Partial Decentralization as a Way to Avoid Secessionist Conflict

Sabine Flamand*
Nova School of Business and Economics

January 29, 2014

Abstract

We study partial decentralization in a political union as a way to avoid wasteful secessionist conflict in the presence of interregional income inequality and diversity. Partial decentralization applies to both public expenditures and public revenues, hence it has efficiency and distributional effects. We first show that if the cost of diversity decreases proportionally with decentralization, there always exists a range of decentralization levels such that the conflict can be avoided. Greater interregional income inequality always widens this range but greater diversity widens the range if and only if the union is socially efficient to start with. We then prove that the actual level of decentralization that is implemented to avoid the conflict is closely related to the equilibrium probability of secession would a conflict occur. Finally, when decentralization is not a politically reversible process, it can never prevent costly separatist conflict.

Keywords: Secession, conflict, inequality, decentralization, diversity, heterogeneity

JEL classification: D74, H56, H77

1 Introduction

Nation boundaries have been in movement for a long time. While the emergence of some countries has in some cases been the result of peaceful separations (like the separation of Slovenia from Yugoslavia), in many other cases separatist conflicts have shown a high degree of violence (like Bosnia, Croatia, or Pakistan and Bangladesh). Furthermore, secessionist movements are currently present in several countries (like Belgium, Spain or Canada). The Center for International Development and Conflict Management (CIDCM) identifies the occurrence of 148 self-determination movements in 78 countries between the 1950s and 2005 (Marshall and Gurr (2005)). Among them, 71 territorially concentrated ethnic groups have waged armed conflicts

*sabine.flamand@novasbe.pt. I wish to thank Enriqueta Aragonès, Carmen Beviá, Caterina Calsamiglia, Benoît Crutzen, Joan María Esteban, Andrea Mattozzi, Florian Morath, Hannes Mueller, Susana Peralta, Clara Ponsatí, Petros Sekeris and Shlomo Weber for helpful discussions, comments and suggestions. Financial support by the Spanish Ministry of Science and Innovation through grant ECO2008-04756 (Grupo Consolidado-C), and by the Portuguese Fundation for Science and Technology (FCT) is acknowledged.

for autonomy or independence at some time since the 1950s, not counting the peoples of former European colonies.

In this context, decentralization is often seen as a way of accommodating regional demands for more autonomy in heterogeneous countries.[1] To the extent that decentralizing allows regional governments to implement policies that are closer to local preferences, it potentially constitutes an alternative to costly and sometimes violent secession attempts. Yet, decentralization does better in curbing secessionism in some countries (such as Switzerland, or to a lesser extent Canada) than in others (such as Yugoslavia, Czechoslovakia or Indonesia) (Lake and Rotchild 2005). In their study on decentralization and country stability, Bird et al. (2010) report 34 countries "at risk", that is, where there is arguably a secessionist (or at least autonomist) movement. According to their data, armed conflict has currently or recently occurred in 17 of these countries (such as Ivory Coast, Russia, or Sri Lanka), and eight have seen such conflict in recent decades (such as Ethiopia or Indonesia). In that list, seven countries are formally federal, two are in transition to a federal structure and in at least 10 others some form of decentralization has taken place. Focusing on the cases of Spain, Belgium, UK and Canada, the authors do not provide any clear answer to the question as to whether decentralization works to preserve national unity.

Decentralization, although it reduces the costs of heterogeneity and diversity, also has the tendency to exacerbate interregional inequality (Linz and Stepan 2000), and it might do so through several mechanisms (Bakke and Wibbels 2006). In this paper, we aim at analyzing whether partial decentralization can serve as a (separatist) conflict-mitigating strategy, with a particular focus on whether —and how— the answer to this question depends on the extent of (1) income disparities between regions, and (2) heterogeneity and diversity across regions. In order to do so, we proceed in four steps:

First, we set up a simple political economy model of border formation in the spirit of Alesina and Spolaore (1997), in which individuals belonging to two regions have to choose where to locate a public good, whose quantity and level is fixed, and suffer disutility in terms of the distance between the public good's location and their ideal point. Furthermore, we assume that heterogeneity has two components, that is, besides the cost of heterogeneity in terms of preferences, we assume that there is a diversity cost under unification, namely the fact that individuals dislike interacting with the people of the other region to some extent (Desmet et al. 2011). Finally, we assume that there is a rich and a poor region, and thus there are implicit interregional transfers taking place under unification through the proportional financing of the public good. This setup allows us to capture the traditional trade-off between heterogeneity and economies of scale regarding the choice between unification and secession: by seceding, a given region eliminates the overall cost of heterogeneity (it can locate the public good at its ideal point and no longer interacts with the other region), while it looses the potential benefits

[1] Sorens (2004) provides evidence that, indeed, countries with significant secessionist parties are more likely to decentralize. More specifically, he finds that central governments have offered autonomy more often to regions with secessionist parties than to regions without such parties.

in terms of economies of scale in the provision of the public good. Then, for a given level of economies of scale and heterogeneity, the more inequality between regions, the higher the size of the implicit transfers under unification, and thus the more likely that the rich region wants to secede from the union, while the poor region wishes to preserve it. Therefore, this setup allows us to capture the interactions between efficiency (heterogeneity versus economies of scales) and distributional (interregional transfers) effects that shape the regional incentives to secede from a union.

Second, given the possibility of a disagreement regarding the best choice of border configuration, namely, the rich region seeking secession and the poor region seeking unification, we assume that there exists a conflict/lobbying technology which allows the regions to devote resources to force the border configuration they prefer. We show that interregional inequality fuels conflict in both the poor and the rich region. However, and interestingly, more inequality yields a higher probability of secession in equilibrium if and only if the union is efficient. Further, more heterogeneity translates into more conflict intensity if and only if the union is efficient, while always increasing the probability of a successful secession. Whether the union is efficient, in turn, depends on the resolution of the above-mentioned trade-off between heterogeneity and economies of scale from an aggregate perspective. If the former effect dominates, seceding is the socially efficient outcome (and thus there is a conflict in an inefficient union), whereas if the latter effect dominates, unifying is the socially efficient outcome (and thus there is a conflict in an efficient union).

The key element determining the intensity of conflict and the resulting outcome is the relative stakes in the conflict. Which of the two regions devotes more resources to the conflict depends on which region has the biggest stakes in such conflict, which depends on whether unification or secession is the socially efficient outcome. If the union is efficient, the poor region invests strictly more resources in the conflict than the rich one, while it is the rich region that invests the most if the union is inefficient. In turn, a secession is more likely in an inefficient union than in an efficient one. Then, given that the rich region fights in order to secede, while the poor region fights in order to preserve the union, it follows that the regional stakes in the conflict are asymmetric. As is turns out, regardless of whether the union is efficient or not, more symmetry in the stakes always has the effect of making the conflict more intense, while its outcome is more uncertain. This means that a rise in inequality, while always increasing conflict intensity, translates into a higher probability of secession if and only if the union is efficient. Conversely, more heterogeneity increases conflict intensity if and only if the union is efficient, while always making a successful secession more likely.

Third, given the above results, we study whether wasteful conflict can be avoided and a peaceful compromise reached by the use of partial decentralization. That is, we ask whether there exists an intermediate solution between unification and secession, which we call partial decentralization, such that both regions are better off under this alternative than under the conflictual outcome. We assume that partial decentralization applies to both public expenditures and revenues, hence it has both efficiency and distributional effects. On the one hand,

decentralization brings the government "closer to the people", while on the other, some benefits in terms of economies of scale are lost. Furthermore, fiscal autonomy, by decreasing the size of the implicit interregional transfers, *de facto* impoverishes the poor region, while it makes the rich region richer. Finally, decentralization decreases the cost of diversity.

If the cost of diversity decreases proportionally with decentralization, there always exists a range of decentralization levels such that both regions prefer decentralization to conflict. We show that this range widens as conflict intensity increases, while the actual level of decentralization that is implemented under the threat of conflict is closely linked to the equilibrium probability of secession would a conflict occur. Therefore, while the range of decentralization levels compatible with peace always increases with inequality, it increases with heterogeneity if and only if the union is efficient. Also, the level of partial decentralization that gets actually implemented to avoid the conflict always increases with heterogeneity, while it increases with inequality if and only if the union is efficient. Finally, we show that if the cost of diversity decreases less than proportionally with the decentralization level, partial decentralization cannot always serve as a conflict-mitigating strategy.

Finally, we analyze whether partial decentralization is self-enforcing. It turns out that whether full unification is still an available option once decentralization has been implemented constitutes the key element in order to answer this question. We show that, if this is not the case, peace is not self-enforcing and no partial decentralization is ever implemented. As a result, when it is not an institutionally and/or politically reversible process, partial decentralization cannot serve as a mean to achieve peace, so that separatist conflict occurs in equilibrium with unification as the status quo.

The rest of the paper is structured as follows: Section 2 reviews the literature. Section 3 describes the basic setup and analyzes the costs and benefits of seceding versus unifying in both the poor and the rich region. In Section 4, we describe the conflict technology and solve for the equilibrium of the conflict game. Section 5 introduces the possibility of using partial decentralization as a peaceful alternative to conflict, and analyzes the political sustainability of such a peaceful compromise. In Section 6, we analyze the issue of self-enforceability of the peaceful outcome. Section 7 concludes. Proofs and analytical derivations, when needed, can be found in the Appendix.

2 Related Literature

Our analysis relates to the recent literature on the political economy of border formation. This literature has mainly focused on the traditional trade-off between economies of scale and heterogeneity of preferences, and then looked at the different forces likely to shape the latter, such as region size (Goyal and Staal 2004), the degree of international openness (Alesina, Spolaore and Wacziarg 2000, 2005), the degree of democratization (Alesina and Spolaore 1997; Arzaghi and Henderson 2005; Panizza 1999), the presence of mobile ethnic groups (Olofsgård 2003), or the presence of external threats (Alesina and Spolaore 2005, 2006; Wittman 2000).

Then, the political economy literature on secessionism has looked at transfer and compensation mechanisms between regions such that an inefficient (unilateral) secession can be avoided (Alesina and Spolaore 2003; Haimanko et al. 2005; Le Breton and Weber 2003). The starting point and motivation for this kind of analysis is the fact that, even though a country may be socially efficient —in the sense of maximizing aggregate welfare— majority voting may however lead to the breakup of such an efficient union. The question is then whether there exist interregional compensation mechanisms such that potentially seceding regions are strictly better off by staying in the union. In other words, that particular part of the literature has looked at possible ways to reconcile the notions of efficiency and stability.

One significant gap in the political economy literature on secessionism is the absence of the income heterogeneity dimension, and, in particular, income inequality between regions. One notable exception is Bolton and Roland (1997), who show in the context of pure redistribution policy that secessionist movements may indeed stem only from individual income heterogeneity, both between and within regions.[2] Still, it is very likely, in fact, that both income and preference heterogeneity are important factors regarding the willingness of a given region to secede from a country/union. Said in other words, both economic and cultural factors play an important role in the cost-benefit analysis of secession from the perspective of the different regions forming a country. In turn, and as importantly, those cultural and economic forces are likely to interact in non-trivial ways, and the potential effects of those interactions in shaping secessionist tensions should also be taken into account. Our approach is then to include both types of interregional heterogeneity in the analysis, while abstracting from intra-regional heterogeneity.

Likewise, the authors who have looked at compensation mechanisms so as to avoid secessions do not generally mention interregional income inequality either. They consider preference-based monetary transfers such that potentially seceding regions are strictly better off by staying in the union. However, assuming that there are income disparities across regions, nothing in fact guarantees that the region who has to be compensated (in terms of preferences for the public good) is poorer than average.[3] If not, compensating then means redistributing from poorer to richer regions, which may not be socially desirable nor politically feasible. Alternatively, taking into account interregional income inequality, decentralization —and in particular fiscal autonomy— by reducing the size of transfers in a union, may be seen as a "politically correct" way of compensating richer and potentially seceding regions.

Furthermore, another issue that arises in this context is the one of commitment. Transfers of resources meant to compensate potentially seceding regions may not be credible, especially if one assumes that such transfers are voted upon after the configuration of borders has been decided. That is, once the seceding region has agreed to stay in, the national majority may

[2]Another exception is Arzaghi and Henderson (2005), who also assume interregional income inequality in their model, in which it is the poor region seeking secession. The authors assess the effects of region size, mobility and imperfect democracy on the incentives for secession. Deiwiks et al. (2012) provide strong evidence that *regional* inequality affects the risk of secessionist conflict. More specifically, their results indicate that in highly unequal federations, both relatively developed and underdeveloped regions are more likely to be involved in secessionist conflict than regions close to the country average.

[3]This point has already been made by Spolaore (2008b).

not find it profitable to vote on positive transfers (which will be the case whenever the median distance from the public good is smaller than the average one) (Alesina and Spolaore 2003). In that context, and in the same spirit as the "franchise extension" of Acemoglu and Robinson (2005), decentralization may serve as a commitment device, since it is by definition a transfer of *power*.

More generally, the literature has considered transfer mechanisms so as to avoid (peaceful) inefficient secessions. However, even when secession is the socially efficient outcome, secessionist movements may still lead to wasteful conflict, which is costly. Our approach is then to focus on the instruments such that such conflicts can be avoided, rather than aiming at avoiding secessions *per se*. Furthermore, when seceding is efficient socially, decentralizing public policy —rather than just implementing transfers of resources between regions— is actually welfare-increasing. In other words, we aim at analyzing the possibility of implementing transfers of power to the regions —that is, decentralization— so as to avoid conflict, as opposed to transfers of resources between regions so as to avoid secessions. Partial decentralization, in that sense, fundamentally constitutes an intermediary solution between unification and secession.

A few papers have explicitly introduced a conflict technology in the context of separatism. Spolaore (2008a) analyzes the choice of regional conflict efforts when a peripheral (minority) region wishes to secede from the center, focusing on the trade-off between economies of scale and heterogeneity of preferences. However, he does not address the issue of interregional inequality, nor does he allow for the possibility of an intermediate peaceful solution between unification and secession. In a subsequent paper (Spolaore 2008b), the same author argues that the effects of decentralization on country stability are analytically ambiguous, as decentralization has two opposite effects: it reduces the net payoff from a secession while increasing the probability of success should a secession be attempted. While a conflict technology is explicitly included in the model, conflict efforts are not determined endogenously. Furthermore, Spolaore (2008b) does not assume income disparities between regions, hence he does not assess the potential effects of decentralization on inequality, yet another significant channel through which decentralization may affect conflict. Anesi and De Donder (2013) build a model of secessionist conflict where voters may wish to accommodate the minority to prevent secession. They show the existence of a majority voting equilibrium with a government's type biased in favor of the minority. While what the authors call "accommodation" may be interpreted as decentralization to some extent, they do not endogenize the choice of conflict inputs either, nor do they address the issue of interregional income inequality.[4]

On the empirical side, a few attempts have been made in order to analyze the effects of decentralization on the stability of states and federations. Among them, the most related to our analysis is the one of Bakke and Wibbels (2006), who focus on differences across federal states, and find that fiscal decentralization increases the likelihood of conflict when there are

[4]Also related to our analysis, although to a lesser extent, Wärneryd (1998) explores the endogenous formation of jurisdictions, assuming that the political process is a contest to acquire shares of the national resources. He shows that less resources are wasted on appropriative activities under a hierarchical system of federalism than in a unified jurisdiction with a single central government.

wide disparities in income across regions. Tranchant (2008), although he does not focus on interregional inequality, finds that fiscal decentralization has a better conflict-mitigating impact in richer countries. Brancati (2006) finds that although decentralization reduces the probability of secession, it also has the converse indirect effect of encouraging secessionism through promoting the growth of regional political parties. Sorens (2004) examines the share of votes to secessionist parties in fifteen regions. Using a four level autonomy index, he finds that increases in the latter neither fuel nor dampen significantly the support for secession. Finally, Tranchant (2010) argues that fiscal decentralization exerts a heterogeneous impact across ethnic local majorities and minorities, and finds that it dampens secessionism for local majorities, whereas it fuels rebellion of local minorities.

3 The Choice between Unification and Secession

The setup we use to assess the regional incentives to secede or unify is a modified version of the standard model of border formation developed by Alesina and Spolaore (1997).[5]

Suppose that the nation is represented by the interval $[0, 1]$, which is also the policy line. There are two regions of same size, and total population has mass 1. There is a rich region (R) and a poor region (P). Individual income in the rich and the poor region is denoted y_R and y_P respectively, and $y_R > y_P$. Following Hindriks et al. (2008), we assume that individual income in region R is given by $y_R = (1 + \epsilon)/2$, and it is given by $y_P = (1 - \epsilon)/2$ in region P, where $\epsilon \in (0, 1)$. Therefore, $(y_R - y_P) = \epsilon$ is our measure of income inequality between regions, and $y_R + y_P = 1$. All individuals in region R are located at 0, and all individuals in region P are located at 1, which also corresponds to their ideal point regarding the location of the public good. Public policy consists in a public good g whose level is fixed, with a fixed production cost k which is shared equally among individuals in a proportional manner.[6] Individuals value both private and public consumption, and incur a disutility from the distance between their ideal point and the public good. Finally, under unification, individuals incur a diversity cost d from interacting with the people living in the other region.

Under unification, we assume that the public good g is located at $1/2$, which is a natural compromise between the ideal points of the two regions given their equal population size.[7] The

[5] See also Goyal and Staal (2004).

[6] We abstract from the possibility of voting on the *level* of g and choose instead to focus on the *location* of g. Wile the quantity of the public good clearly affects the incentives to secede in each region, we believe this may not be the most relevant aspect in the context of separatist conflict. Indeed, very often, the subject of the dispute is not the quantity of the public good, but rather its type (e.g., the language of instruction in education) and/or the way its cost is shared between regions (e.g., nationwide unemployment benefits). Indeed, richer and potentially seceding regions in a union are likely to agree on the optimal quantity of public good provision, while they disagree on its type as well as on the way it is financed, especially when centralized provision involves large implicit transfers to poorer regions. Those are the situations we have in mind. On voting on both public good size and location and how to deal with multidimensionality in this context, see De Donder et al. (2012).

[7] One may argue that a natural way to stave off secessionism would be to place the public good closer to the ideal point of the side seeking secession. However, in the current setup, this may not always be feasible, as biasing the public good location in such a way might actually make the accommodating region prefer secession to unification (which is true whenever the cost of providing the public good is low enough). Furthermore, as we argued earlier in the literature review, our focus is not on compensation mechanisms between regions to prevent

utility of an individual in region $j = R, P$ under unification is given by

$$U_j^U = y_j \left[1 - \frac{2k}{(y_1 + y_2)}\right] + g(1 - ad_j^U) - d = y_j(1 - 2k) + g(1 - \frac{a}{2}) - d$$

where d_j^U is the distance between the individual's location and the public good (hence $d_j^U = 1/2$), and $a \leqslant 1$ is a parameter measuring the intensity of disutility from distance (i.e., the heterogeneity costs). Observe that under unification, the proportional financing of the public good gives rise to an implicit per capita transfer T from the rich to the poor region, which is given by[8]

$$T = k\frac{(y_R - y_P)}{(y_R + y_P)} = k\epsilon$$

Under secession, the location of g coincides with individuals' ideal point in both regions (i.e., 0 in region R and 1 in region P, hence $d_j^S = 0$). As the cost of providing the public good is shared among the individuals located in the region, they lose some benefits in terms of economies of scale, while there is no redistribution between regions. Likewise, there is no cost of diversity, as individuals no longer have to interact with the people of the other region. The utility of an individual in region $j = R, P$ under secession is thus given by

$$U_j^S = y_j(1 - \frac{2k}{y_j}) + g(1 - ad_j^S) = y_j - 2k + g$$

An individual in the rich region prefers secession to unification if and only if

$$k < \frac{2d + ag}{2(1 - \epsilon)} = k_R$$

Similarly, an individual in the poor region prefers secession to unification if and only if

$$k < \frac{2d + ag}{2(1 + \epsilon)} = k_P$$

Given that $k_P < k_R$, the only disagreement configuration is such that

$$k_P < k < k_R \tag{1}$$

If (1) holds, the rich region seeks secession, while the poor region wants to preserve the union. Clearly, whenever the poor region wants to secede, it is also the case for the rich region.

secessionism, but rather on transfers of power (i.e., decentralization) to the regions to prevent wasteful conflict. What we mean by decentralization, in turn, is the duplication of the public good so that each region is able to implement its preferred policy, rather than letting one region bias the national public policy in order to please the separatists.

[8]The per capita net transfer from the rich to the poor region under unification is given by the difference between the per capita tax revenue in the two regions, divided by two:

$$T = \frac{1}{2}\left[y_R \frac{2k}{(y_R + y_P)} - y_P \frac{2k}{(y_R + y_P)}\right]$$

Likewise, whenever the rich region wants to preserve the union, so does the poor region.[9] Other things being equal, the larger income disparities between the two regions —and thus the larger the size of the implicit transfer under unification— the more likely that the rich region seeks secession.[10]

Notice that the traditional trade-off between economies of scale and heterogeneity arises regarding the optimal choice of border configuration from the perspective of both regions. The bigger the potential economies of scale in the production of g (i.e., the bigger k), and/or the smaller the heterogeneity costs both in terms of preferences and interactions (i.e., the smaller a and d), the more likely that both regions prefer unification to secession. Conversely, an increase in income inequality makes the incentives of the two regions go in opposite directions. Indeed, higher inequality, by increasing the size of the implicit transfer under unification, makes the latter more profitable for the poor region, while it increases the incentives to secede in the rich region.

Finally, we would like to know what is the socially efficient border configuration, according to the following definition:

Definition 1. *The union is efficient if and only if total welfare (i.e., the sum of individual utilities in both regions) is higher under unification than under secession.*

In the world we just described, unification is more efficient than secession if and only if

$$k > d + \frac{ag}{2} = h \tag{2}$$

We denote by h the total heterogeneity costs that individuals have to bear under unification, which stem from heterogeneity both in terms of preferences for the public good and social interactions across regions. In the following sections, we include these two distinct effects under the broad term "heterogeneity".

Suppose that (1) holds, hence the two regions disagree on the best border configuration. We assume the following timing:

1. *Stage 1*: Decentralization type stage: Nature decides whether decentralization is reversible or not.

[9] However, if we relax the assumption of equal population size in the two regions, and in particular, if we assume that the rich region is majoritarian and thus decisive on the public good location, it may well be that the poor region is better off seceding, even though this implies losing the implicit transfer from the rich region (see Bolton and Roland (1997) for a similar counter-example in the context of pure redistribution policy). Fundamentally, our point here is not to demonstrate that it is always the richer regions seeking secession (think for instance of the cases of Quebec or Slovakia). Rather, we aim at capturing the fact that efficiency (i.e., heterogeneity versus economies of scale) and distributional effects (i.e., interregional transfers) interact in non-trivial ways to shape the incentives to secede in a given region. We further discuss the implications of this alternative conflict configuration in footnote 22.

[10] The idea that "tax exit" constitutes the motivation for richer regions to secede from a union dates back to Buchanan and Faith (1987). See also Collier and Hoeffler (2006), who provide evidence for the idea that secessionist communities, in fact, invent themselves when part of the population perceives secession to be economically advantageous.

2. *Stage 2*: Decentralization bargaining stage:

   (a) If one region decides not to bargain, no decentralization is implemented and the game moves to the conflict stage (Stage 2(a))

   (b) If both regions agree to bargain, then they bargain over the decentralization level they wish to see implemented and this gets implemented. Then go to Stage 2(b).

3. *Stage 3*: Conflict stage:

   (a) Conflict under unification: If no decentralization has been implemented (Stage 1(a)), the regions choose whether and how much they invest in the conflict, and the game ends.

   (b) Conflict under decentralization: If a level of decentralization has been implemented (Stage 1(b)), the regions choose whether and how much they want to invest in the conflict, and the game ends.

We first solve the conflict game without decentralization (Stage 3(a)). Then, we look at the partial decentralization levels such that both regions prefer the decentralized solution to conflict (Stage 2). Finally, we analyze whether a separatist conflict takes place when partial decentralization has been implemented (Stage 3(b)). The equilibrium concept is Nash subgame perfection.

4 Secessionist Conflict

Assume that (1) holds, so that there is a disagreement regarding the choice of border configuration. The parameter constellation consistent with (1) holding corresponds to the shaded area in Figure 1. If k is such that we are in the left part of the shaded area with respect to the 45 degree line ($k > h$), conflict occurs in an efficient union. Conversely, the shaded area on the right of this line ($k < h$) represents the values of k such that conflict takes place in an inefficient union. On the left of the shaded area ($k > k_R$), both regions prefer unification to secession, while on the right of it ($k < k_P$), they both want to secede from the union. In either case, therefore, there is no separatist conflict.

Clearly, the higher inequality (i.e., the higher ϵ), the larger the shaded area and thus the more likely that there is a conflict. The stakes in such conflict for an individual in the rich and the poor region are respectively given by

$$U_R^S - U_R^U = \left(\frac{ag}{2} + d\right) - k + k\epsilon = h - k + T$$
$$U_P^U - U_P^S = k - \left(\frac{ag}{2} + d\right) + k\epsilon = k - h + T$$

We assume that k is such that both expressions are strictly positive, hence we are in the shaded area in Figure 1. If the union is efficient, it follows that the poor region has bigger stakes in the conflict than the rich one. Indeed, by unifying, the poor region benefits both from

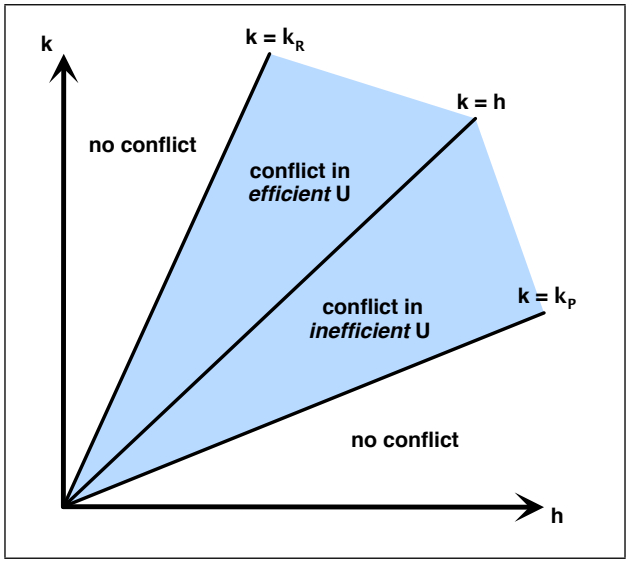

Figure 1: Separatist conflict

redistribution (i.e., the implicit transfer) and from the common financing of the public good (i.e., economies of scale), the latter more than compensating the loss in terms of heterogeneity. By seceding, the rich region benefits from the absence of redistribution, but it incurs a loss from not being able to exploit the economies of scale in the production of the public good, that loss being greater than the benefits arising from the absence of heterogeneity. Conversely, if the union is inefficient, it is the rich region that has the biggest stakes in the conflict.

Given that the rich region fights to secede, while the poor region fights to preserve the union, it follows that the regional stakes in the conflict are asymmetric. What determines the symmetry of the stakes, in turn, can be seen from their analytical expression above: more inequality always brings about more symmetry, since it makes the conflict essentially a distributional one. If the union is efficient, then, an increase in h also makes the conflict more symmetric, as it increases the relative attractiveness of secession (we approach the 45 degree line in Figure 1).

Lemma 1 (Regional stakes in the conflict)**.**

1. *The rich region has bigger stakes than the poor region if and only if the union is efficient.*
2. *The symmetry of the stakes is increasing in inequality. Furthermore, it is increasing in heterogeneity if and only if the union is efficient.*

Suppose that the two regions can invest resources into conflict so as to obtain the border configuration they prefer. Formally, region $j = R, P$ chooses to devote an amount F_j of resources to conflict. As it is standard in the literature, we shall assume that the contest success function (CSF) is given by[11]

[11]This class of CSF was first proposed by Tullock (1980) and later axiomatized by Skaperdas (1996). See Garfinkel and Skaperdas (2007) and the references therein for a description of the possible ways of modeling the conflict technology.

$$\pi = \frac{F_R}{F_R + F_P} \tag{3}$$

The probability of secession is increasing in the effort of the rich region (F_R) and decreasing in the one of the poor region (F_P).[12] We abstract from the free-riding issue regarding individual contributions to the conflict by assuming that in each region, there is a leader who chooses the aggregate amount of resources invested in the conflict so as to maximize the average expected welfare of the region (or, equivalently, the expected utility of the representative individual).[13] Formally, the leader in region $j = R, P$ chooses F_j so as to maximize

$$EU_j = \pi U_j^S + (1 - \pi)U_j^U - 2F_j \tag{4}$$

Observe that we do not impose a budget constraint to individuals regarding the choice of efforts. In other words, the poor and the rich region have the same conflict capacity, and thus being poorer or richer does not influence the resources devoted to conflict in a direct manner. In that sense, the investment in conflict should be understood as any type of costly effort, rather than only as a pure monetary investment. Indeed, whether they turn to be violent or not, separatist tensions involve a waste of resources from both the group seeking separation and the one seeking to preserve the union. They generate lobbying expenditures on both sides, and have a tendency to monopolize the public debate and to divert public resources from other potentially important issues.[14] Therefore, conflict is fundamentally considered here in a very broad manner, as it can represent any kind of costly mobilization, protest or lobbying, rather than its somewhat more restrictive interpretation as a monetary investment in weapons.[15]

The FOC for this problem in region $j = R, P$ yield the regions' best responses:

$$F_R(F_P) = \frac{1}{2}\sqrt{2F_P(h - k + T)} - F_P$$

$$F_P(F_R) = \frac{1}{2}\sqrt{2F_R(k - h + T)} - F_R$$

For a given level of effort in the other region, more inequality translates into more conflict intensity in both regions, since they both have higher stakes in such conflict. Conversely, when

[12] A ratio CSF such as (3) is such that the win probabilities depend on the ratio of efforts F_i/F_j, $j = R, P$. An alternative specification is the logistic function, characterized by $\pi = e^{\beta F_R}/(e^{\beta F_R} + e^{\beta F_P})$, where $\beta > 0$, so that the win probabilities depend on the difference between efforts $(F_i - F_j)$ (Hirshleifer (1989)). One key difference between the two specifications lies in the analytical implications when only one player exerts a positive effort. With a ratio function, the side making no effort faces a zero probability of winning, while this is not necessarily the case with the logistic specification. As discussed by Spolaore (2008a), given that a successful secession, when opposed by the other region, can only be obtained by active separatist effort, a ratio function appears to be more appropriate in this particular context.

[13] For a discussion on individual contributions to conflict and intra-group cohesion, see Esteban and Ray (2011).

[14] Think for instance of Belgium, where separatist tensions paralyzed the government for almost two years. As the *Spiegel* puts it in July 2011: "Belgium is the holder of an unenviable world record. For over a year, the country has not had an elected goverment. But the paralyzing conflict between the Flemish and Walloons comes with a high risk." (http://www.spiegel.de/international/topic/belgium/archiv.html)

[15] We discuss this alternative interpretation of conflict as well as the potential effects of resource constraints in the concluding section.

h increases, the rich region has more to gain from seceding, so that for given F_P, F_R increases, whereas the poor region has less to gain from unifying, so that for given F_R, F_P decreases. Furthermore, we have that

$$\frac{\partial F_R(F_P)}{\partial F_P} > 0 \text{ if and only if } F_P < \tfrac{1}{8}(h-k+T)$$

$$\frac{\partial F_P(F_R)}{\partial F_R} > 0 \text{ if and only if } F_R < \tfrac{1}{8}(k-h+T)$$

From both regions' perspective, given that devoting resources to conflict is costly, it is worth increasing effort as a best response to such an increase in the other region (i.e., conflict efforts are strategic complements) if and only if what is at stake is big enough.

Solving for the Nash equilibrium of this simultaneous game, we obtain the equilibrium effort in each region:[16]

$$F_R^* = \frac{(k-h+T)(h-k+T)^2}{8T^2}$$

$$F_P^* = \frac{(k-h+T)^2(h-k+T)}{8T^2}$$

In equilibrium, effort is strictly positive in both regions, and which region devotes more resources to the conflict depends on which region has the biggest stakes in the latter, which, as we saw, depends on whether the union is efficient or not:

Proposition 1. *The rich region invests more in the conflict than the poor region ($\pi^* > 1/2$) if and only if the union is inefficient.*

Observe, furthermore, that contrary to what (superficial) intuition would suggest, the rich region does not necessarily invest more in the conflict in an inefficient union than in an efficient one. Likewise, the poor region need not be more aggressive when the union is efficient than when it is inefficient.

It turns out that both conflict intensity and outcome are directly related to the symmetry of the stakes in such conflict. In particular, the more symmetric are the stakes, the more intense is the conflict, and the more uncertain is its outcome.[17] As we saw, higher inequality always increases the symmetry of the stakes, while higher heterogeneity increases such symmetry if and only if the union is efficient. Therefore, we have:

Proposition 2. *Total conflict intensity is increasing in inequality. Furthermore, it is increasing in heterogeneity if and only if the union is efficient.*

[16] One can easily check that the second-order conditions for a maximum are satisfied (see Appendix).

[17] The fact that total effort increases with the symmetry of stakes is similar to previous findings according to which symmetry in competitive advantage (capability) tends to enhance individual performance. See for instance Lazear and Rosen (1981), who show that a handicapping system induces efficient competition in a rank-order tournament between weak and strong players, or Myerson (2001), who shows that revenue maximizing auction between asymmetric bidders implies favoring weak bidders.

The ratio of equilibrium conflict inputs coincides with the ratio of stakes, and is given by

$$\frac{F_R^*}{F_P^*} = \frac{U_R^S - U_R^U}{U_P^U - U_P^S} = \frac{h - k + T}{k - h + T}$$

Irrespective of whether economies of scale more than compensate heterogeneity (and thus irrespective of whether the ratio is smaller or bigger than one), an increase in inequality (and thus an increase in symmetry) always brings the ratio closer to one. If the union is efficient, F_R^*/F_P^* is smaller than one, and the ratio is increasing in inequality. That is, conflict gets both more intense and more uncertain with inequality. If, on the contrary, the union is inefficient, the ratio is correspondingly bigger than one, it is decreasing in inequality, and the same conclusion applies. In the limit, when $k = h$ (i.e., unification and secession are equally efficient), the conflict becomes a zero-sum distributional game, the stakes are completely symmetric, conflict intensity is maximized, and the two regions devote exactly the same amount of resources to the conflict (i.e., $F_R^* = F_P^*$). We can apply the same reasoning regarding an increase in heterogeneity: we saw that an increase in h yields more symmetry in the stakes if and only if the union is efficient. In such case, conflict intensity increases, while the ratio F_R^*/F_P^* increases and thus approaches one. Again, more symmetry translates into more conflict intensity and a more uncertain outcome.

Finally, the equilibrium probability of secession is given by

$$\pi^* = \frac{1}{2} + \frac{2(d-k) + ag}{4k\epsilon} = \frac{1}{2} + \frac{h-k}{2T}$$

and we thus have:

Proposition 3. *The equilibrium probability of secession is increasing in heterogeneity. Furthermore, it is increasing in inequality if and only if the union is efficient.*

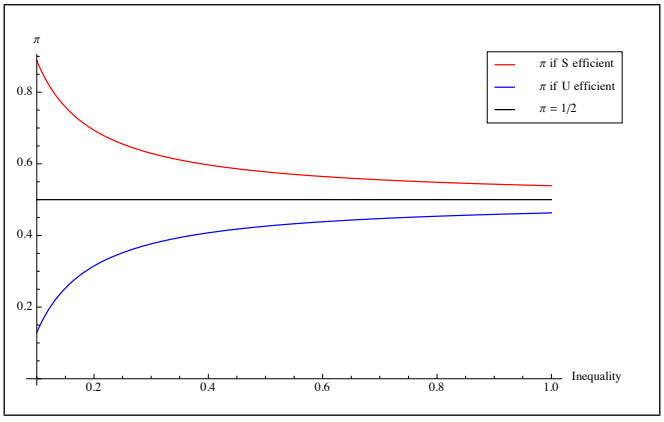

Figure 2: Equilibrium probability of secession and inequality

As expected, the probability of a successful secession is increasing in heterogeneity. Furthermore, it always approaches 1/2 as inequality increases, that is, the conflict outcome is more uncertain (see Figure 2). Whether π^* is increasing or decreasing in inequality, in turn, depends

on whether unifying or seceding is efficient. Again, in either case, more inequality yields more symmetry in the stakes, hence the ratio F_R^*/F_P^* approaches one. If the union is efficient, more inequality translates into an increase in the latter ratio, meaning that π^* is *increasing* in inequality (i.e., π^* approaches its upper bound 1/2). If, on the contrary, the union is inefficient, more inequality translates into a lower value of F_R^*/F_P^*, meaning that π^* is *decreasing* in inequality (i.e., π^* approaches its lower bound 1/2).

To sum up, it turns out that it is all about the relative stakes in the conflict. If the two regions have the exact same stakes (there is no public good, for instance), they invest the same amount in the conflict, the intensity of the latter is maximized, and they both face a probability of winning of exactly 1/2. Conversely, if the regional stakes are very asymmetric, conflict intensity is sharply diminished, and one region faces a high probability of winning. Notice that, interestingly, more symmetry in the stakes actually means *more* inequality. In other words, asymmetry in regional incomes translates into symmetry in regional stakes in the context of a separatist conflict in which the rich region wants to secede. In turn, more inequality —and thus more conflict intensity— can make a secession either more or less likely, while in either case, the conflict outcome is more uncertain.

If $k > h$, it follows directly that unification welfare-dominates conflict, since the former is the socially desirable outcome. Then, if $k < h$ (i.e., the union is inefficient), unification is still socially better than conflict if and only if

$$F_R^* + F_P^* > \pi^*(h - k)$$

Clearly, the higher heterogeneity, the more likely that conflict welfare-dominates unification. Observe that inequality has two adversing effects on welfare. First, inequality fuels conflict in both regions, which is a pure waste from a social point of view. Second, it turns out that inequality makes the efficient outcome less likely. Indeed, if the union is efficient, more inequality increases the probability of a successful secession, while the opposite holds when secession is the efficient outcome. In other words, inequality also makes conflict more costly as a result of making the socially desirable outcome less likely. Therefore, the higher inequality, the more likely that unification welfare-dominates the conflictual outcome.

Given that conflict is costly, the question is whether there exists an intermediate institutional arrangement between unification and secession such that both regions are prevented from triggering a conflict. In particular, can partial decentralization constitute a way to reconcile the two regions' interests, so that they both prefer to remain in peace rather than starting a conflict? If so, under what conditions? We answer these questions in the next section.

5 Partial Decentralization

Now that we have seen how the two regions behave when at least one of them prefers conflict over decentralization (i.e., there is a conflict under unification), we turn to the analysis of the game when both regions agree to bargain over decentralization in an attempt to mitigate the

interregional tensions. That is, we focus on the characteristics of the range of decentralization levels such that both regions are better off under decentralization than under conflict, and on the properties of the decentralization level that gets actually implemented. This implies, in turn, that we are implicitly assuming that the two regions commit not to initiate a conflict once the decentralization agreement has been reached and thus the corresponding decentralization level implemented. In the next section, we will analyze whether this is indeed the case (i.e., decentralization is self-enforcing), considering both the cases of reversible and non-reversible decentralization.[18]

Suppose that the public good can be partially decentralized, and let the degree of decentralization be $\delta \in (0,1)$. This means that a fraction δ (i.e., the decentralized part) of the public good is financed and provided regionally (and thus this fraction of g is produced twice), and located at the regions' ideal points, while a fraction $(1-\delta)$ (i.e., the centralized part) of the public good is financed and provided centrally, and located at $1/2$. Furthermore, as individuals in the two regions still have to interact with each other in the decentralized union, the diversity cost also applies, although to a lesser extent.

The utility of an individual in region $j = R, P$ under partial decentralization is given by

$$U_j(\delta) = y_j \left[1 - \delta\frac{2k}{y_j} - (1-\delta)2k\right] + g\left[1 - (1-\delta)\frac{a}{2}\right] - [(1-\delta)d + \delta sd]$$

where $s \in (0,1)$. Hence, if $\delta = 0$ (i.e., no decentralization), the cost of diversity is the same as under unification (d), whereas if $\delta = 1$ (i.e., *de facto* secession/full decentralization), the cost of diversity is $sd < d$. That is, as long as the groups have to live together (there is no official secession), they still bear a cost from diversity, the latter being decreasing in the level of decentralization.

Notice that decentralization has an effect both in terms of efficiency and on income distribution. Decentralizing the public good reduces the overall heterogeneity costs in the two regions, while they lose some benefits in terms of economies of scale. Furthermore, since δ also applies to the cost of the public good (i.e., there is fiscal autonomy), decentralization *de facto* impoverishes the poor region. Indeed, the implicit per capita transfer from the rich to the poor region is now given by

[18] Starting with Oates (1972), many authors have used the term decentralization to capture similar but often distinct ideas. Later theoretical contributions on partial decentralization include Seabright (1996), Brueckner (2009) and Hatfield and Padró i Miquel (2012). In Oates (1972) and Seabright (1996), decentralization means that local governments choose their own policy, hence it corresponds to secession in our setup. In contrast, what Brueckner (2009) calls partial decentralization is the fact that local governments can choose their own policies but not their own taxes. While we do not allow for vertical fiscal imbalances, we assume that public expenditures can be provided partly at the country level, and partly at the local level. Hatfield and Padró i Miquel (2012) are closest to our definition of partial decentralization, as they assume that the provision of public goods can be split between national and local governments. While they study the problem of tax competition, we use a similar approach in order to analyze the possibility of using partial decentralization as a conflict-mitigating strategy. The literature on decentralization and fiscal federalism is immense and has analyzed a large variety of topics (e.g., the effects of spillovers, accountability) which we do not aim to review here. Instead, we stress the fact that while most of this literature has focused on the comparison of institutional extremes, we focus on the *level* of decentralization, that is, we consider decentralization as an intermediate solution between unification and secession.

$$T(\delta) = (1-\delta)k\frac{(y_R - y_P)}{(y_R + y_P)} = (1-\delta)T$$

5.1 Decentralization Can Fully Eliminate the Cost of Diversity

Suppose that $s = 0$, that is, there is no more diversity cost under full decentralization ($\delta = 1$). In such case, individual utility under decentralization in region $j = R, P$ reduces to

$$U_j(\delta) = \delta U_j^S + (1-\delta)U_j^U$$

The case of $s = 0$ is such that full decentralization is equivalent to secession, whereas no decentralization is equivalent to unification. In such case, decentralization constitutes an intermediary solution (i.e., a linear combination) between unification and secession in utility terms, hence it always holds that $U_R^U < U_R(\delta) < U_R^S$ and $U_P^S < U_P(\delta) < U_P^U$. We now look at the decentralization thresholds such that region $j = R, P$ prefers the decentralized solution to conflict:

An individual in the rich region is willing to bargain over decentralization as long as $U_R(\delta) > EU_R^*$, that is, as long as

$$\delta > \pi^* - \frac{2F_R^*}{(U_R^S - U_R^U)} = \delta_R$$

Similarly, an individual in the poor region is willing to bargain over decentralization as long as $U_P(\delta) > EU_P^*$, that is, as long as

$$\delta < \pi^* + \frac{2F_P^*}{(U_P^U - U_P^S)} = \delta_P$$

An individual in the rich region prefers decentralization to conflict if and only if decentralization is *at least* δ_R, while an individual in the poor region prefers decentralization to conflict if and only if decentralization is *at most* δ_P. The decentralization thresholds have the same properties as the equilibrium probability of secession π^* as it can be shown that $\delta_R = (\pi^*)^2$ and $\delta_P = \pi^*(2 - \pi^*)$. This is intuitive, as it basically means that whatever increases the odds of success of a given region in case of conflict makes this region willing to bargain over decentralization for a smaller range of decentralization levels. In turn, this means that the decentralization thresholds are increasing in heterogeneity, while they are increasing in inequality if and only if the union is efficient.

The two regions are willing to bargain over decentralization as long as they are better off under decentralization than under conflict, hence it requires that the decentralization level δ belongs to the interval (δ_R, δ_P). Taking the difference between the two thresholds yields

$$\delta_P - \delta_R = \left[\frac{F_P^*}{(U_P^U - U_P^S)} + \frac{F_R^*}{(U_R^S - U_R^U)}\right] = \frac{2(F_P^* + F_R^*)}{T} = 2\pi^*(1-\pi^*) > 0$$

Therefore, If decentralization can fully eliminate the cost of diversity ($s = 0$), there is always a range of decentralization levels such that both regions prefer decentralization to conflict:

Proposition 4. *For all levels of inequality, heterogeneity costs and diversity, there is always a non-empty set of decentralization levels over which the two regions are willing to bargain.*

The properties of the interval (δ_R, δ_P) are closely related to the ones of total conflict intensity. In particular, the more intense the conflict, the more resources are wasted, and thus the more room there is for a peaceful compromise, so that the interval gets larger. Therefore, an increase in inequality always increases the range of decentralization levels over which both regions are willing to bargain, while an increase in heterogeneity increases this range if and only if the union is efficient.

Proposition 5. *The range of decentralization levels over which both regions are willing to bargain is increasing in inequality. Furthermore, it is increasing in heterogeneity costs and in diversity if and only if the union is efficient.*

The particular decentralization level $\delta^* \in (\delta_R, \delta_P)$ that is implemented in order to avoid the conflict depends on which region is decisive on that matter. In particular, region R implements δ_P rather than starting a conflict, whereas region P implements δ_R rather than starting a conflict. Whatever assumption we make regarding who is decisive on selecting δ^*, its properties are the same as the ones of the two decentralization thresholds, hence of the probability of secession π^*.[19]

Proposition 6. *The level of decentralization δ^* that is implemented in order to avoid the separatist conflict is increasing in heterogeneity costs and in diversity. Furthermore, it is increasing in inequality if and only if the union is efficient.*

Figure 3 and 4 illustrate the properties of δ_R, δ_P and δ^* with respect to inequality in an efficient and inefficient union respectively. Observe that an increase in inequality has two distinct effects: on the one hand, the range of decentralization levels over which both regions are willing to bargain increases, while on the other hand, the level of decentralization δ^* that is implemented may either increase or decrease. If the union is efficient, more inequality brings about more decentralization under the threat of conflict, while the opposite holds if the union is inefficient.

Observe that our results imply a two-sided relationship between inequality and decentralization. On the one hand, fiscal autonomy, through its effect on implicit transfers, increases inequality to some extent. On the other hand, the level of decentralization which is implemented to avoid the conflict depends on the pre-existing level of inequality. That is, decentralization is endogenous to the territorial structure of inequality.[20] Therefore, we have that decentralization increases inequality, but also that inequality, in turn, conditions the level of decentralization

[19] Given that we assumed that g is located at $1/2$ under unification, a natural assumption would be that the level of decentralization that is implemented is $\delta^* = (\delta_R + \delta_P)/2$.

[20] The interactions between fiscal decentralization and inequality have been widely investigated empirically. The dominant strategy is to assume that decentralization affects inequality, excluding the possibility of effects

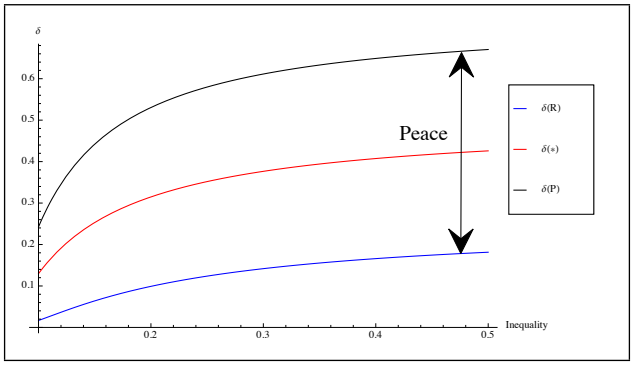

Figure 3: Decentralization thresholds in an efficient union

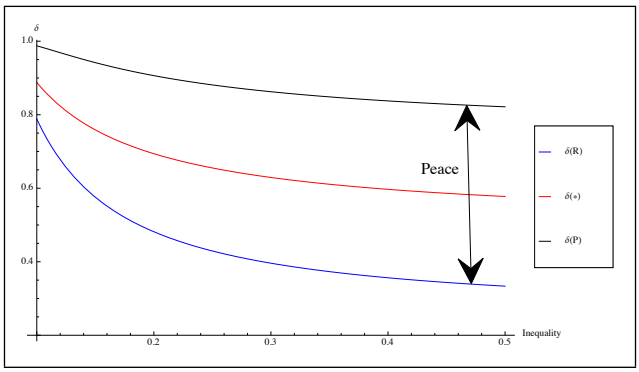

Figure 4: Decentralization thresholds in an inefficient union

under the threat of conflict. This is consistent with the fact that *"the empirical evidence is not conclusive with regards to the exact nature and direction of causality of the relationship between fiscal decentralization and inequality, nor on the sign of the relationship itself"* (Sacchi and Salotti 2011, p. 6).

Figure 5 illustrates the properties of δ_R, δ_P and δ^* with respect to heterogeneity ($h = d + ag/2$). An increase in heterogeneity also has two distinct effects: one the one hand, the range of decentralization levels over which both regions are willing to bargain increases if and only if the union is efficient, while on the other hand, the level of decentralization δ^* that is implemented under the threat of conflict increases.[21]

working in the opposite direction. In this vein, most authors studied regional disparities (e.g., Ezcurra and Pascual 2008), few others overall income inequality (e.g., Sepulveda and Martinez-Vasquez 2011). There are a few exceptions: Beramendi (2007), Bodman and Hodge (2010), and Sacchi and Salotti (2011) tested whether the degree of inequality in a country affects the incentives for fiscal decentralization.

[21] Allowing for the poor region to seek secession (which could be the case if it constitutes a minority in the country (see footnote 10)) would not change the fundamental relation between decentralization and conflict. That is, the range of decentralization levels such that the conflict can be avoided relates to the properties of total conflict intensity, while the particular level of decentralization implemented relates to the underlying probability of secession. Clearly, if it is the poor region seeking secession, an increase in inequality decreases total conflict intensity, hence the range of peace-compatible decentralization levels decreases accordingly. Furthermore, whether the level of decentralization increases or decreases with inequality still depends on whether the union is efficient or not, although the relationship is reversed. Finally, as a secession is still more likely the higher heterogeneity, the level of decentralization implemented in order to avoid conflict increases accordingly.

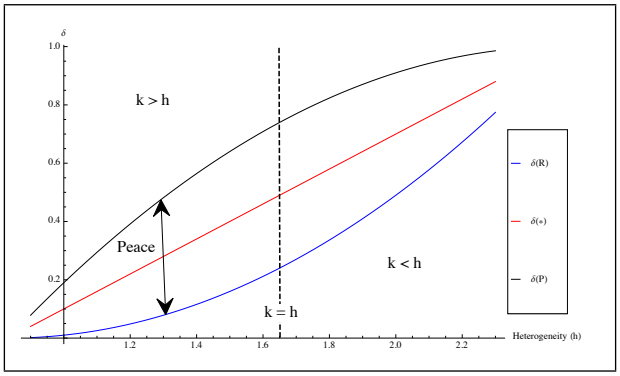

Figure 5: Decentralization thresholds and heterogeneity

5.2 Decentralization Cannot Fully Eliminate the Cost of Diversity

Suppose now that $s \in (0,1)$, which means that even under full decentralization ($\delta = 1$), there is still some diversity cost $sd > 0$. This means that the cost of diversity decreases less than proportionally with the decentralization level. In such case, individual utility under decentralization in region $j = R, P$ is given by

$$U_j(\delta) = \delta U_j^S + (1-\delta)U_j^U - \delta sd$$

Therefore, it is no longer necessarily true that the decentralized solution has an intermediate position between unification and secession in utility terms. Indeed, while it still holds that an individual in the rich region prefers secession to decentralization ($U_R^S > U_R(\delta)$), the latter individual prefers decentralization to unification if and only if

$$k < \frac{h - sd}{1-\epsilon} = \widetilde{k}_R < k_R = \frac{h}{1-\epsilon}$$

Likewise, while an individual in the poor region still prefers unification to decentralization ($U_P^U > U_P(\delta)$), the latter individual prefers decentralization to secession if and only if

$$\delta < \frac{k - h + T}{k - h + T + sd} = \widetilde{\delta}_P < 1$$

Clearly, as the rich is better off under secession than under decentralization for $s = 0$, it must also be true for $s > 0$. Similarly, if the poor prefers unification to decentralization for $s = 0$, it must also be true for $s > 0$. Observe that if $s > 0$, we have that $\widetilde{k}_R < k_R$, hence individuals in the rich region now find partial decentralization relatively less attractive compared to unification. Likewise, as $\widetilde{\delta}_P < 1$, individuals in the poor region prefer secession to full decentralization ($\delta = 1$). We thus have the following two conditions that need to be satisfied in order to ensure that decentralization can potentially serve as an alternative to conflict:

Proposition 7. *If $k > \widetilde{k}_R$ and/or $\delta > \widetilde{\delta}_P$, partial decentralization cannot serve as a separatist conflict-mitigating strategy.*

Suppose that $k < \widetilde{k}_R$. An individual in the rich region is willing to bargain over decentral-

ization as long as $U_R(\delta) > EU_R^*$, that is, as long as

$$\delta > \frac{\pi^*(U_R^S - U_R^U) - 2F_R^*}{U_R^S - U_R^U - sd} = \delta_R(s)$$

Similarly, an individual in the poor region is willing to bargain over decentralization as long as $U_P(\delta) > EU_P^*$, that is, as long as

$$\delta < \frac{\pi^*(U_P^U - U_P^S) + 2F_P^*}{U_P^U - U_P^S + sd} = \delta_P(s)$$

Observe that $\delta_P(s) < \widetilde{\delta}_P$, which is intuitive: as long as the participation constraint is satisfied for the individuals in the poor region, it follows that they prefer conflict to secession. In turn, this implies that the level of decentralization such that they prefer decentralization to conflict must be smaller than the one such that they prefer decentralization to secession. Hence, as long as $\delta_R(s) < \delta < \delta_P(s)$, both regions are willing to bargain over decentralization.

Contrary to the case of $s = 0$, it does not always hold that $\delta_R(s) < \delta_P(s)$. Indeed, the latter condition is satisfied if and only if

$$s < \frac{2\left[F_R^*(U_P^U - U_P^S) + F_P^*(U_R^S - U_R^U)\right]}{d\left[2(F_P^* - F_R^*) + \pi^*(U_R^S - U_R^U + U_P^U - U_P^S)\right]} = \widetilde{s}$$

It is direct from the analytical expression of the thresholds that $\delta_R(s)$ is increasing in s, while $\delta_P(s)$ is decreasing in s. Therefore, the slower the rate at which the cost of diversity decreases with the decentralization level, the less likely that decentralization can be used as a peaceful alternative to conflict. The key difference arising now that $s > 0$ is that the utility under decentralization is no longer a weighted average between the ones under unification and secession (the weight being δ): it is a weighted average from which some cost is subtracted. As a result, and as we saw, the utility under decentralization is not necessarily in an intermediate position between the ones of the two extreme institutional arrangements. However, even if it is (i.e., $U_R^U < U_R(\delta) < U_R^S$ and $U_P^S < U_P(\delta) < U_P^U$), and even though the conflict is costly, it is no longer guaranteed that the conflict can be avoided by partially decentralizing the union. Indeed, if the rate at which the cost of diversity decreases with decentralization is too low (i.e., $s > \widetilde{s}$), there is no range of decentralization levels such that *both* regions prefer peace to conflict.

Assuming $s > 0$ considerably complicates the analysis and yields ambiguous comparative statics for both the range of decentralization levels over which both regions are willing to bargain and the actual level of decentralization level implemented. However, we can show that more inequality makes it more likely that $\delta_R(s) < \delta_P(s)$, that is, there exists a range of decentralization levels over which both regions are willing to bargain. As before, as inequality fuels wasteful conflict, it increases the chances of reaching a peaceful compromise between the two regions (i.e., the threshold $\widetilde{s}$ increases).

Proposition 8. *The set of decentralization levels over which the two regions are willing to bargain is non-empty if and only if $s < \widetilde{s}$, where $\widetilde{s}$ is increasing in inequality.*

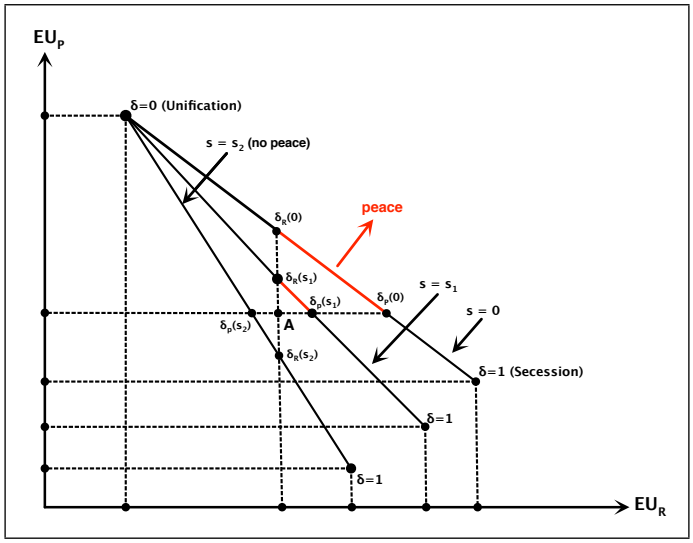

Figure 6: Sustainable peace as a function of s

Figure 6 illustrates the possibility of avoiding conflict through partial decentralization as a function of s. The vertical axis represents the payoff of the poor region, whose maximum is reached under full unification. Similarly, the horizontal axis represents the payoff of the rich region, whose maximum is reached under secession. In case of conflict, we reach the equilibrium at point A. We consider three values of s. If $s = 0$, decentralization is a linear combination between unification ($\delta = 0$) and secession ($\delta = 1$) in utility terms. In such case, there always exists an interval $(\delta_R(0), \delta_P(0))$ such that $U(\delta) > EU_j^*$ for $j = R, P$. At $s_1 < \widetilde{s}$, observe that the two regions prefer secession to full decentralization ($\delta = 1$). However, there still exists a (smaller) range $(\delta_R(s_1), \delta_P(s_1))$ such that both regions are willing to bargain over decentralization. Finally, at $s_2 > \widetilde{s}$, the cost of decentralization in terms of diversity is too high for the conflict to be avoided ($\delta_R(s_2) > \delta_P(s_2)$).

6 Decentralization as a Stepping Stone to Secession?

In the previous section, we have obtained the levels of decentralization that would prevent a secessionist conflict. We have thus implicitly assumed that the two regions can and do credibly commit to this agreement and hence to not reopen conflict in the future. However, there are good reasons to assume asymmetry in the behavior of the two regions from the point of view of their capacity to commit. Indeed, it is likely that while the region that seeks to preserve the union commits to the decentralized agreement, the separatists do not.

Suppose there is a conflict after decentralization has been implemented. It could well be that the poor region does not have the political power to impose a reduction in regional autonomy in the decentralized union even in case of victory. That is, despite the fact that the poor region might win the contest, once the union has been decentralized (and thus regional power increased accordingly), it is likely that both regions can act as veto players on, in particular, (de)centralization matters, making decentralization *de facto* an irreversible process. Also, de-

centralization could occur through a constitutional change, very hard to reverse. In contrast, it may well be that potentially secessionist regions do not give up on their ultimate goals and hence may not feel committed by a decentralization agreement.

In this section, we shall start by checking whether the peaceful (decentralized) outcome is self-enforcing, that is, whether there are no incentives left to start a conflict once partial decentralization has been implemented.[22] We do so by analyzing two situations. First, we study the issue of self-enforcement assuming that full unification (i.e., $\delta = 0$) is still an available option once the union has been decentralized. This is equivalent to assuming that neither of the two regions is credibly committed to the agreement and thus that the pre-agreement scenario can be imposed in case of victory by either region. Then, we conduct the same analysis assuming that once the union has been partially decentralized, it is not possible to go back to a fully centralized union (i.e., decentralization is an irreversible process). This corresponds to the case in which the poor region credibly commits while the rich region does not.

Suppose that $s \in [0, \widetilde{s})$ and $k < \widetilde{k}_R$, hence we are in a situation in which peace is politically sustainable. Furthermore, let $\delta^* \in (\delta_R, \delta_P)$ be the level of partial decentralization that is adopted in order to avoid the conflict. Suppose then that it is possible to return to the unified outcome once δ^* has been implemented. Given that $U_P^U > U_P(\delta^*)$ and $U_R^S > U_R(\delta^*)$, we have to make sure that the two regions are not willing to start a conflict under decentralization.

If full unification is still an option under decentralization, it follows trivially that peace is self-enforcing. Indeed, we know that by definition of the regional thresholds, any decentralization level $\delta^* \in (\delta_R, \delta_P)$ is such that $U_j(\delta) > EU_j^*$ for $j = R, P$. Since the potential conflict that would arise under δ^* is exactly the same as before (i.e., the regional stakes are unaffected), the latter inequality is for sure satisfied.

Suppose now that once δ^* has been implemented, full unification is no longer an option. Given that $U_R^S > U_R(\delta^*)$, we have to make sure that the rich region is not willing to start a conflict under the decentralized outcome. As $U_P^S < U_P(\delta^*)$, we are again in a situation of disagreement, and thus of potential conflict. Decentralization being the (irreversible) status quo, we now ask whether the rich region is willing to start a conflict in order to force secession.

Decentralization being now the alternative to secession, individuals choose conflict efforts F_j, $j = R, P$ so as to maximize

$$EU_j(\delta^*) = \pi U_j^S + (1 - \pi)U_j(\delta^*) - 2F_j$$

where, as before, $\pi = F_R/(F_R + F_P)$. Equilibrium conflict inputs are given by

[22] The general issue of the stability of federal systems dates back to Riker (1964), who argues that to survive, a federal system must resolve two fundamental dilemmas: the first one relates to the fact that central governments tend to expand their powers over time, while the second relates to the fact that constituent units have a tendency to undermine federalism by free-riding and other forms of failure to cooperate. de Figueiredo and Weingast (2005) have studied the two problems simultaneously by investigating the trade-offs among the benefits from central goods provision, the ability of the center to impose penalties for noncompliance, and the costs of states to exit. They argue that, to survive, federal structures must be self-enforcing: the center and the states must have incentives to fulfill their obligations within the limits of federal bargains.

$$F_R^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)+\delta^* sd\right]^2\left[(1-\delta^*)(k-h+T)-\delta^* sd\right]}{8(1-\delta^*)^2T^2}$$

$$F_P^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)+\delta sd\right]\left[(1-\delta^*)(k-h+T)-\delta^* sd\right]^2}{8(1-\delta^*)^2T^2}$$

Total welfare is higher under decentralization than under secession if and only if

$$k > \frac{ag}{2} + d\left[1 + s\frac{\delta^*}{(1-\delta^*)}\right] = h + sd\frac{\delta^*}{(1-\delta^*)}$$

As before, which region invests the most in the conflict depends on which region has the biggest stakes in the latter, which in turn depends on whether decentralization or secession is the socially efficient outcome. Again, the ratio of conflict inputs corresponds to the ratio of regional stakes:

$$\frac{F_R^*(\delta^*)}{F_P^*(\delta^*)} = \frac{U_R^S - U_R(\delta^*)}{U_P(\delta^*) - U_P^S} = \frac{(1-\delta^*)(h-k+T)+\delta^* sd}{(1-\delta^*)(k-h+T)-\delta^* sd}$$

and the equilibrium probability of secession is given by

$$\pi^*(\delta^*) = \frac{1}{2} + \frac{2(d-k)+ag}{4k\epsilon} + \frac{\delta^*}{(1-\delta^*)}\frac{sd}{2k\epsilon} = \pi^* + \frac{\delta^*}{(1-\delta^*)}\frac{sd}{2T}$$

If $s = 0$, the equilibrium conflict effort in region $j = R, P$ is simply $F_j^*(\delta^*) = (1-\delta^*)F_j^*$, whereas the equilibrium probability of secession is left unchanged. As decentralization decreases the stakes in both regions by a factor δ^*, they invest strictly less in the conflict. However, as the relative stakes are unaffected, the probability of secession remains the same. Observe that for $s = 0$, decentralization is more efficient than secession if and only if unification is more efficient than secession. Hence, as before, the rich region invests more in the conflict than the poor one ($\pi^* > 1/2$) if and only if the union is inefficient.

If $s \in (0, \widetilde{s})$, the stakes of the two regions also decrease with the decentralization level δ^*, from which it follows that total conflict intensity decreases with decentralization. However, the ratio of stakes is now increasing in the decentralization level δ^*, which means that the stakes of the poor region decrease faster with decentralization than the stakes of the rich one. In turn, this means that for $s > 0$, the probability of secession is higher under the decentralized status quo than under unification, and it is increasing with the decentralization level δ^*.

Proposition 9 (Conflict under decentralization)**.**

1. *For any $s \in [0, \widetilde{s})$, total conflict intensity is decreasing in δ^**
2. *If $s = 0$, the equilibrium probability of secession is independent of δ^**
3. *If $s \in (0, \widetilde{s})$, the equilibrium probability of secession is increasing in δ^**

The question is now whether it is rational for the rich region to initiate a conflict. As $EU_R^*(\delta^*) > U_R(\delta^*)$ for all $\delta^* \in (\delta_R, \delta_P)$, the answer to this question is positive, hence peace

is not self-enforcing. If full unification is no longer an option once decentralization has been implemented, the rich region always has an incentive to fight in order to secede. In such case, decentralization, even though it makes the conflict less intense, cannot serve as a way to fully eliminate it. As a result, in the absence of commitment, peace is not achievable through the use of partial decentralization when the latter is an irreversible process.

Given that the rich region cannot credibly commit not to start a conflict for any $\delta^* \in (\delta_R, \delta_P)$, we would like to know, in turn, whether any decentralization would be voted upon and implemented in a direct democracy. As for any such δ^*, it holds that $EU_R^*(\delta^*) > EU_R$ and $EU_P^*(\delta^*) < EU_P^*$, it follows that the rich region is always willing to decentralize (and start a conflict afterwards), while the poor region always opposes it. Indeed, the poor region, knowing that the rich will start a conflict for any δ^*, opposes the implementation of any decentralization in the first place, since fighting when decentralization is the status quo is strictly worse than when unification is the status quo. Therefore, if both regions have to agree on decentralizing, no decentralization is ever implemented, and conflict arises in equilibrium with unification as the status quo.

Proposition 10 (Self-enforcing peace)**.**

1. *If decentralization is a reversible process, peace is self-enforcing for all* $\delta \in (\delta_R, \delta_P)$*.*
2. *If decentralization is not a reversible process, peace is not self-enforcing for any* $\delta \in (\delta_R, \delta_P)$*. As a result, separatist conflict occurs in equilibrium with unification as the status quo.*

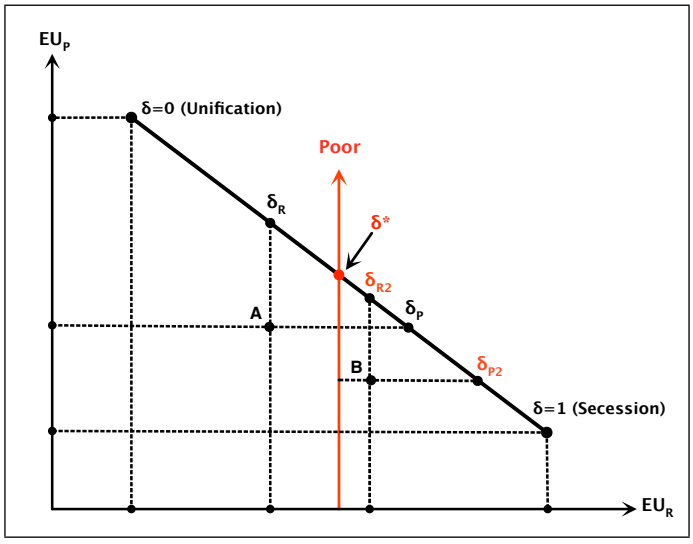

Figure 7: Self-enforcement

Figure 7 illustrates the mechanism through which conflict occurs in equilibrium when decentralization is not reversible. As in Figure 6, the payoffs of the rich and poor region are represented in the horizontal and vertical axis, respectively. In case of conflict, we reach the

equilibrium at point A. Given that $s \in [0, \widetilde{s})$ ($s = 0$ in the figure), there exists a range of decentralization levels, defined by (δ_R, δ_P), such that both regions are strictly better off under that intermediary solution than under conflict.

Suppose that the two regions find a compromise somewhere in this interval, so that the decentralization level δ^* is implemented. Suppose furthermore that decentralization is not reversible, which means that the vertical axis shifts to the right until crossing δ^*. In this case, the rich region can increase its payoff by triggering a conflict, so as to reach point B. At this new conflict equilibrium, again, there exists a range of partial decentralization levels, defined by $(\delta_{R2}, \delta_{P2})$, such that both regions are strictly better off under that intermediary solution than under conflict. Again, if some $\delta \in (\delta_{R2}, \delta_{P2})$ is implemented, the vertical axis shifts to the right, and the rich region has an incentive to trigger a conflict under the new decentralized solution. One can clearly foresee that this process of successive waves of decentralization eventually leads to full secession, although in a peaceful manner.

Now, observe that the rich region is strictly better off at B than at A, which means that it is always willing to decentralize and start a conflict afterwards. However, as the poor region is strictly better off at A than at B, it opposes the implementation of any decentralization, so that conflict occurs in equilibrium with unification as the status quo (point A).

This somewhat strong finding arises as a result of all individuals being identical within a given region. Suppose, to the contrary, that there is a continuum of individuals uniformly distributed on $[0, 1]$, the rich region being the interval $[0, 1/2]$ and the poor one being the interval $[1/2, 1]$. This means that in each region, there are some moderates and some extremists regarding their preferred location for the public good. Suppose then, that under unification, all individuals in the rich region have an incentive to start a conflict to force secession, so that in the absence of decentralization, they coordinate to fight and reach the equilibrium at point A. However, it may well be the case that once partial decentralization is implemented, a majority of individuals in the region are better off at δ^* than at the conflict equilibrium B, meaning that peace would be self-enforcing.[23] Then, one possibility is that, once they have obtained a partial decentralization level of δ^* (and provided it is not reversible), the most extremist individuals in the rich region start to invest in separatist propaganda so as to "extremize" the moderates, thereby making the conflict threat credible and obtain a new wave of decentralization $\delta \in (\delta_{R2}, \delta_{P2})$. Again, this process would eventually lead to full secession.

7 Conclusion

In this paper, we aimed at determining whether partial decentralization can serve as a way to avoid wasteful secessionist conflict, and what is the role of heterogeneity and income inequality

[23] Sorens (2004, p. 730), who studies the implications of secessionist persistence for decentralization, formulates the same idea: "*Offers of autonomy should forestall secessionism if some voters are "conditional secessionists", preferring independence to the status quo but not to substantial autonomy".* Also consistent with our conjecture, Cunningham (2011), using data on the structure of self-determination movements and the concessions they receive, finds that internally divided movements receive concessions at a much higher rate than unitary ones and that the more divided the movement, the more likely it is to receive concessions.

in order to answer this question. We showed that even though conflict is wasteful, partial decentralization cannot always serve as a conflict-mitigating strategy. This will be the case whenever (i) decentralization does not decrease sufficiently the cost of diversity, and/or (ii) decentralization is not a politically reversible process.

If the cost of diversity decreases proportionally with the level of decentralization, secessionist conflict can be avoided whenever decentralization is a reversible process. In such case, the level of decentralization which is implemented under the threat of conflict directly relates to the underlying probability of secession would a conflict occur. In particular, while the level of decentralization always increases with heterogeneity, it increases with inequality if and only if the union is efficient. If the cost of diversity decreases less than proportionally with the level of decentralization, and provided decentralization is reversible, secessionist conflict may still be avoided provided interregional inequality is high enough. Indeed, if inequality is too low, meaning that the underlying conflict is not very intense, there is no decentralization level that can satisfy both regions simultaneously.

We believe there are several directions in which our analysis could be developed further. First, we assumed that conflict effort is coordinated, implying that individual contributions to conflict are equal within a region. This assumption is clearly questionable, especially if we add heterogeneity with respect to individual location within a region. Indeed, it is rather unlikely that all individuals in a region will accept to devote the same amount of resources to the conflict, given that the associated expected benefits vary across individuals within the region. Most likely, under any kind of intra-regional heterogeneity, the issue of free-riding regarding individual contributions is an important one, hence one should solve the model using individual best responses rather than assuming a coordinated conflict effort.

Second, we have assumed equal individual income within a region. Alternatively, as in Bolton and Roland (1997), we could introduce intra-regional income heterogeneity, meaning that there would be both losers and winners within each region stemming from the presence of implicit transfers under unification. Indeed, in addition to interregional transfers of resources, there would be transfers from rich to poor individuals in each region. As a result, the costs and benefits of seceding versus unifying would be affected in several manners, and so would be the incentives of the two regions to trigger a conflict.[24] As we discussed in the previous section, it is likely that the self-enforcing properties of the peaceful solution depend on the extent of polarization within each region, whether in terms of individual income or location.

Finally, we have interpreted conflict in a very broad sense. In particular, we did not assume that the rich region, as a result of being richer, is also more powerful. An alternative interpretation is to consider conflict as a pure monetary investment, which implies, in turn, that regional income matters for relative power in the presence of resource constraints. But then, if decentralization has the tendency to exacerbate interregional income inequality, it also has the additional effect of altering regional fighting capacities from a dynamic perspective. Notice that

[24]For an attempt to explore empirically the link between inequality *within* regions and the demand for sovereignty, see Sambanis and Milanovic (2009).

with this alternative interpretation, the issue of self-enforcement of the peaceful solution is of crucial importance. Indeed, as decentralization alters future conflict capacities, it also affects the willingness of a given region to trigger conflict once a particular level of decentralization has been implemented. Second, observe that this additional effect of decentralization may be either stabilizing or destabilizing, depending on whether it is the rich or the poor region seeking secession. It is not clear, then, whether more decentralization would be associated with higher conflict intensity, although a conjecture is that more decentralization would translate into a higher probability of success for the richer region, regardless of whether the latter seeks secession or unification.

8 Appendix

Proof of Proposition 1. The leader in region R chooses F_R so as to maximize the utility of the representative individual, that is, so as to maximize

$$EU_R = \pi(y_R - 2k + g) + (1-\pi)\left[y_R(1-2k) + g(1-\frac{a}{2}) - d\right] - 2F_R$$

$$\Leftrightarrow EU_R = \frac{F_R}{(F_R+F_P)}(y_R - 2k + g) + \frac{F_P}{(F_R+F_P)}\left[y_R(1-2k) + g(1-\frac{a}{2}) - d\right] - 2F_R$$

Similarly, the leader in region P chooses F_P so as to maximize

$$EU_P = \pi(y_P - 2k + g) + (1-\pi)\left[y_P(1-2k) + g(1-\frac{a}{2}) - d\right] - 2F_P$$

$$\Leftrightarrow EU_P = \frac{F_R}{(F_R+F_P)}(y_P - 2k + g) + \frac{F_P}{(F_R+F_P)}\left[y_P(1-2k) + g(1-\frac{a}{2}) - d\right] - 2F_P$$

Taking derivatives, we obtain

$$\frac{\partial EU_R}{\partial F_R} = \frac{F_P}{(F_R+F_P)^2}(y_R - 2k + g) - \frac{F_P}{(F_R+F_P)^2}\left[y_R(1-2k) + g(1-\frac{a}{2}) - d\right] - 2$$

$$\frac{\partial EU_P}{\partial F_P} = -\frac{F_R}{(F_R+F_P)^2}(y_P - 2k + g) + \frac{F_R}{(F_R+F_P)^2}\left[y_P(1-2k) + g(1-\frac{a}{2}) - d\right] - 2$$

From the FOC, we get the regions' best responses, which are given by

$$F_R(F_P) = \frac{1}{2}\sqrt{F_P\left[2d + ag - 2(1-\epsilon)k\right]} - F_P$$

$$F_P(F_R) = \frac{1}{2}\sqrt{F_R\left[2(1+\epsilon)k - ag - 2d\right]} - F_R$$

Recall that $h = d + ag/2$. Hence the best responses reduce to

$$F_R(F_P) = \frac{1}{2}\sqrt{2F_P(h - k + k\epsilon)} - F_P$$

$$F_P(F_R) = \frac{1}{2}\sqrt{2F_R(k - h + k\epsilon)} - F_R$$

Furthermore, we have

$$\frac{\partial^2 EU_R}{\partial^2 F_R} = \frac{F_P\left[2(1-\epsilon)k - 2d - ag\right]}{(F_R+F_P)^3} < 0$$

$$\frac{\partial^2 EU_P}{\partial^2 F_P} = \frac{F_R\left[2d + ag - 2(1+\epsilon)k\right]}{(F_R+F_P)^3} < 0$$

Substituting $F_R(F_P)$ and $F_P(F_R)$ into one another, we obtain the equilibrium conflict inputs:

$$F_R^* = \frac{(k - h + k\epsilon)(h - k + k\epsilon)^2}{8(k\epsilon)^2}$$

$$F_P^* = \frac{(k-h+k\epsilon)^2(h-k+k\epsilon)}{8(k\epsilon)^2}$$

Hence we have

$$F_R^* - F_P* = \frac{(h-k)(h-k+k\epsilon)(k-h+k\epsilon)}{4(k\epsilon)^2} > 0 \text{ if and only if } h > k$$

□

Proof of Proposition 2. Total conflict intensity is given by

$$F_R^* + F_P^* = \frac{(h-k+k\epsilon)(k-h+k\epsilon)}{4k\epsilon}$$

Taking derivatives, we obtain

$$\frac{\partial(F_R^*+F_P^*)}{\partial\epsilon} = \frac{(k-h)^2+(k\epsilon)^2}{4k\epsilon^2} > 0$$

$$\frac{\partial(F_R^*+F_P^*)}{\partial h} = \frac{k-h}{2k\epsilon} > 0 \text{ if and only if } k > h$$

□

Proof of Proposition 5. The range of decentralization levels such that peace is sustainable is given by

$$\delta_P - \delta_R = \left[\frac{F_P^*}{(U_P^U - U_P^S)} + \frac{F_R^*}{(U_R^S - U_R^U)}\right] = \frac{(h-k+k\epsilon)(k-h+k\epsilon)}{2(k\epsilon)^2} > 0$$

Taking derivatives, we obtain

$$\frac{\partial(\delta_P-\delta_R)}{\partial\epsilon} = \frac{(h-k)^2}{k^2\epsilon^3} > 0$$

$$\frac{\partial(\delta_P-\delta_R)}{\partial h} = \frac{k-h}{(k\epsilon)^2} > 0 \text{ if and only if } k > h$$

□

Proof of Proposition 7. The utility of an individual in region R under partial decentralization and unification is given by, respectively,

$$U_R(\delta) = y_R\left[1 - \delta\frac{2k}{y_R} - (1-\delta)2k\right] + g\left[1-(1-\delta)\frac{a}{2}\right] - [(1-\delta)d + \delta sd]$$

$$U_R^U = y_R(1-2k) + g(1-\frac{a}{2}) - d$$

Therefore, we have

$$U_R(\delta) - U_R^U = \delta\left[\frac{ag}{2} - (1-\epsilon)k + d(1-s)\right] = \delta(h-(1-\epsilon)k - sd)$$

Hence, an individual in the rich region prefers unification to decentralization if and only if

$$k > \frac{h-sd}{1-\epsilon} = \widetilde{k}_R \tag{5}$$

The utility of an individual in region P under partial decentralization and secession is given by, respectively,

$$U_P(\delta) = y_P \left[1 - \delta\frac{2k}{y_P} - (1-\delta)2k\right] + g\left[1 - (1-\delta)\frac{a}{2}\right] - [(1-\delta)d + \delta sd]$$

$$U_P^S = y_P - 2k + g$$

Therefore, we have

$$U_P(\delta) - U_P^S = (1-\delta)\left[(1+\epsilon)k - \frac{ag}{2}\right] - d(1-\delta+\delta s)$$

which simplifies to

$$U_P(\delta) - U_P^S = (k - h + T) - \delta(k - h + T + sd)$$

Hence, an individual in the poor region prefers secession to decentralization if and only if

$$\delta > \frac{k-h+T}{k-h+T+sd} = \widetilde{\delta}_P \tag{6}$$

If (5) and/or (6) hold, decentralization cannot serve as a wait to avoid the separatist conflict. □

Proof of Proposition 8. The regional thresholds are given by

$$\delta_R(s) = \frac{\pi^*(U_R^S - U_R^U) - 2F_R^*}{U_R^S - U_R^U - sd}$$

$$\delta_P(s) = \frac{\pi^*(U_P^U - U_P^S) + 2F_P^*}{U_P^U - U_P^S + sd}$$

and thus $\delta_P(s) > \delta_R(s)$ if and only if

$$s < \frac{2\left[F_R^*(U_P^U - U_P^S) + F_P^*(U_R^S - U_R^U)\right]}{d\left[2(F_P^* - F_R^*) + \pi^*(U_R^S - U_R^U + U_P^U - U_P^S)\right]} = \widetilde{s}$$

Substituting, we get

$$\widetilde{s} = \frac{[2d + ag - 2(1-\epsilon)k]\left[2(1+\epsilon)k - 2d - ag\right]^2}{2d\left[(2d+ag)^2 - 2(2+\epsilon)(2d+ag)k + 4(1+\epsilon+2\epsilon^2)k^2\right]}$$

and, given that $h = d + ag/2$,

$$\widetilde{s} = \frac{(h - k + k\epsilon)(k - h + k\epsilon)^2}{d\left[(h-k)^2 + k\epsilon(k - h + 2k\epsilon)\right]}$$

Finally, taking derivative with respect to inequality yields

$$\frac{\partial \widetilde{s}}{\partial \epsilon} = \frac{6k^2\epsilon(k-h+k\epsilon)\left[(h-k)^2+(k\epsilon)^2\right]}{d\left[(h-k)^2+k\epsilon(k-h+2k\epsilon)\right]^2} > 0$$

□

Proof of Proposition 9. If there is a conflict after the decentralization level δ^* has been implemented, equilibrium conflict inputs are given by

$$F_R^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)+\delta^* sd\right]^2\left[(1-\delta^*)(k-h+T)-\delta^* sd\right]}{8(1-\delta^*)^2T^2}$$

$$F_P^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)+\delta sd\right]\left[(1-\delta^*)(k-h+T)-\delta^* sd\right]^2}{8(1-\delta^*)^2T^2}$$

If $s = 0$, this reduces to

$$F_R^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)\right]^2\left[(1-\delta^*)(k-h+T)\right]}{8(1-\delta^*)^2T^2} = (1-\delta^*)F_R^*$$

$$F_P^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)\right]\left[(1-\delta^*)(k-h+T)\right]^2}{8(1-\delta^*)^2T^2} = (1-\delta^*)F_P^*$$

In that case, it follows directly that total conflict intensity is decreasing in δ^*, and π^* is the same as when conflict occurs when unification is the status quo, that is,

$$\pi^* = \frac{1}{2} + \frac{h-k}{2T}$$

If $s > 0$, total conflict intensity is given by

$$F_R^*(\delta^*) + F_P^*(\delta^*) = \frac{\left[(1-\delta^*)(h-k+T)+\delta^* sd\right]\left[(1-\delta^*)(k-h+T)-\delta^* sd\right]}{4(1-\delta^*)T}$$

Taking derivative with respect to δ^* yields

$$\frac{\partial(F_R^*(\delta^*)+F_P^*(\delta^*))}{\partial\delta^*} = \frac{(1-\delta^*)^2\left[(h-k+T)(h-k-T)-2sd(h-k)\right]-\delta^*(2-\delta^*)(sd)^2}{4(1-\delta^*)^2T^2}$$

Let A be given by

$$A = (h-k+T)(h-k-T)-2sd(h-k)$$

If $A < 0$, we have a sufficient condition for the above derivative to be negative. We have that

$$\tfrac{\partial A}{\partial k} = 2(k-h+sd) > 0 \text{ if and only if } k > h-sd$$

We know that $k_P < k < \widetilde{k}_R$, where $k_P = h/(1+\epsilon)$ and $\widetilde{k}_R = (h-sd)/(1-\epsilon)$. For $k = \widetilde{k}_R$, we have $A = -(sd)^2 < 0$, while at $k = k_P$, we have $A = -2hsd\epsilon/(1+\epsilon) < 0$. Therefore, $A < 0$

for all admissible values of k.

Finally, the equilibrium probability of secession is given by

$$\pi^*(\delta) = \frac{1}{2} + \frac{2(d-k)+ag}{4k\epsilon} + \frac{\delta^*}{(1-\delta^*)}\frac{sd}{2k\epsilon} = \pi^* + \frac{\delta^*}{(1-\delta^*)}\frac{sd}{2T}$$

It is direct from its analytical expression that π^* is increasing in δ^*.

□

Proof of Proposition 10. Equilibrium expected utility under conflict once δ^* has been implemented for an individual in region R, provided that δ^* is not reversible, is given by

$$EU_R^*(\delta^*) = \pi^*(\delta^*)U_R^S + (1-\pi^*(\delta^*))U_R(\delta^*) - 2F_R^*(\delta^*)$$

while his utility under the decentralized solution (with δ^*) is given by

$$U_R(\delta^*) = y_R\left[1 - \delta^*\frac{2k}{y_R} - (1-\delta^*)2k\right] + g\left[1-(1-\delta^*)\frac{a}{2}\right] - [(1-\delta^*)d + \delta^* sd]$$

Substituting for equilibrium values of the conflict game, and taking the difference between utilities, we get that

$$EU_R^*(\delta^*) - U_R(\delta^*) = \frac{[(1-\delta^*)(h-k+T)+\delta^* sd]^3}{4(1-\delta^*)^2T^2} > 0$$

Therefore, the rich region always triggers a conflict after any $\delta^* \in (\delta_R, \delta_P)$ has been implemented (i.e., peace is not self-enforcing).

Equilibrium expected utility under conflict in region $j = R, P$, for unification and decentralization as the status quo, is given by

$$EU_j^* = \pi^* U_j^S + (1-\pi^*)U_j^U - 2F_j^*$$

$$EU_j^*(\delta^*) = \pi^*(\delta^*)U_j^S + (1-\pi^*(\delta^*))U_j(\delta^*) - 2F_j^*(\delta^*)$$

By definition of the thresholds δ_R and δ_P, we know that any $\delta^* \in (\delta_R, \delta_P)$ is such that $U_j(\delta^*) > EU_j^*$ for $j = R, P$. Furthermore, we know that $EU_R^*(\delta^*) > U_R(\delta^*)$. Hence, it holds by transitivity that $EU_R^*(\delta^*) > EU_R^*$, that is, the rich is better off fighting under decentralization than under unification.

We know that for $\delta = 0$, we have $EU_P^* = EU_P^*(\delta)$. Then, taking derivative, we get

$$\frac{\partial EU_P^*(\delta)}{\partial \delta} = \frac{[(1-\delta)(k-h+T)+sd(3-\delta)]\,[(1-\delta)(k-h+T)-\delta sd]^2}{4(\delta-1)^3T^2} < 0$$

Therefore, we have $EU_P^* > EU_P^*(\delta^*)$ for any $\delta^* \in (\delta_R, \delta_P)$, that is, the poor region is better off fighting under unification than under decentralization. As individuals in the poor region can

foresee that the rich region will trigger a conflict no matter the level of decentralization, they oppose the implementation of any δ^*, so that conflict occurs in equilibrium with unification as the status quo.

□

9 References

1. Alesina, A. and E. Spolaore (1997), On the Number and Size of Nations, *Quarterly Journal of Economics*, Vol. 112, No. 4, pp. 1027-1056.

2. Alesina, A. and E. Spolaore (2003), *The Size of Nations*, The MIT Press.

3. Alesina, A. and E. Spolaore (2005), War, Peace, and the Size of Countries, *Journal of Public Economics*, Vol. 89, No. 7, pp. 1333-1354.

4. Alesina, A. and E. Spolaore (2006), Conflict, Defense Spending, and the Number of Nations, *European Economic Review*, Vol. 50, No. 1, pp. 91-120.

5. Alesina, A., E. Spolaore and R. Wacziarg (2000), Economic Integration and Political Disintegration, *American Economic Review*, Vol. 90, No. 5, pp. 1276-1296.

6. Alesina, A., E. Spolaore and R. Wacziarg (2005), Trade, Growth, and the Size of Countries, prepared for the *Handbook of Economic Growth*, edited by P. Aghion and S. Durlauf, North Holland, Amsterdam.

7. Anesi, V., and P. De Donder (2013), Voting under the Threat of Secession: Accommodation vs. Repression, *Social Choice and Welfare*, forthcoming.

8. Arzaghi, M. and J. V. Henderson (2005), Why Countries Are Fiscally Decentralizing, *Journal of Public Economics*, Vol. 89, No. 7, pp. 1157-1189.

9. Bakke, K and E. Wibbels (2006), Diversity, Disparity, and Civil Conflict in Federal States, *World Politics*, Vol. 59, No. 1, pp. 1-50.

10. Beramendi, P. (2007), Inequality and the Territorial Fragmentation of Solidarity, *International Organization*, Vol. 61, pp. 783-820.

11. Bird, R., Vaillancourt, F. and Roy-César, E. (2010), Is Decentralization "Glue" or "Solvent" for National Unity?, International Studies Program, Working Paper 10-03.

12. Bodman, P.,and A. Hodge, (2010), What Drives Fiscal Decentralization? Further Assessing the Role of Income, *Fiscal Studies*, Vol. 31, No. 3, pp. 373-404.

13. Bolton, P. and G. Roland (1997), The Breakup of Nations: A Political Economy Analysis, *Quarterly Journal of Economics*, Vol. 112, No. 4, pp. 1057-1090.

14. Brancati, D. (2006), Decentralization: Fueling the Fire or Dampening the Flames of Ethnic Conflict and Secessionism?, *International Organization*, Vol. 60, No. 3, pp. 651-685.

15. Brueckner, J. K. (2009), Partial Fiscal Decentralization, *Regional Science and Urban Economics*, Vol. 39, No. 1, pp. 23-32.

16. Buchanan, J. M. and R. L. Faith (1987), Secession and the Limits of Taxation : Toward a Theory of Internal Exit, *American Economic Review*, Vol. 77, No. 5, pp. 1023-31.

17. Collier, P. and A. Hoeffler (2006), The Political Economy of Secession, in Hurst Hannum and Eileen F. Babbitt (eds), *Negotiating Self-Determination*, Lanham: Lexington Books.

18. Cunningham, K. G. (2011), Divide and conquer or divide and concede: How do states respond to internally divided separatists?, *American Political Science Review*, Vol. 105, No. 2, pp. 275-297.

19. De Donder, P., Le Breton, M. and E. Peluso (2012), On the (Sequential) Majority Choice of Public Good Size and Location, unpublished.

20. de Figueiredo, R. J. P., Jr., and B. R. Weingast (2005), Self-enforcing federalism, *Journal of Law, Economics and Organizations*, Vol. 21, No. 1, pp. 103-135.

21. Deiwiks, C., Cederman, L-E., and K. S. Gleditsch (2012), Inequality and Conflict in Federations, *Journal of Peace Research*, Vol. 49, No. 2, pp. 289-304.

22. Desmet, K., Le Breton, M., Ortuño-Ortín, I. and S. Weber (2011), The Stability and Break-up of Nations: A Quantitative Analysis, *Journal of Economic Growth*, Vol. 16, No. 3, pp. 183-213.

23. Esteban, J. and D. Ray (2011), Linking Conflict to Inequality and Polarization, *American Economic Review*, Vol. 101, No. 4, pp. 1345-74.

24. Ezcurra, R., and P. Pascual (2008), Fiscal Decentralization and Regional Disparities: Evidence from Several European Union Countries, *Environment and Planning A*, Vol. 40, No. 5, pp. 1185-1201.

25. Garfinkel, M.R. and S. Skaperdas (2007), Economics of Conflict: An Overview, in T. Sandler and K. Hartley (Eds.), *Handbook of Defense Economics*, Vol. II, pp. 649-709.

26. Goyal, S. and K. Staal (2004), The Political Economy of Regionalism, *European Economic Review*, Vol. 48, No. 3, pp. 563-593.

27. Grossman, H.I. and M. Kim (1995), Swords or Plowshares? A Theory of the Security of Claims to Property, *Journal of Political Economy*, Vol. 103, No. 6, pp. 1275-288.

28. Haimanko, O., M. Le Breton and S. Weber (2005), Transfers in a Polarized Country : Bridging the Gap between Efficiency and Stability, *Journal of Public Economics*, Vol. 89, No. 7, pp. 1277-1303.

29. Hatfield, J. W. and G. Padró i Miquel (2012), A Political Economy Theory of Partial Decentralization, *Journal of the European Economic Association*, Vol. 10, No. 3, pp. 605-633.

30. Hindriks, J., Peralta, S. and S. Weber, Competing in taxes and investment under fiscal equalization, *Journal of Public Economics*, Vol. 92, No. 12, pp. 2392-2402.

31. Hirshleifer, J. (1989), Conflict and Rent-Seeking Success Functions: Ratio versus Difference Models of Relative Success, *Public Choice*, Vol. 63, pp. 101-112.

32. Horowitz, D. L. (1985), *Ethnic groups in conflict*, University of California Press, Berkeley.

33. Lake, D.A. and Rotchild, D. (2005), Territorial Decentralization and Civil War Settlements, *Sustainable Peace: Power and Democracy after Civil Wars*, edited by Philip G. Roeder and Donald Rothchild, Ithaca, NY, Cornell University Press.

34. Lazear, E..P., and S. Rosen (1981), Rank-Order Tournaments as Optimum Labor Contracts, *Journal of Political Economy*, Vol. 89, No. 5, pp. 841-864.

35. Le Breton, M. and S. Weber (2003), The Art of Making Everybody Happy: How to Prevent a Secession?, *IMF Staff Papers*, Vol. 50, No. 3, pp. 403-435.

36. Linz, J.J. and A. Stepan (2000), Inequality Inducing and Inequality Reducing Federalism, Paper presented at the World Congress of the International Political Science Association, Quebec City, Quebec, Canada.

37. Marshall, M.G. and T.R. Gurr (2005), Peace and Conflict 2005: A Global Survey of Armed Conflicts, Self-determination Movements, and Democracy, Integrated Network for Social Conflict Research, Center for International Development and Conflict Management, University of Maryland, College Park.

38. Myerson, R. (1981), Optimal auction design, *Mathematics of Operations Research*, Vol. 6, No. 1, pp. 58-73.

39. Oates, W.E. (1972), Fiscal Federalism, New York: Harcourt Brace Jovanovich.

40. Olofsgård, A. (2003), Incentives for Secession in the Presence of Mobile Ethnic Groups, *Journal of Public Economics*, Vol. 87, No. 9-10, pp. 2105-2128.

41. Panizza, U. (1999), On the Determinants of Fiscal Centralization: Theory and Evidence, *Journal of Public Economics*, Vol. 74, No. 1, pp. 97-139.

42. Riker, W. H. (1964), *Federalism: Origins, operations, and significance*, Boston: Little, Brown.

43. Sacchi, A. and S. Salotti (2011), Income inequality, Regional Disparities, and Fiscal Decentralization in Industrialized Countries, paper prepared for the *Workshop on Regional and Urban Economics: Inequality and Regional Growth and Cohesion*, University of Barcelona.

44. Sambanis, N. and B. Milanovic (2009), Explaining the Demand for Sovereignty, Manuscript, Department of Political Science, Yale University.

45. Seabright, P. (1996), Accountability and Decentralization in Government: An Incomplete Contracts Model, *European Economic Review*, Vol. 40, No.1, pp. 61-89.

46. Sepulveda, C.F., and J. Martinez-Vazquez (2011), The Consequences of Fiscal Decentralization on Poverty and Income Equality, *Environment and Planning C: Government and Policy*, Vol. 29, No. 2, pp. 321-343.

47. Skaperdas, S. (1996), Contest Success Functions, *Economic Theory*, Vol. 7, No. 2, pp. 283-90.

48. Sorens, J. (2004), Globalization, Secessionism, and Autonomy, *Electoral Studies*, Vol. 23, No. 4, pp. 727-752.

49. Spolaore, E. (2008a), Civil Conflict and Secessions, *Economics of Governance*, Vol. 9, No. 1, pp. 45-63.

50. Spolaore, E. (2008b), Federalism, Regional Redistribution, and Country Stability, *Studies in Fiscal Federalism and State-Local Finance*, Edward Elgar Publishing.

51. Tranchant, J-P. (2008), Fiscal Decentralization, Institutional Quality, and Ethnic Conflict: A Panel Data Analysis, 1985-2001, *Conflict, Security and Development*, Vol.8, No. 4, pp. 419-514.

52. Tranchant, J-P. (2010), Does Fiscal Decentralization Dampen All Ethnic Conflicts? The Heterogeneous Impact of Fiscal Decentralization on Local Minorities and Local Majorities, Institute of Development Studies, University of Sussex.

53. Tullock, G. (1980), Efficient Rent-Seeking, in Buchanan, J.M., Tollison, R.D. and G. Tullock (Eds.), *Towards a Theory of a Rent-Seeking Society*, Texas A&M University Press, pp. 97-112.

54. Wärnerid, K. (1998), Distributional Conflict and Jurisdictional Organization, *Journal of Public Economics*, Vol. 69, No. 3, pp. 435-450.

55. Wittman, D. (2000), The Wealth and Size of Nations, *Journal of Conflict Resolution*, Vol. 44, No. 6, pp. 868-884.