relates to three strands of the literature: social conflict (Esteban and Ray, 1999, 2008, 2009; Esteban and Schneider, 2008), the viability of political systems and social decision rules (Esteban and Ray, 2001a, 2001b, 2008), and rent-seeking and lobbying (Verdier and Ades, 1996; Mohtadi and Roe, 1998; Rama and Tabellini, 1998; Esteban and Ray, 2006).

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

2 A model of political conflict

Let's assume that the CG is due to implement a vertical equalization grant to secure horizontal equity between regional governments. Accordingly, the standard equalization grant is defined proportional to regional needs and inversely related to *standard* regional revenues. One of the main issues in setting grants of this kind is to decide whether equalization should be total or partial. If equalization is fully accomplished, then regional governments achieve *standard* average revenues per unit of need and disparities are fully cancelled. In contrast, if equalization is partial, grants are used to diminish disparities ensuring that all regions manage to cover a certain level of public provision[10] while leaving relatively *less deserving* regions still better off after the equalization takes place.

Constitutional Court (FCC) by the Länder of Baden-Württemberg, Bavaria and Hesse. As a result, the degree of equalization was reducedm, moving to a partial equalization scheme, and the reranking effect was avoided. In other words, the reform signified moving from the third to the second distribution principle mentioned above (Fenge and Weizsäcker, 2001).

[10] This level could be defined, for example, as some sort of *corrected* mean or as a percentage of the mean. The equalization system of the Canadian provinces (see, Boadway, 2007; Vaillancourt, 1998) offers an example of the first possibility while the equalization system among German Länder (Werner, 2008), is an example of the second.

Regional preferences about the level of equalization need not be homogeneous. In fact, relatively *more deserving* regions are likely to defend more egalitarian systems while relatively *less deserving* regions will probably be happier under partial equalization. Thus, it might be not straightforward to reach an agreement on the desired level of equalization. Also, if the equalization rule applied by the central government is not considered fair or good enough by one of the regions a situation of political conflict could emerge.

To simplify let's consider two regions, labeled 1 and 2, which differ in their favored alternative for equalization, while they are indifferent to the preferences of the other region. Each region is composed by N_i individuals with homogeneous preferences for equalization and linear utilities, with $\sum_{i=1}^{2} N_i = N$ total population. Each region attempts to impose its own preferences for equalization on the rest of the country through lobbying. Thus, we measure political conflict as the global amount of resources expended on lobbying.

Consider now that the vertical equalization grant offered by the CG totals S euros and that regional population is used as the indicator of regional needs.[11] Moreover, let's assume that the CG distributes the amount S between region 1 and 2 in two steps in the following way. First, the CG distributes H euros to fully equalize *standard* per capita revenues. And second, the CG distributes the rest of the grant, $Q = S - H$, between the two regions. There are three possible rules for distributing the extra amount Q:

(a) Proportional share: each region receives a total amount equal to $n_i Q$, where n_i is the proportion of population in region i. After distributing the total grant, S, *standard* per capita revenues are fully equalized between regions.

(b) Q goes in full to region 1. In this way, the result is partial equalization and the relatively *less deserving* region continues to be better off after equalization. In other words, the equalization system respects the original regional ranking; regional disparities are reduced but not fully cancelled.

(c) Q goes in full to region 2. Consequently, there is over-redistribution and reranking of regions. In other words, after equalization, the originally *more deserving* region has higher per capita resources for providing public services than the originally *less deserving* region.

Let's use the proportional rule of distribution (a) as a benchmark. In other words, assume that the *peaceful* outcome is the result of applying the proportional rule. Then the other two rules of distribution, (b) and (c), could be conceived of as the outcomes of a lottery where the prize is Q. With probability

[11] 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). 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.

p option (b) is implemented and region 1 obtains the prize Q. With probability $(1-p)$ option (c) is implemented and it is region 2 that obtains the prize Q.

The winning probability of each region depends on its lobbying effort, i.e., on the resources invested in lobbying. Thus, the probability of winning for region i is defined as,[12]

$$p_i = \frac{n_i r_i}{\sum_{j=1}^{2} n_j r_j} \tag{1}$$

where n_i is the proportion of population in region i and r_i are the resources devoted to lobbying by each individual residing in region i, $i = 1$ and 2. Social conflict is defined as the total amount of resources spent on lobbying, $R = \sum_{j=1}^{2} n_j r_j$. The cost of lobbying[13] 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.

Because the cost function is strictly convex every individual will expend equal effort (contribution) on lobbying. Furthermore, we will assume that there is no free-riding.[14]

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 $p_i \Phi_i$ is the expected benefit of region i when its first option is imposed on the rest of the country, and $c(r_i)$ is the per capita cost of lobbying defined in (2).

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

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

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

[12] Skaperdas (1996)

[13] We could think of it as the monetary and time resources expended on lobbying.

[14] 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) for an analysis of the free-rider problem in rent-seeking models.

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

$$u_1 = \Phi_1\left(kp_1 + (1-k)\,p_1^2\right) \tag{9}$$

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 winning probability 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. 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 mixture 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.
- Private and public regional budgets. This is the general case, where some of the goods provided by regional governments are pure public goods and others are rival public goods.

3.1 Private regional budgets

When regional budgets are used to provide private goods or rival public goods, the per capita payoff of imposing regional preferences 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 (and rival public goods), and that under the peaceful agreement, regions have a per capita equal share of Q. 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*

To prove this proposition see that, 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.

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 conflict equilibrium condition, represented by C on the y-axis, for different values of α: $\alpha = 2$, [—]; $\alpha = 4$, [−−]; $\alpha = 10$, [++]; $\alpha = 100$, [...]. 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. Moreover, 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 and rival public goods (in the extreme case, monetary transfers), small regions are more inclined to initiate political conflict, if we define the *peaceful* agreement as the proportional equalization rule. However, other possible *peaceful* agreements could be considered since regional governments are able to bargain for different equalization rules using compensating transfers (to the losers). Regional cooperation is feasible since the sum of the expected payoffs under political conflict is lower than the payoff received under peace

$$n_1\Phi_1\left[kp_1 + (1-k)\,p_1^2\right] + n_2\Phi_2\left[kp_2 + (1-k)\,p_2^2\right] =$$
$$q\left[2(k-1)p_1p_2 + 1\right] < q \qquad \text{since} \quad (k-1) < 0$$

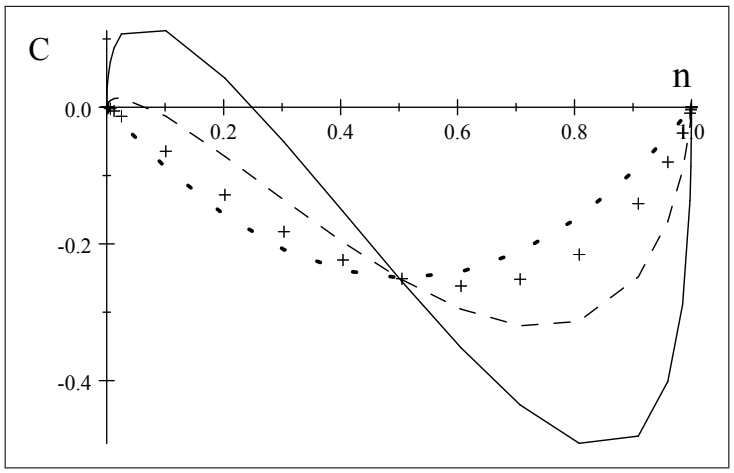

Figure 1: *Conflict equilibrium condition for different values of* α

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 imposing regional preferences is defined as $\Phi_i = \Omega$. The payoff corresponding to the *peaceful* agreement (proportional rule) is defined as Ωn_i[15].Thus, 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

$$p_i = \frac{n_i}{n_i + (1-n_i)} \tag{15}$$

Proposition 2 *Assume that regional budgets are used to provide pure public goods, and that under the peaceful agreement, regions have a per capita equal share of* Q*. Thus, no region will have an incentive to initiate political conflict. Therefore, the proportional rule would be immune to political conflict.*

To prove this proposition, 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 $\sum_i p_i = 1$ we obtain that $s = 1$ and consequently that $p_i = n_i$. Finally, substituting p_i

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

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.

4 Private & public regional budgets

Let us consider now the general case where regional budgets are used to provide both rival and pure public goods. Thus, the per capita payoff of region i, when it imposes its own preferences, 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. Likewise, the payoff corresponding to the *peaceful* agreement (proportional rule) is defined as $\lambda q + (1-\lambda)\,\Omega\, n_i$. Thus, using (9) and (11) the condition for region i initiating conflict is

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

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 probability of winning. 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 winning probability of small regions increases when the proportion of private goods in their budget also increases. In contrast, the winning probability of large regions increases when the proportion of pure public goods increases.

Proposition 3 *Assume that regional budgets are used to provide a combination of private goods and pure public goods, and that under the peaceful agreement, regions have a per capita equal share of Q. 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 be likely to launch into political conflict*

The proof of this proposition 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 the 'x' axis only once in 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. For instance, setting $\lambda = \frac{1}{2}$, $n_i^* = 0,19$.

Condition (16) includes, as particular solutions, the extreme cases of pure private budgets and pure public budgets.

Setting $\lambda = 1$ in (18) and substituting p_i in (16) we obtain the equilibrium conflict condition for the extreme case of only private goods when $\alpha = 2$. Thus, $\left(\frac{q}{n_i}\right)\left(kp_i + (1-k)\, p_i^2\right) > q$ where $p_i = \frac{{n_i}^{\frac{1}{2}}}{{n_i}^{\frac{1}{2}} + (1-n_i)^{\frac{1}{2}}}$.

Likewise, setting Setting $\lambda = 0$ in (18) and substituting p_i in (16) we obtain the equilibrium conflict condition for the extreme case of a budget devoted solely to provision of pure public goods when $\alpha = 2$. Thus, $\Omega\left(kp_i + (1-k)\, p_i^2\right) > \Omega n_i$ where $p_i = \frac{n_i}{n_i + (1-n_i)}$

As in the case of private regional budgets, regions can always agree on different *peaceful* equalization rules using suitable compensating transfers. In other words, regions could always bargain and reach a new agreement since the sum of the expected payoffs under political conflict is lower than the payoff received under peace

$$n_1\Phi_1\left[kp_1 + (1-k)\, p_1^2\right] + n_2\Phi_2\left[kp_2 + (1-k)\, p_2^2\right] =$$
$$\lambda q\,[a] + (1-\lambda)\Omega\,[b] < \lambda q + (1-\lambda)\Omega \quad \text{since} \quad a < 1,\ b < 1$$

where $[a] = [2(k-1)p_1p_2 + 1]$, $[b] = [(k-2)p_1p_2 + 1]$, $k < 1$.

5 Conclusions

We have analysed the political viability of equalization rules using a standard model of conflict, as in Ray (2009). We have shown 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, no equalization rule is immune to political conflict when regional budgets are used to provide private goods or a linear 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 impose its own preferences on the rest of the country. Consequently, neither partial equalization nor excessive redistribution would be immune to political conflict.

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 matter 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. Moreover, we have shown that peaceful agreements, other than full equalization are feasible through the definition of compensating transfers.[16] 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).

Empirical evidence from Spain and Germany shows that equalization systems based on progressive transfers which cause the reranking of regions in terms of per capita (*standard)* revenues are not politically stable. Furthermore, the case of Germany is also an example of the use of transfers as an instrument to reach peaceful agreements other than full equalization. In concrete terms, after the judgment of the Federal Constitutional Court (11 November 1999), the equalization device was reformed establishing a partial equalization system. Additionally, the eastern Länder were compensated and awarded high Federal investments until 2019, through the Solidarity Pact II.

Furthermore, the results obtained 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)[17]. We should explore further this argument

[16] Suitable transfers can be implemented to compensate losers since the addition of "conflict payoffs" is lower than the payoffs under the peaceful agreement (see sections 3.1 and 3.3). Haimanko *et al* (2005), in a different setting, also argue for the use of transfers as a mechanism to resolve conflicts.

[17] 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

using a theoretical framework as in Desmet *et al* (2006).

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. Haimanko *et al*, 2005; Le Breton and Weber, 2003 a, b).

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References

[1] Boadway, R., 2007. Canada. In: Shah, A., (ed), The practice of fiscal federalism: comparative perspectives. Montréal: Forum of Federations and iacfs by McGill-Queen's University Press, 98-124.

[2] Boadway, R. and Shah, A., (ed), 2007. Theory and Practice of Intergovernmental Transfers. MIT Press.

[3] Boothe, P. and Vaillancourt, F., 2007. A fine Canadian compromise. Perspectives on the report of the expert panel on equalization and territorial funding financing. Edmonton et Montréal: Institute for Public Econonics et CIRANO.

[4] Desmet, K., Le Breton, M., Ortuño-Ortín, I., 2006. Nation formation and genetic diversity. Mimeo

[5] Esteban, J., Ray, D., 2009. Linking conflict to inequality and polarization. Mimeo.

[6] Esteban, J., Ray, D., 2008. Polarization, fractionalization and conflict. Journal of Peace Research 45 (2): 163-182.

[7] Esteban, J., Ray, D., 2006. Inequality, lobbying and resource allocation. American Economic Review, 96(1): 257-279.

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.

[8] Esteban, J., Ray, D., 2001a. Collective action and the group size paradox. American Political Science Review, 95 (3): 663-672.

[9] Esteban, J., Ray, D., 2001b. Social decision rules are not immune to conflict. Economics of Governance, 2: 59-67.

[10] Esteban, J., Ray, D., 1999. Conflict and distribution. Journal of Economic Theory 87: 370-415.

[11] Esteban, J., Schneider, G., 2008. Polarization and conflict: theoretical and empirical issues. Journal of Peace Research, 45 (2): 131-141.

[12] Fenge, R., Weizsäcker, J. V., 2001. How much equalization? a constitutional approach. Journal of Institutional and Theoretical Economics 157: 623-633.

[13] Haimanko, O., Le Breton, M., Weber, S., 2005. Transfers in a polarized country: bridging the gap beween efficiency and stability. Journal of Public Economics, 89: 1277-1303.

[14] Jackson, M. O., Morelli, M., 2006. Political bias and war. Institute of Governmental Studies, WP 2006'9. University of California, Berkeley.

[15] Lambert, P. J., 2001. The distribution and redistribution of income. Manchester University Press.

[16] Le Breton, M., Weber, S., 2003a. The art of making everybody happy: how to prevent a secession. IMF Staff Papers, 50 (3): 403-435.

[17] Le Breton, M., Weber, S., 2003b. Secession-proof cost allocations and stable group structures in models of horizontal differentiation. Mimeo.

[18] Mohtadi, H., Roe, T. L., 1998. Growth, lobbying and public goods. European Journal of Political Economy, 14(3): 453-473.

[19] Oates, W. E., 1972. Fiscal federalism. New York: Harcourt Brace Jovanovich, Inc.

[20] Persson T., Tabellini, G., 1996. Federal Fiscal constitutions: risk sharing and moral hazard. Econometrica 64: 623-646.

[21] Powell, R., 2004. Bargaining and learning while fighting. American Journal of Political Science , 48(2): 344-361.

[22] Rama, M., Tabellini, G., 1998. Lobbying by capital and labor over trade and labor market policies. European Economic Review, 42(7): 1295-1316.

[23] Ray, D., 2009. Remarks on the initiation of costly conflict. Mimeo

[24] Skaperdas, S., 1996. Contest success functions. Economic Theory 7: 283-290.

[25] Sen, A., 1973. On Economic Inequality. Oxford: Clarendon Press.

[26] Shah, A., (ed), 2007. The practice of fiscal federalism: comparative perspectives. Montréal: Forum of Federations and iacfs by McGill-Queen's University Press.

[27] Vaillancourt, F., 1998. Equalization in Canada: a critical view. In R. Boadway and P.A. Hobson (eds): Equalization: its contribution to Canada's economic and fiscal progress. Kingston: John Deutsch Institute for the Study of Economic Policy, 243-247.

[28] Verdier, T., Alberto, A., 1996. The rise and fall of elites: a theory of economic development and social polarization in rent-seeking societies. Center for economic policy research, CEPR Discussion Papers: No. 1495.

[29] Wagner, R. H., 2000. Bargaining and war. American Journal of Political Science, 44 (3): 469-484.

[30] Werner, J., 2008. Fiscal equalization among the states in Germany. Institute of Local Public Finance. Working Paper 02-2008.

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