

National Borders and the Size of Nations¹

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1 Introduction

The formation, consolidation and breakup of states has been at the center of human history for thousands of years, from Hammurabi's unification of Mesopotamia to the recent collapse of the Soviet Union and Yugoslavia. Currently in the world there are almost two hundred nations, some as large as China or India, others as small as San Marino or Tuvalu.¹

Questions on the number and size of states have been debated for almost as long as states themselves exist.² Plato in *The Laws* even calculated the "optimal size" of a polity (5,040 heads of family), although he also pointed out that "the number of citizens should be sufficient to defend themselves against the injustice of their neighbors." Aristotle in *The Politics* argued that a state should be no larger than a size in which everybody knows each other, and claimed that "experience has shown that it is difficult, if not impossible, for a populous state to be run by good laws." Montesquieu in *The Spirit of the Laws* wrote that "in a small republic, the public good is more strongly felt, better known, and closer to each citizen." Issues of "optimal" size and centralization were at the core of the debate during the American Constitutional Convention in 1787, when Madison and the other Federalists provided celebrated arguments in defense of a large federal polity against the objections of the Anti-Federalists.

Sovereignty, independence and border redrawing have been paramount issues throughout the nineteenth and twentieth centuries, and remain very prominent

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²By "nation" in this chapter we mean internationally recognized "sovereign state," as commonly understood in English when one speaks of *international* trade or United *Nations*.

³For a discussion of the older political literature on the size of states see Dahl and Tufte (1973). Historical studies of nationalism include Hobsbawm (1990) and Anderson (1991).

today, from Quebec to the Basque Countries and Catalonia, from Ireland to Belgium and Corsica, from the Middle East to Kashmir and Indonesia.

While these issues have traditionally been the preserve of political philosophers and historians, in recent years they have also been addressed by a growing analytical literature within political economy. Understanding the formation and breakup of nations is a natural development of political economy's research program. A central goal of contemporary political economy is the endogenization of political institutions, and sovereign states are perhaps the most important political institutions in the world.

2 Literature on size of nations and related areas of research

In this chapter I will briefly review some ideas and results from the political-economy literature on the size of nations. Earlier contributions are Friedman (1977) and Wittman (1991). More recent analytical work includes Alesina and Spolaore (1997, 2003, 2005a, 2005b), Alesina, Spolaore, and Wacziarg (2000, 2003), Bolton and Roland (1997), Bordignon and Brusco (2001), Casella (2001), Casella and Feinstein (2003), Dagan and Volij (2000), Ellingsten (1998), Findlay (1996), Goyal and Staal (2003), LeBreton and Weber (2001, 2003), Haimanko, LeBreton and Weber (2000), Spolaore (1995, 2004), and Wittman (2000) among others. An earlier discussion of the literature is provided by Bolton, Roland and Spolaore (1996). Alesina and Spolaore (2003) cover most of the materials discussed in this chapter and also provide discussions of the empirical and historical evidence, which must be omitted here because of space limitations.

Recent contributions have studied the determination and change of political borders in different political and economic environments, and using various concepts of solutions and equilibria. For example, in his pioneering paper Friedman (1977) studied the formation of borders as set by rent-maximizing Leviathans. Bolton and Roland (1997) studied the breakup of nations by direct majority vote, when income distributions differ across regions, and median voters in different regions have different preferences over redistribution policies. LeBreton and Weber (2002) among others have analyzed equilibria when groups of individuals can secede unilaterally and form their own country. Wittman (2000) has focused on efficient (i.e., welfare-maximizing) solutions. In Alesina and Spolaore (1997, 2003) the number and size of countries have been derived and compared under different solution concepts: efficient borders, voting equilibria, equilibria under unilateral secessions, and equilibria in a world of rent-maximizing Leviathans.

The recent political-economy literature on national borders is connected to other related bodies of research. An important link is to the literature on local public goods and clubs, pioneered by Tiebout (1956) and Buchanan (1965).³

³This literature studies public goods that are jointly supplied but excludable either through some technological device or because of spatial distance. For a survey see Inman and Rubinfeld

In Buchanan's analysis, clubs are modeled as voluntary associations in which individuals have identical tastes for both public and private goods. The optimal club size is determined where the marginal cost of an additional member from crowding equals the reduction in the other members' dues from spreading the fixed costs of the public goods over the extra club member.⁴ In Tiebout's analysis, different bundles of public goods are offered at different locations, and people sort themselves in homogeneous local "clubs" by voting-with-the-feet. A necessary condition to ensure global optimality in a Tiebout world is the absence of economies of scale in producing the public good.

There are many points of contact between the literature on clubs and local public goods and the literature on nations: in a way nations, from a global perspective, do provide "local" public goods. However, national public goods - unlike local public goods - have high economies of scale from sharing the costs with a large population. Moreover, in the traditional theory of local public goods local jurisdictions are not completely autonomous, while the analysis of nations explicitly focuses on *sovereign* states that can impose direct barriers to economic exchange and/or use force in settling disputes with their neighbors.⁵

The literature on the formation of nations is also linked to the large literature on customs unions, trade blocs and preferential trade agreements.⁶ Modern national states tend to promote free trade within their own borders, while all their regions tend to face the same barriers to trade with other countries. In that respect, countries can be seen as "trade blocs" of regions. On the other hand, countries are much more than trade blocs: they are not only economically integrated, but also politically integrated. In fact, one could think of free trade areas, customs unions, supranational associations and sovereign states as points on a continuum of increasing coordination and integration of political functions. Hence, while the study of nation formation and breakup benefits from a close connection to the analysis of trade blocs, the study of trade blocs could also benefit from using some of the tools, concepts and results developed in the study of nations. The European Union, with its intermediate nature between a free-trade area and a fully-fledged political union, represents a promising case study.⁷

A third body of research that is highly relevant for the study of nations

(1997) and Scotchmer (2002). Schmidtchen (1994) explicitly studies national borders in the context of Buchanan's theory of clubs and constitutional rules.

⁴The stable distribution of club sizes and benefits was studied in classic contributions by Pauly (1967, 1970). Formally, this approach to voluntary clubs is analogous to the study of the core with externalities.

⁵An interesting approach to jurisdictions based on voluntary association has been proposed by Frey and Eichenberger (1999), who have stressed voluntary mechanisms for the creation of clubs of public goods (their "functional, overlapping, and competing jurisdictions," or FOJC). Issues of legal monopoly of coercion and free riding are usually not addressed in this context.

⁶The classical reference is Viner (1950). For a survey of the literature see, for instance, Baldwin and Venables (1995).

⁷On European integration see, for example, Alesina and Wacziarg (1999) and Alesina and Spolaore (2003, chapter 12). See also the chapter on the political economy of European integration by Eichengreen in this Handbook. For a discussion of the effects of European integration on European nation-states and regions, see Drèze (1991).

is the economic analysis of conflict and appropriation, developed by Boulding (1962), Tullock (1974), Hirshleifer (1989, 1991, 1995a, 1995b), Grossman (1991), Skaperdas (1992) and others. This work is also related to the formal study of conflict by international-relations scholars (see Powell, 1999). Links between this formal literature on conflict and the study of the size of nations have been developed by Wittman (2000) and Alesina and Spolaore (2005a, 2005b). While in most formal work on conflict and wars the identity and number of agents and groups engaging in conflict have been taken as given, the fundamental objective of the literature on nations is to endogenize those collective organizations. In this respect, the literature on nations is related to the literature on the formation of military alliances, from which it differs for its focus on centralization of defense in sovereign institutions (nations).⁸ The mechanisms through which governments manage (or fail) to establish an effective monopoly on the means of coercion within their borders is an important area of inquiry that is likely to receive increasing attention in the future.

3 Benefits and costs of national size.

When considering the equilibrium size of nations, a natural starting point is the trade-off between benefits and costs from a larger size. There are several benefits from a larger national size. A key role for nations is the provision of a set of public goods to their citizens. The per capita cost of many public goods is lower in larger countries, where more taxpayers pay for them. Economies of scale can be expected in the provision of general-policy coordination and administration, defense and foreign policy, a legal and judicial system, police and crime prevention, a monetary and financial system, infrastructure for communications, public health, and so on. Empirically, the share of government spending over GDP is decreasing in population (smaller countries have larger governments).⁹ Larger countries can also better internalize cross-regional externalities, a point extensively studied in the literature on decentralization and fiscal federalism¹⁰ An additional benefit from size comes from insurance via interregional transfers. When international capital markets are imperfect, larger countries can better provide insurance to regions affected by imperfectly correlated shocks. Larger countries can also build redistributive schemes from richer to poorer regions, therefore achieving distributions of after-tax income which would not be available to individual regions acting independently.¹¹ Finally, larger nations mean larger domestic markets when political borders are associated with barriers to international exchange. In principle, the size of the market may or may not coincide with the political size of a country as defined by its borders. It does

⁸A classic reference is Olson and Zeckhauser (1966). A survey is provided by Murdoch (1995).

⁹See Alesina and Wacziarg (1998) and Alesina and Spolaore (2003, chapter 10).

¹⁰For a survey see Oates (1999).

¹¹However, as we will see below, these redistribution schemes may also induce political fragmentation when there is political disagreement between voters in different regions. Redistribution also increases the possibility of wasteful rent-seeking.

coincide with it if a country is completely autarkic, that is, if it does not engage in exchanges of goods or factors of production with the rest of the world. By contrast, market size and political size would be uncorrelated in a world of perfect free trade in which political borders imposed no costs on international transactions. So, in models in which the scale of markets matters, market size depends both on country size and on the trade regime. In a regime of free trade, small countries can prosper, while in a world of trade barriers, being large is much more important for economic success.¹²

Size also comes with costs. As countries become larger, administrative and congestion costs may overcome the benefits of size mentioned above. More importantly, larger populations are associated with higher heterogeneity of preferences of different individuals. Being part of the same country implies sharing jointly-supplied public goods and policies in ways that cannot satisfy everybody's preferences. Decentralization of some public goods and policies can offer a partial response to such heterogeneity. The current move towards decentralization in many parts of the world has been partly explained as a response to increasing secessionist pressures.¹³ Nonetheless, some essential national policies that characterize a sovereign state (defense, foreign policy, basic characteristics of the legal system) are indivisible and must be shared among the whole population. The costs of heterogeneity in the population have been documented empirically in a recent literature on the political and economic effects of ethno-linguistic fractionalization, which is shown to be inversely related to measures of economic performance, economic freedom, and quality of government.¹⁴ As noted by Wittman (2000), such political costs are likely to depend not only on the degree of heterogeneity of preferences, but also on the quality of institutions through which preferences are mediated and turned into policy. While in some societies and political systems there exist effective mechanisms to integrate populations with diverse preferences, in other societies heterogeneity brings about high political and economic costs. On the other hand, the quality of institutions itself is likely to depend on heterogeneity of preferences.¹⁵ Further research is needed to provide insights and evidence on the complex relationships and causal links among heterogeneity of preferences, formation of jurisdictions, and the nature and quality of political institutions.

¹²This point will be further discussed in Section 8.

¹³See Bardhan (2002) and De Figueiredo and Weingast (2002).

¹⁴See Easterly and Levine (1997), La Porta et al. (1999) and Alesina et al. (2003)

¹⁵Moreover, heterogeneity of preferences in the long run may be an endogenous function of variables under the direct or indirect control of the government (see Alesina and Spolaore, 2003, 76-78).

4 Borders, voting, and efficiency in a simple framework

In this section we will present a simple analytical framework for understanding some basic issues about the formation and breakup of nations.¹⁶

We assume that governments come in different "types," with different legal structures, different policies, different official languages, etc. To keep things simple, we collapse all these characteristics into one dimension, and denote a "type" of government as a point on the interval $[0, 1]$. For instance, we can say that a country has a government of "type $1/4$ " while another country has a government of "type $3/4$." We assume that physical space is also unidimensional, and all individuals are distributed over a unidimensional interval, also denoted by $[0, 1]$. So, we can say that Mr. X is "located" at $1/4$ while Ms. Y is "located" at $3/4$. Finally, we assume that there exists a *perfect correlation* between an individual's location and his or her most preferred type of government. This means that Mr. X, who is located at $1/4$, prefers a government of type $1/4$, while Ms. Y, who is located at $3/4$, prefers a government of type $3/4$. To fix ideas, picture the interval as the East Coast of the United States between Boston and Savannah, and assume that all the American population is located along that coast (not a bad approximation for the U.S. right after independence in 1776). Interpret the "type" of government as the location of the country's "capital city." A perfect correlation between an individual's location and his or her preference for the "type of government" means that people in Boston would like a "Bostonian" type of government, with "Bostonian" policies, laws, rules and rights. An independent country with the "capital city" in Boston would be a country with the type of government most preferred by the inhabitants of Massachusetts. Bostonians would be less happy with a "New-York-City" type of government, but may still prefer that to a government "located" in South Carolina or in Georgia, which would be a "Southern" type of government. As we will see, when people with different "preferred types" form a country, their "capital city" will reflect the median preferences of the relevant population. For instance, the location of Washington, D.C and, more importantly, the "type of government" of the newly formed United States, would reflect "median" preferences for location and type of government in the original thirteen colonies¹⁷. Of course, we all know that the real world is not unidimensional, and geographical locations are not always perfectly correlated with ideological preferences.¹⁸ But, as it is often the case, drastic analytical simplifications provide useful insights on

¹⁶Because of space limitation, formal proofs are omitted.

¹⁷More precisely, the original "type of government" in the U.S. did not reflect the preferences of the whole population (including slaves), but of that subset of the American population with political rights and power at the time.

¹⁸For instance, some individuals in San Francisco may have preferences for the type of government which are "far" from those of some of their neighbors while closer to the preferences of some other individuals who live farther away - say, in New York. However, political maps of the U.S. (and elsewhere) show a strong correlation between political preferences and geographical location. Especially strong correlations tend to hold when preferences for types of government are affected by ethnolinguistic differences across populations.

the trade-offs involved in border formation that can generalize to more complex settings¹⁹ Therefore, we will assume that the whole population, of mass equal to P , is distributed over a geographical *and* ideological interval $[0, 1]$. Nations are geographically connected (no "holes"), and of size $P_1, P_2, \dots, P_j \dots P_N$.²⁰

Each individual i has income y_i and pays taxes equal to t_i . In this section we will assume that everybody has the same exogenous income y .²¹ Private consumption is $c_i = y - t_i$. Public goods provide individual i with services denoted by g_i . Individual i 's utility is increasing both in c_i and in g_i :

$$U_i = u(c_i) + g_i \quad (1)$$

where $u'(c_i) > 0$ and $u''(c_i) \leq 0$. Government services have different utilities for different individuals depending on the type of public policy selected by the government. As mentioned above, each individual i 's location x_i also denotes his or her preferred public policy. $\theta_{j(i)}$ is the type of public policy chosen in the country j in which individual i lives. We assume

$$g_i = g - h|x_i - \theta_{j(i)}| \quad (2)$$

The parameter h plays a key role in the analysis of national size.²² It captures the costs associated with policies far from one's preferred policy - e.g., the political costs from heterogeneous preferences over types of governments and public policies. The parameter h may also reflect institutional quality: a lower h can be associated with institutions that are better at reducing the political costs of heterogeneity within the population.²³

In order to provide government services, the government of the nation j in which individual i lives must pay a cost $k_{j(i)}$, which includes a fixed part $f > 0$ and a variable part, proportional to the size of the nation $P_{j(i)}$ (the mass of nation j 's population):

$$k_{j(i)} = f + vP_{j(i)} \quad (3)$$

where v is a nonnegative parameter. If the costs of government are equally shared by all citizens in the nation of size $P_{j(i)}$, we can calculate individual i 's taxes by dividing the total costs $k_{j(i)}$ in equation (3) by the size of the country's population $P_{j(i)}$:

$$t_i = \frac{f}{P_{j(i)}} + v \quad (4)$$

¹⁹For a broader discussion of the meaning and limits of these assumptions, see Alesina and Spolaore (2003).

²⁰For example, if population P is uniformly distributed on the interval $[0, 1]$ and is divided in two countries of equal size, all people in the first country, of size $P_1 = P/2$, will be located between 0 and 1/2, and all people in the second country, also of size $P_2 = P/2$, will be located between 1/2 and 1.

²¹We will consider the case of income inequality in Section 6.

²²In the rest of the analysis we will normalize $g = 0$.

²³As mentioned above, the model can be given a simple geographical interpretation by defining the type of a government as the "location" of the country's "capital." Then the heterogeneity costs can be reinterpreted as a political analogue of "transportation costs." See Fujita and Thisse (2002) for a useful survey of spatial models, including models of "capital cities."

The parameter f captures the benefits from belonging to a larger country where the costs of government can be spread on a larger population, therefore reducing taxes per capita. For example, an individual who lives in a country that has size $P_{j(i)} = 1,000,000$ pays taxes equal to $\frac{f}{1,000,000} + v$, but an individual who lives in a *larger* country - say, twice that size, with $P_{j(i)} = 2,000,000$ - pays lower taxes equal to $\frac{f}{2,000,000} + v$, because the fixed cost f is shared among twice as many people.

But a larger country also means, on average, a larger distance from a citizen's preferred policy. Suppose that the whole population P is uniformly distributed on the interval $[0, 1]$ and belongs to a unified country with one government and one public policy. A government that aims at maximizing average utility would choose the type of government preferred by the median individual, i.e., by the individual located at $1/2$. The same outcome is obtained if the type of government is chosen directly by majority vote (median voter's theorem). With a uniform distribution the government is located at $1/2$, average distance from the government is $1/4$, and average utility is

$$U_a = u(y - v - \frac{f}{P}) - \frac{h}{4} \quad (5)$$

Now, consider the case in which population P is divided in two countries of equal size $P/2$. Then the cost of government will increase: everybody will pay higher taxes ($\frac{2f}{P} + v$). But average distance will go down to $1/8$, because the two governments will be located at $1/4$ and $3/4$, respectively, and more people will be "closer" to each government. Average utility when the population is divided in two separate countries is given by

$$U_b = u(y - v - \frac{2f}{P}) - \frac{h}{8} \quad (6)$$

Let $\Delta(f, v, y)$ denote the change in utility from private consumption that each person experiences when we compare a two-country outcome and a one-country outcome

$$\Delta(y, v, \frac{f}{P}) \equiv u(y - v - \frac{f}{P}) - u(y - v - \frac{2f}{P}) \quad (7)$$

$\Delta(f, v, y)$ measures the net benefits (per person) from economies of scale in public-good provision: it is always nonnegative, and strictly positive if and only if $f > 0$. The benefits from scale are increasing in the fixed cost of the public good f . For a positive f and a strictly concave utility function, they are also increasing in the variable cost v , because a higher v increases taxes and reduces disposable income, therefore raising the marginal utility of tax savings from unification.²⁴

²⁴For the same reason, the economies of scale in the provision of the public good have a bigger impact on utility at lower levels of income.

Average utility is higher in the unified country than in two separate countries (i.e., $U_a > U_b$) if and only if

$$\Delta(y, v, \frac{f}{P}) > \frac{h}{8} \quad (8)$$

which means that the benefits from scale $\Delta(y, v, \frac{f}{P})$ must exceed the costs associated with a higher distance from the government, measured by $h/8$. That is, the left-hand side shows the benefits from scale, and the right-hand side shows the average "heterogeneity costs." When the economies of scale are higher than the heterogeneity costs, average utility is higher in a unified country than in two separate countries. Therefore, when inequality (8) holds, it is "efficient" (i.e., average utility-maximizing) to keep the country together. However, if citizens can choose whether to form one or two countries by majority vote, inefficient breakups may occur. One can show that a majority of voters will strictly prefer a unified country to a breakup if and only if the individual at location $1/4$ prefers unification, that is, if and only if

$$\Delta(y, v, \frac{f}{P}) > \frac{h}{4} \quad (9)$$

The above equation (9) has a similar structure to equation (8), but the heterogeneity costs on the right-hand side are *higher*. That means that the median voter will accept a breakup even when economies of scale are high enough to make unification efficient. Specifically, for all values of the parameters such that

$$\frac{h}{8} < \Delta(y, v, \frac{f}{P}) < \frac{h}{4} \quad (10)$$

we have majorities in favor of an inefficient breakup. This result is due to the unequal distribution of the benefits from having a larger country: the individuals at the margins do not fully internalize those benefits, since they pay a disproportionate share of heterogeneity costs, and are therefore willing to break up the country, even if that means higher taxes per capita for everybody and a reduction of average utility overall.

The result that majority voting might lead to inefficient breakup of countries extends to the more general case in which individuals can vote on any number and size of countries. Alesina and Spolaore (1997, 2003) consider the case in which utility from private consumption is linear ($u(c_i) = c_i$), the mass of population is normalized to one ($P = 1$ - an assumption we will maintain in the rest of this chapter), - and majority voting takes place on configurations of countries of equal size in order to satisfy a stability condition. Under those assumptions, they find that the unique number of countries in their majority voting equilibrium is given by the integer that is closest to the following number:

$$N^v = \sqrt{\frac{h}{2f}} \quad (11)$$

By contrast, the efficient number of countries is the integer closest to

$$N^e = \sqrt{\frac{h}{4f}} < N^v \quad (12)$$

Both numbers capture the trade-off between heterogeneity of preferences (higher h - more nations of smaller size) and economies of scale in public-good provision (higher f - fewer, bigger nations), but the voting equilibrium presents an inefficiently large number of nations. N^v does not maximize average welfare, but the utility of the individual at the border (the individual with the lowest utility). In fact, the majority vote equilibrium N^v would be chosen as the “optimal” solution by a Rawlsian social planner with the goal of maximizing minimum utility, assuming that taxes are identical across individuals with different preferences.

In specific cases it might be possible to obtain efficient borders by direct majority rule. Consider a modification of the above framework in which political costs are modeled as a *quadratic* function of an individual’s distance from the government, a specification used by Wittman (2000) in his analysis of efficient national borders. Now

$$U_i = u(c_i) - h(x_i - \theta_{j(i)})^2 \quad (13)$$

Individuals are still uniformly distributed over $[0, 1]$, and world population size P is normalized to one. Because of the symmetric distribution, for all configurations of borders mean and median locations coincide, and the median voter’s favored location of government is identical to the mean location, which now maximizes average utility.²⁵ In a unified country, the sum of everybody’s utility can be calculated by adding up the utility from consumption, that is identical for all individuals and equal to $u(y - v - f)$ (i.e., utility of income y minus taxes $v + f$), and all the “heterogeneity costs” associated with individuals being far from the government (which is located at $1/2$). These costs vary across individuals, and can be calculated by integrating (that is, summing up) all individual costs. With a uniform distribution and a population size $P = 1$, we have that the density $f(x) = 1$, and we can write the sum of all squared distances from 0 to 1 as $\int_0^1 (x_i - \frac{1}{2})^2 dx_i$. Hence, the sum of everybody’s utilities in a unified country is given by

$$\bar{U}_1 = u(y - v - f) - h \int_0^1 (x_i - \frac{1}{2})^2 dx_i \quad (14)$$

²⁵An interesting issue is what happens when mean and median do not coincide. Wittman (2000) argues in favor of the mean rather than the median as the appropriate solution concept in this case, using two arguments: a) average welfare is maximized by the mean, and with appropriate transfers across voters, everybody would prefer that solution, b) in a symmetric probabilistic-voting framework an opportunist policy-makers in competition for a representative office would maximize his votes by targeting mean preferences. As briefly discussed below, analogous issues are important when one considers not just the efficiency of policy choice (type of government) for given borders, but also the efficient determination of the borders themselves.

When people are split in two separate countries, their utility from consumption is lower because of higher taxes: taxes are now $v+2f$ and utility is $u(y-v-2f)$. On the other hand, total heterogeneity costs are lower, because now we have to sum up the costs associated with the distance from $1/4$ (the "capital city" of the first country) of all individuals who are located between 0 and $1/2$, and the distance from $3/4$ (the "capital city" of the second country) of all individuals located between $1/2$ and 1 . Therefore, the sum of everybody's utilities when people are divided in two separate countries is

$$\bar{U}_2 = u(y - v - 2f) - h \int_0^{1/2} (x_i - \frac{1}{4})^2 dx_i - h \int_{1/2}^1 (x_i - \frac{3}{4})^2 dx_i \quad (15)$$

A unified country provides higher average utility than two separate countries if and only if $\bar{U}_1 > \bar{U}_2$. By solving the integrals in equations (13) and (14), and using equation (7) for $P = 1$, we have that $\bar{U}_1 > \bar{U}_2$ holds if and only if

$$\Delta(y, v, f) > \frac{h}{16} \quad (16)$$

The above inequality shows, as usual, the benefits of scale on the left-hand side and the heterogeneity costs on the right-hand side. As before, average utility is higher in a unified country than in two separate countries when the benefits of scale are high enough to offset the heterogeneity costs. A majority of citizens will be in favor of maintaining a unified country if and only if the individual at location $1/4$ prefers a unified country²⁶, which happens to imply the same condition $\Delta(y, v, f) > \frac{h}{16}$. Therefore in this example a democratic vote over border replicates the efficient outcome. The result depends on the quadratic specification of the political costs. In general, direct voting over borders brings about inefficient outcomes, unless appropriate tax-and-transfer schemes are in place.

5 Compensations

Can individuals with preferences "far from the government" receive compensations, and can such compensations sustain efficient borders? Sometime we can observe "border regions" with different preferences and characteristics from the "center" that have received a relatively favorable fiscal treatment - for instance, special-status regions in Italy, Northern regions in Sweden, some provinces of Canada and Argentina, etc.. However, in general the implementation of these transfer schemes may be economically costly, distortive or, as briefly discussed below, non credible.²⁷ The feasibility of transfer schemes as means to prevent secessions and implement efficient border configurations has been studied

²⁶As in the case of linear costs, it is easy to check that if the individual at location $1/4$ prefers a unified country, so do all individuals between 0 and $1/4$ and all individuals between $3/4$ and 1 .

²⁷These issues are discussed in Alesina and Spolaore (2003, chapter 4).

by LeBreton and Weber (2001, 2003), who explore the case in which a non-linear transfer scheme can prevent unilateral secessions in a country of optimal size, and generalize the analysis to populations distributed over bounded and unbounded intervals.²⁸

In the case of linear utility from consumption ($u(c_i) = c_i$), an efficient solution would be achieved via majority voting if taxes could be set according to a "full-compensation" formula, in which individuals who are "far" from the government pay lower taxes as compensation for the "political costs" they suffer. In principle, by appropriately lowering the taxes of individuals in proportion to the "political harm" they receive because of their location, it is possible to ensure that all voters have equal utility. Specifically, individual i 's taxes in a "full-compensation" formula are given by

$$t_i = Q_{j(i)} - h|x_i - \theta_{j(i)}| \quad (17)$$

For each country of size P_j (with $j = 1, 2, \dots, N$) with borders between \underline{b}_j and \bar{b}_j , Q_j is set in order to satisfy the budget constraint (that is, total taxes equal to total costs):

$$\int_{\underline{b}_j}^{\bar{b}_j} t_i di = f + vP_j \quad (18)$$

When the world is divided in N countries all of equal size $\bar{P} = 1/N$, all individuals in the world will receive the same utility, which can be calculated as follows²⁹:

$$U(\bar{P}) = y - \frac{f}{\bar{P}} - v + g - \frac{h\bar{P}}{4} \quad (19)$$

The above equation shows that, *for all individuals*, utility is given by consumption (income minus the costs per capita of the government $\frac{f}{\bar{P}} + v$) plus the average benefits of government services, which take into account the *average* "political costs" $\frac{h\bar{P}}{4}$. The above utility is maximized for $\bar{P} = 1/N^e$. Hence all individuals will unanimously choose the configuration of borders for which $\bar{P} = 1/N^e$, i.e., the efficient configuration of borders. In this version of the model, linear full compensation would work perfectly, in principle, to ensure efficient and equitable borders.

Practical problems with this scheme include costs, feasibility in the presence of imperfect information about individual preferences (an issue from which we

²⁸In this chapter we have mainly focused on breakup via majority voting. However, equal or even greater attention in the literature has been given to the concept of unilateral secessions by groups of individuals - a concept related to the study of the core. For an earlier contribution on secession threats and taxation in a different context see Buchanan and Faith (1987). Characterizations of secession-proof configurations of countries for the linear version of our basic framework are provided in Alesina and Spolaore (1997 and 2003, chapter 3). See also Bordignon and Brusco (2001).

²⁹It is also easy to verify that all parameters Q_j will be identical and equal to $\frac{f}{\bar{P}} + v + \frac{h\bar{P}}{4}$

have abstracted in the model), and credibility. In our example if there are any costs, even very small, associated with this scheme, voters would reject the scheme *after* borders are set, unless there exists a persistent and credible threat of secession. Haimanko, LeBreton and Weber. (2000) show that even in the absence of an appropriate commitment technology, linear transfer schemes may be supported by a majority of the population in *polarized* societies in which the median distance from the government is higher than the average distance. However, even in this case, there is no assurance that the feasible redistributive scheme enforces the optimal size of countries. In fact, in a political-economy equilibrium in which compensation schemes are decided via majority voting, “excessive” compensation may induce a “secession of the center”³⁰.

6 Income inequality, redistribution, and breakup of nations

Bolton and Roland (1997) study a model of country breakup by majority vote when individuals differ in productivity and income. Then differences in income across region are at the roots of different preferences over public policies (redistribution), and may generate incentives to break up, even in the absence of other forms of heterogeneity. Bolton and Roland’s model can be illustrated with a simple modification of our basic framework. Again, we focus on the potential breakup of a unified country into two countries of size 1/2 each. The distribution of income in the first half of the unified country (region 1) is represented by a probability density function $\phi_1(y_i)$, while the distribution of income in the second half of the unified country (region 2) is denoted by a probability density function $\phi_2(y_i)$. Income distribution in the unified country formed by region 1 plus region 2 is defined by $\phi_u(y_i)$. y_1 , y_2 and y_u denote average income levels in region 1, region 2 and the unified country., As before, governments provide public goods with fixed cost equal to f .³¹ Government’s functions also include redistribution of income across individuals. Each individual i receives lump-sum transfers R . Public goods and transfers are financed by a proportional income tax at rate τ . Taxation is costly: a dollar of tax revenues provides only $(1 - \frac{\tau}{2})$ dollars for transfers and public goods. Individual i ’s utility is³²

$$U_i = c_i = (1 - \tau)y_i + R \quad (20)$$

If a region $j = 1, 2$ is independent, each individual in the region receives

$$R_j = (\tau - \frac{\tau^2}{2})y_j - 2f - v \quad (21)$$

³⁰ A numerical example is discussed in Alesina and Spolaore (2003, 60-63).

³¹To simplify notation and without loss of generality, we will assume $v = 0$ and $u(c_i) = c_i$

³²Here we abstract from heterogeneity of preferences over types of public goods, and focus on heterogeneity of income.

while if everybody is part of a unified country transfers per capita are

$$R_u = \left(\tau - \frac{\tau^2}{2}\right)y_u - f - v \quad (22)$$

Let y_1^m , y_2^m , and y_u^m denote median incomes in region 1, region 2, and in the unified country. Let the tax rate preferred by the median voters (i.e., the voters with median income) in region 1, region 2, and in the unified country be, respectively, τ_1 , τ_2 and τ_u . If the median income is lower than average income (as usually the case empirically) we can calculate the preferred tax rate by the median voter as

$$\tau_j = 1 - \frac{y_j^m}{y_j} \quad (23)$$

The above equation shows that the median voter's preferred tax rate is higher the larger the gap between median income and average income, since a poorer median voter has more to gain from higher taxes. Will voters prefer unification or separation? The median voter's theorem applies: a majority of individuals in region j will strictly prefer unification if and only if unification is preferred by the individual with median income in the region, that is, if an only if

$$U_u(y_j^m) > U_j(y_j^m) \quad (24)$$

which can be written as ³³

$$f > \frac{(y_u^m - y_j^m)^2}{2y_u} + \left[\frac{y_j - y_u}{2} + \frac{(y_j^m)^2}{2y_j} - \frac{(y_j^m)^2}{2y_u}\right] \quad (25)$$

Three effects can be identified. The first effect is captured by the the term f : it comes from the *economies of scale* from forming a union. The larger is f , the more likely is that unification will be preferred to separation. The second effect (*political effect* in Bolton and Roland's terminology) is captured by $\frac{(y_u^m - y_j^m)^2}{2y_u}$, which is the difference in desired fiscal policy between the median voter in region j and the median voter in the unified country. From the perspective of the median voter in region j , this effect is always positive (that is, it raises the appeal of a separation), as long as $y_j^m \neq y_u^m$. The third term $\left(\frac{y_j - y_u}{2} + \frac{(y_j^m)^2}{2y_j} - \frac{(y_j^m)^2}{2y_u}\right)$ captures the "*tax base effect*". This effect increases the likelihood of secession if region j is richer than the unified country ($y_j > y_u$), while it subtracts from the political effect (i.e., it makes unification more appealing) if region j is poorer than the unified country. However, if the political effect is large enough, the regional median voter may prefer secession even if his or her region is *poorer* than the unified country. In other terms, while a richer region is more likely

³³This equation is analogous to a similar equation (12) in Bolton and Roland (1997, p. 1064). However, this equation differs from the Bolton-Roland equation because we assume economies of scale in public-good provision, while Bolton and Roland assume that separation reduces everybody's income proportionally.

to secede than a poorer region, sufficiently large differences in preferences over redistribution may also induce secessions by poorer regions. Bolton and Roland (1997) show that even when using a compensatory fiscal policy, the national median voter cannot always prevent a breakup when faced with large differences in desired redistribution policies. The study of the relationships among redistribution policies, income inequality, and secessions is a promising area of theoretical and empirical research within the literature on political borders.

7 Nations in a world of rent-seeking governments

Borders set efficiently or by direct majority rule are useful benchmarks that help identify important trade offs between benefits and costs of size. However, it is unlikely that actual borders have ever been determined through those mechanisms. More often, border changes have been the outcomes of actions by rulers - kings, emperors, dictators - entering in peaceful negotiations and/or violent wars over territories and populations.³⁴ Even when governments are elected democratically, they rarely allow their citizens to make direct decisions over borders by referendum. In the literature on nations, the drawing of borders by rent-seeking Leviathans has been analyzed by Friedman (1977), who first proposed that in a world of rent-seeking governments, actual borders in the long run will maximize the net rents of Leviathans.

The concept of a “Leviathan solution” has been formalized by Alesina and Spolaore (1997). In particular, they have assumed that Leviathans are constrained by the need to provide utility above a give threshold to a fraction of their population (δ) in order to stay in power. Under this constraint, the equilibrium number of nations that maximizes Leviathans’ net rents is given by

$$N^\delta = \sqrt{\frac{h\delta}{2f}} \quad (26)$$

The result implies that countries are too few and too large when Leviathans are “real dictators” who only need the support of a minority of the population ($\delta < 1/2$). Efficiency is achieved with Leviathans who need to keep into account the preferences of exactly half of the population, while for $\delta = 1$ a world of Leviathans has the same (inefficient) borders that would have been chosen by voters in direct referenda.

In summary, nondemocratic governments are associated with excessive size and centralization, while democratization should go hand in hand with breakup of countries and secessions - unless efficient compensation schemes and/or mechanisms that reduce political costs are introduced along with the democratization process.

The historical record on the breakup of empires - including the former Soviet Union -, the empirical evidence on the size of capital cities in dictatorships (Ades

³⁴An interesting analysis of the expansion of empires has been provided by Findlay (1996). A more recent study is Grossman and Mendoza (2004).

and Glaeser, 1995), and cross-country evidence on democracy and decentralization (Panizza, 1999) are consistent with this view of "centralizing Leviathans."

8 Borders and barriers: international openness and the size of nations

The relationship between international economic integration and the size of nations has been at the forefront of the recent literature on endogenous national borders. A survey of these topics, which also focuses on the implications for growth and development, is provided by Alesina, Spolaore and Wacziarg (2005), who build on previous work by Alesina and Spolaore (1997), Alesina, Spolaore and Wacziarg (2001), Spolaore (1995) and Spolaore and Wacziarg (2005). The topic is also covered in detail by Alesina and Spolaore (2003, especially chapters 6 and 10). Therefore in this section I will very briefly review some general points, while referring the reader to the survey and book chapters for analytical details and for discussions of the empirical and historical evidence.

This work suggests that economic integration and political disintegration tend to go hand in hand. The reason is that, as already mentioned, the benefits of a large domestic market go down as international economic integration increases. Conversely, the benefits of trade openness and economic integration are larger, the smaller the size of a country. This is confirmed by empirical evidence from cross-country regressions (Alesina, Spolaore and Wacziarg, 2001; Alcalá and Ciccone, 2003; Spolaore and Wacziarg, 2005), where measures of economic performance (income per capita, growth, productivity) depend positively on a country's size, positively on a country's openness (appropriately instrumented), but negatively on the interaction between size and openness, showing that the benefits from size are larger for less open countries, and the benefits from openness are bigger for smaller countries. As the world economy becomes more integrated, one of the benefits of large countries (the size of domestic markets) tends to vanish. Hence the trade-off between size and heterogeneity shifts in favor of smaller and more homogeneous countries. In the model presented by Alesina, Spolaore and Wacziarg (2003), this effect tends to be larger in more developed economies. By contrast, technological progress in a world of *high* barriers to trade should be associated with the formation of *larger* countries.

We can also think of the reverse source of causality. Small countries have a particularly strong interest in maintaining free trade, since so much of their economy depends upon international markets. When openness is endogenized, the analysis can be extended to capture two possible worlds: a world of large and relatively closed economies, and one of more numerous, smaller, more open economies. Spolaore (1995, 2004) provides models with endogenous openness and multiple equilibria in the number of countries. Spolaore and Wacziarg (2005) also treat openness as an explicitly endogenous variable, and show empirically that larger countries tend to be more closed to trade. In the real world both directions of causality between size of nations and international openness

are likely to coexist. *Coeteris paribus*, smaller countries tend to adopt more open trade policies, so that a world of small countries will be more open to trade.³⁵ Conversely, changes in the average degree of openness in the world should be expected to lead to more secessions and smaller countries.

These effects abstract from the role of factor mobility (labor and capital). Capital and labor mobility introduce potential competition among governments and may affect the size of nations through several channels. For example, in Friedman's (1977) analysis national borders are set by rent-maximizing Leviathans who want to prevent migration, and Friedman argues that trade, by increasing labor productivity, leads to larger countries so that the rulers can capture higher monopoly rents. By contrast, Wittman (2000) develops a model of efficient size of nations in which individuals can migrate across countries. Wittman does not model international trade explicitly, but allows for economies of scale in production, and argues that such economies would be zero under perfect free trade and perfect cross-country enforcement of property rights, but are positive when intracountry transaction costs are higher than intercountry transaction costs. Hence in Wittman's framework a reduction in the economies of scale in production - due, for example, to increasing economic integration - would lead to smaller, more numerous countries, consistently with the above mentioned results in Alesina and Spolaore (1997, 2003), Spolaore (1995), and Alesina, Spolaore and Wacziarg (2000, 2003). Analyzing trade and factor mobility in microfounded models with international trade, endogenous international barriers and endogenous borders represents an interesting and promising area for future research.

9 Conflict, defense, and the size of nations

Conflict, defense and security have historically been paramount in the determination and redrawing of national borders. Contributions to the formal literature of endogenous borders have explicitly modeled provision of defense by governments, international conflicts and wars, building on the formal literature on conflict and appropriation that we mentioned in Section 2. In particular, conflict and defense are at the center of the analysis in Alesina and Spolaore (2005a, 2005b) and Spolaore (2004), and are also modeled by Wittman (2000).

In these papers the size of nations is affected by the fact that a country's military power matters in the settlement of international disputes. Defense and national power are public goods, and, at least in principle, larger countries can provide better and cheaper security for their citizens.³⁶ In a more bellicose world, larger, more centralized countries may be at an advantage, while a reduction in international conflict reduces the incentives to form larger political

³⁵The effect might be partially or totally offset if a regime of international free trade also requires investments in some "international public good." Then smaller countries might have stronger incentives to free ride.

³⁶For a contrary view see Thomson (1974).

unions, and may lead to breakups and secessions.³⁷ For example, in Alesina and Spolaore (2005a), defense spending per capita in equilibrium is an inverse function of country size, and the number of nations in a world of Leviathans is given by

$$N^\delta = \sqrt{\frac{h\delta - pe}{2f}} \quad (27)$$

where p is the probability that force will be used in an international dispute, and e measures the stakes of the dispute.³⁸ In a world where conflict is more likely and/or matters more (higher p and/or e) there are fewer, larger countries. The larger is our measure of "democratic constraint" δ (i.e., the fraction of the population whose preferences must be taken into account by the Leviathan), the smaller is the impact of p on the size of nations. Vice versa, the less conflictual the world is (smaller p), the larger is the impact of democratization on the size of countries.³⁹ In other words, democratization and *reduction* in conflict both lead to a breakup of countries, and also mutually reinforce their respective effects.

However, a decrease in p , while reducing the incentives for citizens and rulers to form larger political units, might not reduce the total "mass" of conflict in the world. When borders are endogenous, a lower p , by leading to more political fragmentation, may indeed increase the number of observed conflicts in the world, because, even if the use of force is less likely in each specific international dispute, the formation of more numerous, smaller countries may increase the probability that some countries will enter into a confrontation. In other words, since a lower probability of having to use force in international relations increases the number of nations in equilibrium, it can be associated with an overall increase in the number of international interactions that are resolved through conflict and the use of national power. In particular, a reduction in global conflict between larger political units may lead to an increase in more localized conflict between smaller political units (Alesina and Spolaore, 2005a). By the same token, improvements in the enforcement of control rights by countries through a more effective rule of international law reduce the need for defense and force, and therefore may cause a breakup of nations, and lead to more rather than less conflict in equilibrium (Alesina and Spolaore, 2005b).

In general, economies of scale in defense and military exploitation, and other aspects of military technology have played a key role in the dynamics of national borders, in interaction with the other important variables identified in the literature, that is: heterogeneity and political costs, economies of scale in the provision of other public goods, democratization and internal organization of

³⁷For example, the expansion in the scale and costs of international wars has been emphasized by Tilly (1990) as the key force behind the consolidation of modern European national states and the decline of alternative political organizations (city-states, federations).

³⁸The parameter e in this model is related to Wittman (2000)'s parameter g (general military effectiveness), a variable that depends on both military technology and the spoils of war.

³⁹Formally, $\frac{\partial^2 \bar{P}^\delta}{\partial p \partial \delta} < 0$ where $\bar{P}^\delta = \frac{1}{N^\delta}$

governments, tax-and-transfers schemes and ability to provide side payments and compensations across regions, income inequality and redistribution policies, benefits from the extent of the market, and effects of increasing economic integration in goods and factors of production.⁴⁰ The study of the complex interrelations among all these variables and mechanisms, and the assessment of their relative weights in actual episodes of border redrawing, represent challenging and stimulating tasks for political economists who want to gain insights on the endogenous formation and breakup of nations.

⁴⁰For example, as analyzed in a vast economic and political literature, trade may affect conflict, and conflict may affect trade, and both interact with border redrawing. For a formal analysis of these issues, see Spolaore (2004).

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