Partial Decentralization as a Way to Prevent Secessionist Conflict

Sabine Flamand*

October 3, 2016

Abstract

We study secessionist conflict driven by cultural and economic motives in a political union of two regions, and analyze under what conditions partial decentralization may serve as a conflict-mitigating strategy. While the probability of a successful secession is increasing in heterogeneity, it is increasing in interregional income inequality if and only if the union is socially efficient to start with. If the cost of diversity decreases proportionally with decentralization, there always exists a range of decentralization levels compatible with peace. Greater inequality always widens this range but greater heterogeneity widens the range if and only if the union is efficient. The decentralization level implemented to prevent conflict relates to the underlying secession probability. If decentralization is not reversible, it can never prevent conflict.

Keywords: Secession, conflict, inequality, decentralization, heterogeneity

JEL classification: D74, H56, H77

1 Introduction

Nation boundaries have been in movement for a long time. 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). Furthermore, secessionist movements are currently present in several countries (like Belgium, Spain, Ukraine, or the UK) or at the supranational level, as the recent vote on *Brexit* testifies..

Even when they do not lead to violent conflict, separatist tensions involve a waste of resources for both the group seeking separation and the one seeking to preserve the union. They generate lobbying expenditures on both sides, and tend to monopolize the public debate and divert public resources. In Belgium, separatist tensions paralyzed the government for almost two years[1], while

*Universitat Rovira i Virgili, Department of Economics, Av. de la Universitat 1, 43204 Reus, Spain. Phone: +34650298041, e-mail: sabine.flamand@urv.cat

[1]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)

in Spain, the tensions between Catalonia and the central government materialize into sterile and hostile discussions in which every side sticks to its positions.

In this context, decentralization is often cited as a way of accommodating regional demands for more autonomy in heterogeneous countries.[2] To the extent that decentralization allows regional governments to implement policies that are closer to local preferences, it potentially constitutes an alternative to costly and sometimes violent secession attempts.[3] 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. 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.

The goal of this paper is twofold. First, we analyze the workings of wasteful secessionist conflict in the presence of income disparities and cultural heterogeneity between regions. Second, we analyze under what conditions partial decentralization of both public expenditures and revenues can serve as a secessionist conflict-mitigating strategy. We do so in four steps.

In the first step, 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 and suffer disutility with the distance to the latter. Under unification, besides the latter heterogeneity cost, there is a diversity cost resulting from a homogeneity bias (Desmet et al. 2011). Indeed, as argued by Alesina et al. (2004), even if individuals have similar preferences to those in other groups, they may still prefer to interact with members of their own group. Finally, there is a rich and a poor region, so that there are implicit interregional transfers taking place under unification through the proportional financing of the public good. This setup allows us to capture the standard trade-off between heterogeneity and economies of scale: by seceding, a region eliminates the heterogeneity and diversity costs, while losing the benefits from economies of scale in the provision of the public good. Higher income inequality between regions increases the size of the implicit transfers under unification, making it more likely that the rich region wants to secede from the union, while the poor region wishes to preserve it. Therefore, we are able to capture the interactions between efficiency (heterogeneity versus economies of scales) and distributional (interregional transfers) effects in shaping the regional incentives for secession.

The second step of the analysis concentrates on the case of a disagreement between the two regions, namely the rich region seeking secession and the poor one seeking unification, and

[2]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.

[3]See, for instance, the *Ukraine Decentralization Initiative* initiated by Roger Myerson in response to the recent events taking place in Ukraine. In this context, Myerson stated that "[...] a decentralization reform can be the key for reducing regional tensions and developing trusted democratic leadership for Ukraine."(https://sites.google.com/site/tmylovanov/ukraine-decentralization-initiative)

introduces a technology that allows the regions to exert costly effort in order to force their preferred border configuration. We show that the key element determining the intensity of conflict and the resulting outcome is the relative stakes in the conflict.

The region devoting more resources to the conflict is the one whose stakes are the largest, which depends on whether unification or secession is the socially efficient outcome, i.e., whether economies of scale outweigh aggregate heterogeneity and diversity costs. Given that the poor region prefers unification, and as the difference in total welfare between the two border configurations is equal to the difference between the regional stakes, it follows that the poor region has bigger stakes than the rich region whenever the union is efficient. Conversely, if the union is inefficient, it is the rich region that has the biggest stakes in the conflict. As a consequence, a secession is more likely in an inefficient union than in an efficient one.

An increase in heterogeneity and diversity costs, by making the union relatively less attractive, reduces the stakes of the poor region while increasing those of the rich region. Thus, if the union is efficient to start with, such an increase also contributes to make the conflict stakes more symmetric, while doing the opposite in an inefficient union. In contrast, higher inequality always brings about more symmetry in the stakes, since it makes the conflict essentially a distributional one over interregional transfers (i.e., the stakes of both regions increase). In turn, as more symmetry in the stakes basically means that competition is stronger, it follows that conflict is more intense, while its outcome is more uncertain. Interestingly, this means that a rise in inequality, while always fuelling conflict intensity, yields a higher probability of secession if and only if the union is efficient. Indeed, as in an efficient union the poor region is more aggressive than the rich one, an increase in inequality, by bringing about more symmetry in the stakes, makes the conflict outcome more uncertain, which means that the probability of secession increases. Conversely, higher inequality reduces the likelihood of a successful secession whenever the union is inefficient. By the same reasoning, higher heterogeneity and diversity costs fuel conflict intensity if and only if the union is efficient, while always making a successful secession more likely.

In the third step of the analysis, we study whether such wasteful secessionist conflict can be avoided by the use of partial decentralization. That is, we ask whether there exists an intermediate arrangement between unification and secession such that both regions better off than under conflict. As partial decentralization applies to public expenditures and revenues, it has efficiency and distributional effects. On the one hand, decentralization brings the government "closer to the people", while on the other, some benefits from economies of scale are lost. Furthermore, fiscal autonomy, by decreasing the size of the implicit interregional transfers, *de facto* impoverishes the poor region, while making the rich region richer. Finally, decentralization reduces 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 underlying

probability of secession would a conflict occur. Intuitively, the more intense the conflict, the more resources are wasted, hence the greater the range of decentralization levels compatible with peace. Further, the larger the probability of a successful secession, the more concessions must be made to the separatists in order to avoid the conflict, so that the level of decentralization increases. Therefore, while the range of decentralization levels compatible with peace always increases with inequality, it increases with heterogeneity and diversity costs if and only if the union is efficient. Furthermore, the level of partial decentralization that is implemented to prevent conflict always increases with heterogeneity and diversity costs, 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 decentralization, there exists a range of decentralization levels compatible with peace provided that inequality is high enough, meaning that the underlying conflict is very intense. Otherwise (i.e., if inequality is "too low"), there is no decentralization level that can satisfy both regions simultaneously. In the latter case, therefore, partial decentralization cannot serve as a way to prevent conflict.

In the fourth and final step of the analysis, we analyze whether partial decentralization is self-enforcing. It turns out that whether full unification is still an available option once a decentralization agreement has been reached 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. Indeed, if decentralization is not a reversible process, the rich region always has an incentive to trigger conflict in order to force secession after decentralization has been implemented. In turn, as it correctly foresees the latter, the poor region opposes the implementation of any decentralization to start with. 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 secessionist conflict occurs in equilibrium.

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 secession in 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 way to prevent conflict, and analyzes the feasibility of such a peaceful compromise. In Section 6, we analyze the issue of self-enforceability of the peaceful (i.e., decentralized) solution. Section 7 concludes. Proofs can be found in the Appendix.

2 Related Literature

In that the basic ingredients of our model follow the seminal contribution of Alesina and Spolaore (1997), our analysis relates to the literature on the political economy of border formation. This literature has analyzed the forces shaping the incentives for secession, focusing on the tra-

ditional trade-off between economies of scale and heterogeneity of preferences.[4] Furthermore, the political economy literature on secessionism has looked at transfer and compensation mechanisms among regions such that inefficient secessions can be avoided (Alesina and Spolaore 2003; Haimanko et al. 2005; Le Breton and Weber 2003). The 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 its breakup. 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 part of the literature has focused on possible ways to reconcile the notions of efficiency and stability.

Most contributions in the above literature overlooked the income heterogeneity dimension, and, in particular, income inequality between regions. A notable exception is Bolton and Roland (1997), who show in the context of pure redistribution policy that secessionist movements may indeed stem only from the presence of income heterogeneity, both within and between regions.[5] Yet, it is very likely that both economic and cultural factors constitute important motives for the willingness of a given region to secede from a union. In turn, and as importantly, those cultural and economic forces are likely to interact in non-trivial ways in shaping secessionism. For this reason, we include both types of cross-regional heterogeneity (i.e., culture and income) in our analysis.

Likewise, the authors who have focused on compensation mechanisms aimed at preventing inefficient 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, in the presence of income disparities across regions, nothing guarantees that the region that has to be compensated (in terms of preferences for the public good) is poorer than average (Spolaore 2008b). If it is not, compensating *de facto* means redistributing from poorer to richer regions, which may not be socially desirable nor politically feasible. Alternatively, taking into account interregional income inequality, partial decentralization (and in particular fiscal autonomy), by reducing the size of implicit transfers in a union, may be seen as a "politically correct" way of compensating richer and potentially seceding regions. Therefore, our approach allows for a more realistic compensation mechanism when it is the rich region that seeks secession.

Finally, another issue that arises in this context is the one of commitment, as monetary transfers meant to compensate potentially seceding regions may not be credible (Alesina and Spolaore 2003). In turn, and in the same spirit as the "franchise extension" of Acemoglu

[4] Building on the work of Alesina and Spolaore, this literature has looked at the different forces likely to shape this trade-off, 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).

[5] 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.

and Robinson (2005), decentralization may then serve as a commitment device, since it is by definition a transfer of *power*.[6]

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 way to prevent such conflicts (in both efficient and inefficient unions), rather than aiming at avoiding inefficient secessions *per se*. Furthermore, when seceding is socially efficient, decentralizing public policy —rather than implementing monetary transfers between regions— is actually welfare-increasing. In other words, our goal is to analyze the possibility of implementing transfers of power to the regions (i.e., decentralization) so as to avoid costly secessionist conflict, as opposed to transfers of resources between regions so as to avoid inefficient secessions. Partial decentralization, in that sense, fundamentally constitutes an intermediary solution between unification and secession.

A few authors have explicitly introduced a conflict technology in the context of separatism. We build on Spolaore (2008a), who 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. We thus complement his analyzis by showing how inequality and heterogeneity jointly impact on the choice of regional conflict efforts, and by considering the possibility of a peaceful compromise by the use of partial decentralization. In a subsequent paper (Spolaore 2008b), the same author argues that decentralization has two opposite effects on country stability: it reduces the net payoff from a secession while increasing the probability of success should a secession be attempted. Although the author includes an explicit conflict technology in his model, he does not derive conflict efforts endogenously, whereas we do so in our analysis. Furthermore, Spolaore (2008b) assumes away income disparities between regions, hence he does not consider the potential effects of decentralization on inequality, yet another significant channel through which decentralization may affect conflict.[7] Anesi and De Donder (2013) build a model of secessionist conflict and 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 efforts either, nor do they address the issue of interregional income inequality.[8]

Our contribution is thus twofold. First, we analyze how income inequality and cultural heterogeneity between regions jointly determine conflict intensity and outcomes when both regions can exert costly effort to obtain their preferred border configuration. Second, we analyze

[6] See the recent contribution by Gradstein (2016) for a similar idea in the context of non-democracies.

[7] In particular, he assumes that decentralization always increases the resources at the disposal of the region seeking secession. However, if that region is poorer than average, fiscal autonomy actually reduces the resources at its disposal.

[8] 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.

under what conditions transferring power to the regions (i.e., partially decentralizing public expenditures and revenues) can serve as a way to prevent such wasteful secessionist conflict.

On the empirical side, a few attempts have been made to analyze the effects of decentralization on the stability of states and federations. Among them, the most related to our analysis is Bakke and Wibbels (2006), who stress the potential adverse effect of decentralization on country stability as a result of its tendency to exacerbate interregional income inequality. They find that fiscal decentralization in federal states increases the likelihood of conflict when there are wide disparities in income across regions. This is only partially consistent with our predictions, as we find that more inequality yields less decentralization under the threat of conflict only in inefficient unions. Tranchant (2008), although he does not focus on interregional inequality, finds that fiscal decentralization has a better conflict-mitigating impact in richer countries. 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. 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. Tranchant (2010) finds that fiscal decentralization dampens secessionism for local majorities, whereas it fuels rebellion of local minorities. More recently, Cederman et al. (2015a) and Tranchant (2016) find a peace-promoting effect of autonomy to only appear once using an instrumental variables approach. According to Tranchant (2016), and consistently with our results, this further establishes that central governments strategically grant autonomy status in response to threats or existence of ethnic conflict.

3 The model

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 one. There is a rich region (R) and a poor region (P). Individual income in the rich and the poor region is denoted by y_R and y_P respectively, and $y_R > y_P$. Following Hindriks et al. (2008), we assume that individual income is given by $y_R = (1 + \epsilon)/2$ in region R and 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 zero, and all individuals in region P are located at one, which 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 proportionally among individuals.[9] Individuals value both private and public

[9]We abstract from the possibility of choosing the *level* of g and focus instead 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 secessionist 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 among 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 disagreeing on its type and/or on the way it is financed, especially when centralized provision involves large implicit transfers to poorer regions. On voting on both public good size and location and how to deal with multidimensionality in this context, see De Donder et al. (2012).

consumption, and incur a disutility from the distance between their ideal point and the public good's location. Finally, under unification, individuals bear a diversity cost (d) *à la* Desmet et al. (2011) stemming from the homogeneity bias. This parameter is meant to capture the fact that, as argued by Alesina et al. (2004), even if individuals have similar preferences to those in other groups, they may still prefer to interact with members of their own group.

Under unification, and given that the two regions have equal population size, we assume that the public good g is located at one half.[10] [11] The per capita tax to finance the public good is equal to its cost divided by total income (i.e., $k/\left[(y_R + y_P)/2\right]$). The utility of an individual in region $j = R, P$ under unification is thus given by

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

where d_j^U is the distance between the individual's location and the public good (hence $d_j^U = 1/2$), and $a \in (0, 1]$ is a parameter measuring the intensity of heterogeneity costs. Observe that under unification, the proportional financing of the public good involves an implicit per capita transfer from the rich to the poor region, which is given by[12]

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

Under secession, the location of g coincides with individuals' ideal point in both regions (i.e., zero in region R and one 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, some benefits from economies of scale are lost, while there is no redistribution between regions. Likewise, there is no diversity cost, since individuals do not interact with the people in the other region. The per capita tax to finance the public good is equal to its cost divided by total regional income (i.e., $k/(y_j/2)$). The utility of an individual in region $j = R, P$ under secession is thus given by

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

[10] One may argue that a natural way to stave off secessionism would be to locate the public good closer to the ideal point of the side seeking secession. However, this is not always feasible, as the accommodating region may then prefer secession to unification (when the union is inefficient, for instance). Furthermore, as we argued earlier, our focus is not on compensation mechanisms between regions to prevent 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 (and finance) its preferred policy, rather than letting one region bias the national public policy in order to please the separatists.

[11] This assumption is not needed for our results, but it allows us to limit the length of the analysis. For more on this see footnotes 13 and 26.

[12] 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:

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

3.1 The choice between unification and secession

The traditional trade-off between economies of scale and heterogeneity arises regarding the preferred 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 costs of the union in terms of preferences and social interactions (i.e., the smaller a and/or d), the more likely that both regions prefer unification to secession. Conversely, an increase in income inequality makes the incentives of the two regions diverge. Indeed, as inequality increases the size of the implicit transfer under unification, it makes the union more profitable for the poor region, while increasing the incentives to secede in the rich region.

As is usual in this type of model (e.g., Goyal and Staal 2004), the economies of scale effect determines a threshold above which a region prefers unification to secession. While both regional thresholds are increasing in heterogeneity, the redistribution effect implies that the threshold is lower in the poor region. Comparing U_j^U with U_j^S for $j = R, P$ yields the thresholds k_R and k_P, respectively:

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

Therefore, 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. Likewise, whenever the rich region wants to preserve the union, so does the poor region.[13] Other things being equal, the larger income disparities between the two regions —and thus the larger the implicit transfer under unification— the more likely that the two regions disagree on unification (i.e., the difference between the two thresholds is increasing in inequality).[14]

Not surprisingly, the trade-off between economies of scale and heterogeneity from an aggregate perspective also determines the socially efficient border configuration, i.e., the one that maximizes the sum of individual utilities across regions. More specifically, the union is efficient if and only if $U_R^U + U_P^U > U_R^S + U_P^S$, which boils down to

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

[13] 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 in the union, it may well be that the poor region is better off seceding, even though it implies losing the implicit transfer from the rich region (see Bolton and Roland (1997) for a similar counter-example in the context of redistribution policy). This alternative conflict configuration (as in Slovakia or Quebec) can be analyzed with the insights derived from our model. We further discuss this case in footnote 26.

[14] 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 invent themselves when part of the population perceives secession to be economically advantageous.

We denote by h the total heterogeneity costs of unification, which include both the cost from preferences heterogeneity and the one stemming from the homogeneity bias. In the following sections, we include these two distinct effects under the broad term "heterogeneity".

3.2 The stakes in the conflict

The parameter constellation consistent with (1) holding corresponds to the shaded area in Figure 1. The left-hand part of the conflict area ($k > h$) is such that conflict occurs in an efficient union, while the right-hand part of the conflict area ($k < h$) is such that conflict occurs in an inefficient union. Note that the northwest area ($k > k_R = h/(1-\epsilon)$) is such that both regions prefer unification to secession, while the southeast area ($k < k_P = h/(1+\epsilon)$) is such that they both want secession. In either case, therefore, there is no secessionist conflict.

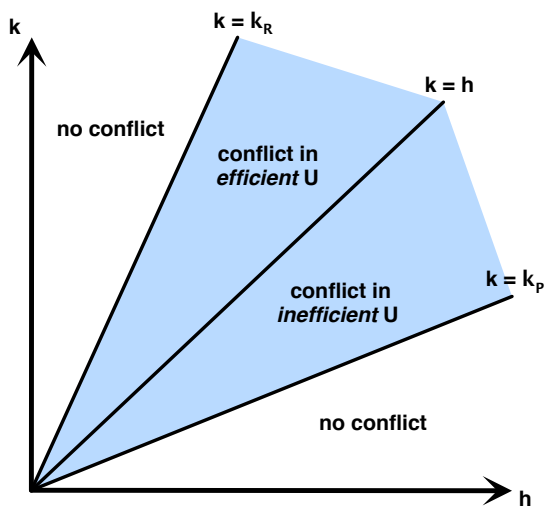


Figure 1: Conflict area

Recall that more inequality increases the likelihood of a disagreement, hence the conflict area increases accordingly. The stakes in such conflict for an individual in the rich and the poor region are respectively given by

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

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

It is instructive to write the ratio of the stakes, which we denote by Φ:

$$\Phi = \frac{h - k + T}{k - h + T}$$

If the union is efficient ($k > h$), we have that $\Phi < 1$ and thus the poor region has higher stakes than the rich region. Conversely, if the union is inefficient ($k < h$), we have that $\Phi > 1$ and it is the rich region that has the highest stakes in the conflict. Observe that the stakes are

made of two effects: a redistributive one (with the same positive amplitude for both regions) and another one which is related to the efficiency of the union. If the union is efficient, then the two effects are positive for the poor region (seeking unification) and reinforce each other, while the efficiency effect is negative for the rich region (seeking secession). This explains why the poor region's stakes are higher if the union is efficient, and why the opposite occurs when the union is inefficient.

Given that the rich region seeks secession, while the poor region wants to preserve the union, it follows that the regional stakes in the conflict are asymmetric regarding the trade-off between heterogeneity and economies of scale as measured by $(h - k)$. We shall say that the stakes are symmetric when $\Phi = 1$, and the further Φ is from one, the more asymmetric are the stakes. Figure 2 depicts the ratio of stakes given that there is a disagreement, so that $k \in (k_P, k_R)$. The stakes are symmetric (i.e., $\Phi = 1$) when union and secession are equally efficient, hence when $k = h$. More inequality (ϵ) always brings about more symmetry in the stakes, since it makes the conflict essentially a distributional conflict over the transfer. If the union is efficient to start with (i.e., $k > h$ and thus $\Phi < 1$), an increase in heterogeneity (h) also translates into more symmetry in the stakes, since a secession gets relatively more attractive. As a result, Φ approaches one from below. If the union is inefficient, (i.e., $k < h$ and thus $\Phi > 1$), an increase in heterogeneity reduces further the relative attractiveness of secession, so that the stakes get even more asymmetric, hence Φ increases and gets further away from one.

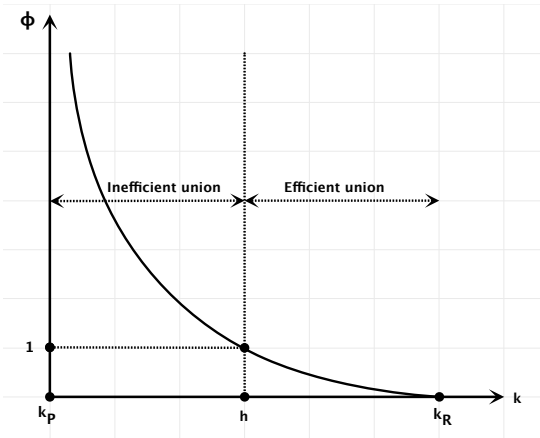


Figure 2: Symmetry of the conflict stakes

We can now establish the following lemma:

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

1. *The rich region has higher stakes than the poor region if and only if the union is inefficient.*

2. *The symmetry of the stakes is increasing in inequality. Furthermore, it is increasing in heterogeneity if and only if the union is efficient.*

In what follows, we shall always assume that (1) holds, so that there is a disagreement over unification.

4 Secessionist conflict

Suppose that the two regions can exert costly effort so as to obtain their preferred border configuration. Formally, region $j = R, P$ chooses to devote an amount F_j of resources to the conflict. As it is standard in the literature, we shall assume that the contest success function (CSF) is given by[15]

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

The probability of secession is increasing in the effort of the rich region (F_R) and decreasing in the effort of the poor region (F_P).[16] 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 level of conflict effort so as to maximize the average expected welfare of the region (or, equivalently, the expected utility of the representative individual).[17] That is, the leader in region $j = R, P$ chooses F_j so as to maximize[18]

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

Observe that we do not impose a budget constraint to the regions regarding the choice of conflict 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 the conflict in a direct manner. In that sense, and as we argued in the Introduction, the contribution to the conflict should be understood as any type of costly effort. In other words, 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.[19]

As each region's effort choice problem is well defined, the FOC in region $j = R, P$ yields the region's best response. Solving for the Nash equilibrium of this simultaneous game, we obtain the equilibrium effort in each region:[20]

[15] 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.

[16] A ratio CSF such as (3) is such that the winning probabilities depend on the ratio of efforts F_i/F_j. 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 winning 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 argued 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 seems more appropriate in this particular context.

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

[18] As there is a mass of individuals of one half in each region, an individual in region j contributes by $2F_j$ to the aggregate regional conflict effort F_j.

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

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

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

It is immediate that $F_R^*/F_P^* = \Phi$, hence the region with the highest stakes is also the one exerting the greatest level of effort:

Proposition 1. *The rich region exerts a higher level of effort than the poor region if and only if the union is inefficient.*

Interestingly, the rich region does not necessarily exert higher effort in an inefficient union than in an efficient one. Likewise, the poor region need not exert higher effort when the union is efficient than when it is inefficient.

We finally obtain the equilibrium probability of secession:

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

The equilibrium probability of secession depends on the trade-off between economies of scale and heterogeneity $h-k$, which determines whether π^* is smaller or greater than one half. An increase in inequality (which increases T) works to weaken this effect, thereby bringing π^* closer to one half. Clearly, the probability of secession is increasing in heterogeneity. Interestingly, whether π^* is increasing or decreasing in inequality depends on whether unifying or seceding is efficient. If the union is efficient, $\pi^* < 1/2$ and is thus *increasing* in inequality (i.e., π^* approaches its upper bound one half). If, on the contrary, the union is inefficient, $\pi^* > 1/2$ so that higher inequality reduces the equilibrium probability of secession (i.e., π^* approaches its lower bound one half).

Proposition 2. *The equilibrium probability of secession is increasing in heterogeneity. Furthermore, it is increasing in inequality if and only if the union is efficient.*

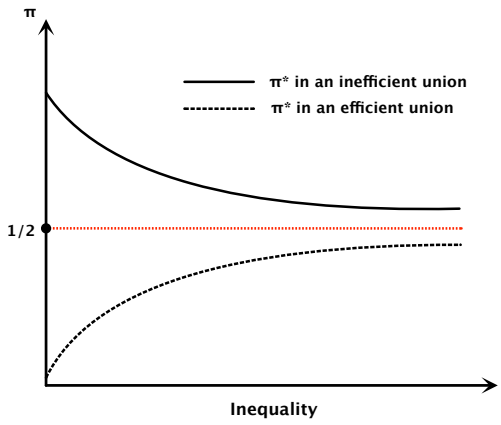


Figure 3: Equilibrium probability of secession and inequality

We define total conflict intensity as the sum of conflict efforts, hence it is given by

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

Both the intensity of the conflict and its outcome are directly related to the symmetry of the stakes in the conflict. In particular, the more symmetric are the stakes, the more intense is the conflict, and the more uncertain is its outcome. As we saw, higher inequality always increases the symmetry of the stakes, while greater heterogeneity increases their symmetry if and only if the union is efficient. Therefore, we have:

Proposition 3. *Total conflict intensity is increasing in inequality. Furthermore, it is increasing in heterogeneity if and only if the union is efficient.*

If union and secession are equally efficient, the two regions have the exact same stakes (i.e., $k = h$). As a result, they devote the same amount of resources to the conflict (i.e., $\pi^* = 1/2$), while the intensity of the latter is maximized.[21] 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 secessionist conflict in which the rich region wants to secede. In turn, more inequality —and thus higher 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. 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 adverse effects on welfare. On the one hand, inequality fuels conflict intensity, which is a pure waste from a social point of view. On the other hand, inequality makes the efficient outcome less likely. Indeed, if the union is efficient, higher inequality increases the probability of a successful secession, while the opposite holds when secession is the efficient outcome. In other words, inequality also increases the cost of conflict as a result of making the socially desirable outcome less likely.

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

[21] More symmetry in the stakes essentially means that competition is stronger, hence conflict intensity increases. This parallels 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 workers, or Myerson (2001), who shows that revenue maximizing auction between asymmetric bidders implies favoring weak bidders.

5 Partial decentralization

Now that we have seen how the two regions behave when there is a conflict under unification, we investigate the possibility of using partial decentralization in an attempt to mitigate inter-regional tensions. That is, we focus on the characteristics of the range of decentralization levels such that both regions prefer decentralization to conflict, and on the properties of the decentralization level that gets actually implemented. We are thus implicitly assuming that the two regions commit not to initiate a conflict once a decentralization agreement has been reached. In the next section, we will analyze whether this is indeed the case (i.e., decentralization is self-enforcing), considering the cases of reversible and non-reversible decentralization.[22]

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 one half.[23] Given that individuals in the two regions still have to interact with each other in the decentralized union, the diversity cost also applies. However, we assume that the latter is decreasing in the level of decentralization, since bringing the public good closer to local preferences is likely to reduce resentment among the individuals belonging to different regions/groups.

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

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

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

[22]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), and we do not aim to review it 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.

[23]Think for instance of education policy, where the language of instruction could be left at the discretion of local governments, while the content of the curriculum would be decided centrally. The extent to which local governments are responsible for financing their local expenditures under a decentralized system varies greatly across countries. Eyraud and Lusinyan (2013) using data from 28 OECD countries over the period 1995-2007, report that vertical fiscal imbalances (defined as the share of subnational own spending not financed through own revenues) vary from 13 percent in Iceland to 83 percent in Mexico, the average being 40 percent. Our assumption of local spending fully financed by local revenues (i.e., no vertical fiscal imbalances) is not crucial for our results, the important point is that decentralization implies some loss in terms of ecomomies of scale.

of diversity is $sd < d$. If $s > 0$, insofar as there is no official secession, individuals bear a cost from the homogeneity bias, which is decreasing in the level of decentralization.

Notice that partial decentralization has an effect in terms of efficiency and on income distribution. Indeed, decentralization reduces the heterogeneity and diversity costs of the union, while the regions lose some benefits from economies of scale. Furthermore, decentralization *de facto* impoverishes the poor region. Indeed, as the decentralized part of the public good is financed regionally (i.e., there is fiscal autonomy), the implicit per capita transfer from the rich to the poor region is now given by

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

5.1 Decentralization can fully eliminate the cost of diversity

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

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

In utility terms, full decentralization is equivalent to secession, whereas no decentralization is equivalent to unification. In that case, decentralization constitutes an intermediary solution between unification and secession in utility terms from both regions' perspective. We now look at the decentralization thresholds such that region $j = R, P$ prefers decentralization to conflict.

An individual in the rich region is willing to bargain over decentralization as long as his utility under decentralization is greater than his expected utility under the conflict scenario (i.e., $U_R(\delta) > EU_R^*$), which reduces to

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

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

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

An individual in the rich region prefers decentralization to conflict if and only if the chosen decentralization level is *at least* δ_R, while an individual in the poor region prefers decentralization to conflict if and only if the chosen decentralization level 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. Hence, 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 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 (i.e., $s = 0$), there is always a range of decentralization levels such that both regions prefer decentralization to conflict:

Proposition 4. *If $s = 0$, there is always a non-empty set of decentralization levels over which both regions are willing to bargain.*

The properties of the interval (δ_R, δ_P) are closely related to the ones of total conflict intensity. This is intuitive: 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. We thus have:

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 if and only if the union is efficient.*

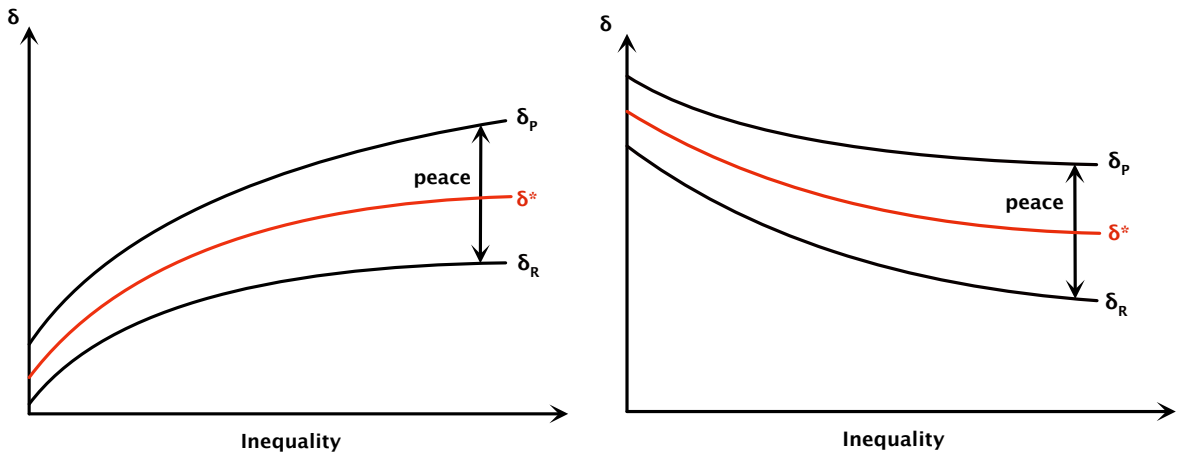
The particular decentralization level $\delta^* \in (\delta_R, \delta_P)$ that is implemented to prevent the conflict depends on which region is decisive on that matter. In particular, region R implements δ_P rather than starting a conflict, whereas region P implements δ_R rather than starting a conflict. Whatever assumption we make regarding who is decisive on selecting δ^*, its properties coincide with the ones of the two decentralization thresholds, hence of the probability of secession π^*.[24]

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

Figure 4 illustrates 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 effects: on the one hand, the range of decentralization levels over which both regions are willing to bargain widens, 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.

Note 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 that is implemented to prevent

[24] As we assumed that g is located at one half under unification, a natural assumption would be that the level of decentralization that is implemented is $\delta^* = (\delta_R + \delta_P)/2$ (which is what is represented in figures 4 and 5). Alternatively, a reasonable assumption here could be that δ^* is the solution to a Nash bargaining process with conflict as the outside option.



(a) Efficient union

(b) Inefficient union

Figure 4: Partial decentralization and inequality

conflict depends on the pre-existing level of inequality.[25] Therefore, we have that decentralization increases inequality, but also that inequality, in turn, conditions the level of decentralization 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 the overall heterogeneity costs ($h = d + ag/2$). An increase in those costs also yields two 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 to prevent conflict increases.[26]

5.2 Decentralization cannot fully eliminate the cost of diversity

Suppose now that $s \in (0, 1)$, so that even under full decentralization (i.e., $\delta = 1$), individuals still bear a diversity cost $sd \in (0, d)$ from having to interact with each other in the decentral-

[25] 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 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.

[26] Allowing for the poor region to seek secession (which could be the case if it constitutes a minority in the country (see footnote 13)) would not change fundamentally the relation between decentralization and conflict. That is, the range of decentralization levels compatible with peace relates to total conflict intensity, while the particular level of decentralization that is implemented relates to the underlying probability of secession. Clearly, if it is the poor region that seeks secession, an increase in inequality decreases total conflict intensity, hence the range of peace-compatible decentralization levels gets smaller. Furthermore, whether the decentralization level increases or decreases with inequality still depends on whether unification or secession is efficient, although the relationship is reversed. Finally, as higher heterogeneity still makes a secession more likely, the level of decentralization that is implemented in order to prevent the conflict increases accordingly.

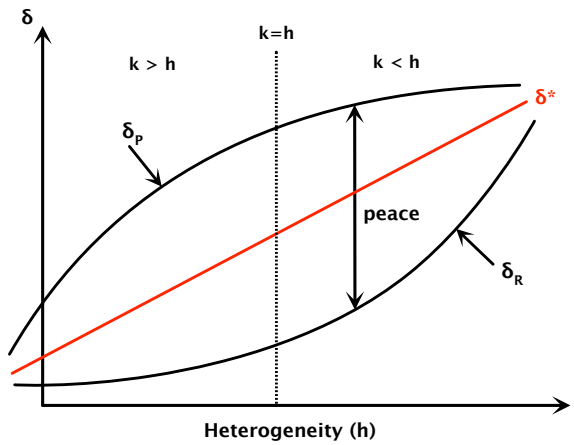


Figure 5: Partial decentralization and heterogeneity

ized union. 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 may no longer be true that decentralization 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, he 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, he prefers decentralization to secession if and only if

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

Clearly, as an individual in the rich (poor) region prefers secession (unification) to decentralization for $s = 0$, it must also be true for $s > 0$. As $\widetilde{k}_R < k_R$, 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 are better off under secession than under high levels of decentralization. There are thus two additional 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 way to prevent secessionist conflict.*

Suppose that $k < \widetilde{k}_R$. An individual in the rich region is willing to bargain over decentralization as long as his utility under decentralization is greater than his expected utility under

the conflict scenario (i.e., $U_R(\delta) > EU_R^*$), which reduces to

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

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

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

As before, the two regions are willing to bargain over decentralization as long as $\delta \in (\delta_R(s), \delta_P(s))$.[27] However, as $s > 0$, it may no longer hold that $\delta_R(s) < \delta_P(s)$. Indeed, the latter condition is satisfied if and only if

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

As $(\delta_P(s) - \delta_R(s))$ is decreasing in s, it follows that the slower the rate at which the diversity cost decreases with decentralization (i.e., the higher s), the less likely that decentralization can serve as an alternative to costly conflict. In particular, if $s > \widetilde{s}$, there is no range of decentralization levels such that *both* regions prefer decentralization to conflict.

Allowing for $s > 0$ considerably complicates the analysis and yields ambiguous comparative statics for both the range of decentralization levels compatible with peace and the level of decentralization implemented. However, we can show that higher inequality makes it more likely that $\delta_R(s) < \delta_P(s)$. As before, given that inequality fuels conflict intensity, it also increases the chances of reaching a peaceful agreement (i.e., the threshold $\widetilde{s}$ increases).

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

Figure 6 illustrates the possibility of using partial decentralization as a way to prevent conflict depending on s. The vertical axis represents the payoff of the poor region, whose maximum is reached under unification. Similarly, the horizontal axis represents the payoff of the rich region, whose maximum is reached under secession. In case of conflict, we reach an equilibrium at a point like A, say. 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, we saw that there always exists an interval $(\delta_R(0), \delta_P(0))$ such that $U_j(\delta) > EU_j^*$ for $j = R, P$ (Proposition 4). At $s_1 < \widetilde{s}$, both regions prefer secession to full decentralization ($\delta = 1$). However, there still exists a (smaller) interval $(\delta_R(s_1), \delta_P(s_1))$ such that both regions are willing to bargain over decentralization. Finally, at $s_2 > \widetilde{s}$, the diversity cost of decentralization is too high for the conflict to be avoided ($\delta_R(s_2) > \delta_P(s_2)$).

[27] Observe that $\delta_P(s) < \widetilde{\delta}_P$, which is intuitive: insofar as the participation constraint is satisfied for the individuals in the poor region, it follows that they prefer conflict over secession. Thus, the level of decentralization under which they prefer decentralization to conflict must be smaller than the one under which they prefer decentralization to secession.

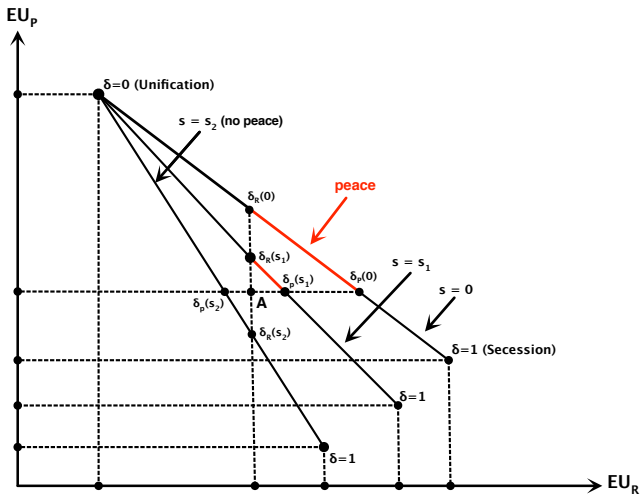


Figure 6: Peace-compatible decentralization levels depending on s

6 Self-enforcing decentralization

In the previous section, we have obtained the levels of decentralization that are compatible with peace. We have thus implicitly assumed that the two regions can and do credibly commit to the decentralization agreement and hence to not reopen conflict in the future. However, in order for peace to be self-enforcing, we need to verify that no region has an incentive to trigger conflict once decentralization has been implemented. In turn, this requires making assumptions on whether decentralization is a politically reversible process or not.

Suppose that there is a conflict after the union has been decentralized. 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, even though 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 (de)centralization matters, making decentralization *de facto* an irreversible process. Also, decentralization may occur through a constitutional change, which is very hard to reverse.

In this section, we analyze whether decentralization is self-enforcing by analyzing two situations. First, we assume that full unification (i.e., $\delta = 0$) is still an available option once the union has been decentralized (i.e., decentralization is a reversible process). In other words, the poor region can impose the pre-agreement scenario in case of victory. Second, we assume that once the union has been partially decentralized, it is not possible to return to a fully centralized union (i.e., decentralization is not a reversible process). In other words, the poor region cannot impose the pre-agreement scenario in case of victory.

Suppose that $k < \widetilde{k}_R$ and $s \in [0, \widetilde{s})$, hence we are in a situation in which both regions are willing to bargain over decentralization. Furthermore, let $\delta^* \in (\delta_R, \delta_P)$ be the level of partial decentralization that is implemented to prevent the conflict. Suppose then that it is possible to reverse to full unification once δ^* has been implemented. We have to verify that no

region is 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, 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. 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 in region $j = R, P$ choose their conflict effort F_j so as to maximize

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

where, as before, $\pi = F_R/(F_R + F_P)$. Again, the region exerting the highest level of effort is the one whose stakes are the greatest, which depends on whether decentralization or secession is the socially efficient outcome. As before, the ratio of conflict efforts is given by the ratio of regional stakes, which now depends on δ^*:

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

and the equilibrium probability of secession is now given by

$$\pi^*(\delta^*) = \frac{\Phi(\delta^*)}{1+\Phi(\delta^*)} = \pi^* + \frac{\delta^*}{(1-\delta^*)}\frac{sd}{2T}$$

If $s = 0$, the 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 devote strictly less resources to the conflict. However, as the relative stakes are unaffected, the probability of secession remains the same.

If $s \in (0, \widetilde{s})$, the regional stakes also decrease with the decentralization level, hence total conflict intensity is decreasing in δ^*. However, as the ratio of stakes is increasing in δ^*, it means that the stakes of the poor region decrease relatively faster than the stakes of the rich region. As a result, the probability of secession is higher under decentralization than under unification, and it is increasing in the decentralization level.

As the rich region is always better off under conflict than under the (irreversible) decentralization level $\delta^* \in (\delta_R, \delta_P)$, it follows that decentralization 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 trigger conflict to force secession. In such case, decentralization, even though it makes the conflict less intense, cannot serve as a way to fully eliminate it.

Given that the rich region cannot credibly commit not to trigger conflict for any $\delta^* \in (\delta_R, \delta_P)$, we now ask whether any decentralization level is implemented to start with. 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, foreseeing that the rich region will trigger conflict for any δ^*, opposes the implementation of any decentralization in the first place, since fighting under decentralization is strictly worse than fighting under unification. As a result, no decentralization is ever implemented, and conflict arises in equilibrium under unification:

Proposition 9 (Self-enforcing peace). *Suppose that $k < \widetilde{k}_R$ and $s \in [0, \widetilde{s})$. Then,*

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, secessionist conflict occurs under unification.*

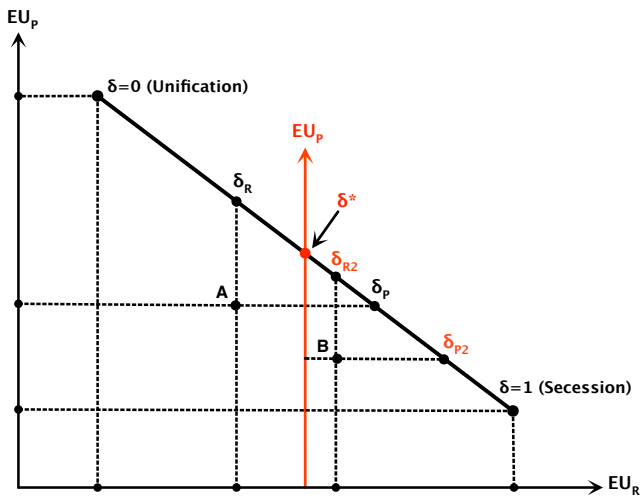


Figure 7: Self-enforcing decentralization

Figure 7 illustrates the mechanism through which conflict occurs in equilibrium when decentralization is not reversible. As in Figure 6, the payoff of the rich and poor region is represented on the horizontal and vertical axis, respectively. In case of conflict, we reach an equilibrium at a point like A, say. If $s \in [0, \widetilde{s})$ ($s = 0$ in the figure), there exists a range of decentralization levels (δ_R, δ_P) such that both regions are willing to bargain over decentralization. Suppose that the two regions find a compromise somewhere in this interval, so that δ^* is implemented. Suppose furthermore that decentralization is not reversible, which means that once δ^* is implemented, the vertical axis shifts to the right until crossing δ^*. In this case, the rich region can increase its payoff by starting a conflict, so as to reach a point like B, say. At this new conflict equilibrium, again, there exists a range of partial decentralization levels $(\delta_{R2}, \delta_{P2})$ such that both regions prefer decentralization to 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 start a conflict under the new decentralization agreement. 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, hence the rich region is always willing

to decentralize and trigger conflict afterwards. However, as the poor region is strictly better off at A than at B, it opposes the implementation of any decentralization in the first place, so that conflict occurs in equilibrium under unification (point A).[28]

7 Conclusion

We showed that even though secessionist conflict is wasteful, partial decentralization cannot always serve as a way to prevent it. 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 provided that decentralization is a reversible process. In such case, the level of decentralization that 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 and diversity costs, it increases with interregional income 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 that 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. As a result, secessionist conflict occurs in equilibrium.

We believe that there are several directions in which our analysis could be developed further. First, we assumed that conflict effort is coordinated within regions. This assumption is clearly questionable, especially if we add heterogeneity with respect to individual location within regions. 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. 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

[28]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 $[0, 1]$, so 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. It may well be the case that once a decentralization agreement has been reached, a majority of individuals in the region are better off at δ^* than at B, meaning that peace would be self-enforcing. Put otherwise, it could well be that the self-enforcing properties of decentralization depend on the extent of heterogeneity within regions. 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*". Likewise, Cederman et al. (2015b), based on a descriptive analysis of their sample of observations, suggest that granting autonomy to a group demanding such an arrangement is associated with a much lower conflict risk, while autonomy offered to a secessionist movement does not seem to reduce the risk of civil war. Finally, 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.

individual best responses rather than assuming a coordinated conflict effort.

Second, we assumed equal individual income within regions. Alternatively, as in Bolton and Roland (1997), one could introduce intra-regional income heterogeneity, and thus there would be 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 from secession would be affected, and so would be the regional incentives to trigger a conflict.[29] As we discussed in the previous section, the self-enforcing properties of the peaceful solution could well 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 future regional fighting capacities. In turn, the issue of self-enforcement is of particular relevance in this context. Furthermore, this additional effect of decentralization may be either stabilizing or destabilizing, depending on whether it is the rich or the poor region that seeks 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.

[29]For an attempt to explore empirically the link between inequality *within* regions and the demand for sovereignty, see Sambanis and Milanovic (2014).

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 3. Omitted. □

Proof of Proposition 4. Omitted. □

Proof of Proposition 5. The range of decentralization levels over which both regions are willing to bargain 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 6. Omitted. □

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

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

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

Therefore, we have

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

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 respectively given by

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

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

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 way to prevent secessionist 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

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

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 δ^* has been implemented, equilibrium conflict inputs are given by

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

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

from which we obtain the equilibrium probability of secession:

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

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

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

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

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

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 respectively 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 region 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

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

Therefore, it holds that $EU_P^* > EU_P^*(\delta^*)$ 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 foresee that the rich region will start a conflict no matter the level of decentralization, they oppose the implementation of any δ^*, so that conflict occurs in equilibrium under unification.

□

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