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Political geography

FEDERICO ETRO
Catholic University of Milan and E.C.G.; E-mail: federico.etro@unicatt.it

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Abstract. I study a model of geopolitical organization endogenizing the size of nations, their public spending and their degree of openness. The optimal geography may not be a stable equilibrium and a bias toward too many countries tends to emerge. An exogenous increase in openness tends to reduce the size of countries but also to increase the size of their public sectors. When openness is endogenous there can be multiple equilibria, some with globalization backlash associated with large nations and small governments and others with smaller countries, bigger governments and high openness. However, stable equilibria may imply excessive globalization, too many countries and too much government spending.

1. Introduction

Three fundamental political and economic phenomena of the last century have been the raise of public spending, the break up of nations in smaller states or more decentralized countries and the increased integration of international markets. While the first phenomenon has probably achieved its peak and may now reverse, the processes of decentralization and globalization are still in their full momentum. This paper tries to provide a partial but consistent explanation for these phenomena.

The starting point of my research is the theoretical work of Alesina and Spolaore (1997, 2003, AS hence on), who have studied the endogenous creation of borders between nations following the pioneeristic work of Buchanan and Faith (1987). They introduce a trade-off between heterogeneity in preferences and scale economies in public good provision as the determinant of the political geography, deriving the optimal size of nations. Despite this optimal solution can be a stable equilibrium, AS emphasize a tendency toward political equilibria with too many small nations. A serious limit of the analysis by AS is that they keep public spending per nation as an exogenous and fixed variable, so that countries cannot choose the size of their public spending and are actually constrained to provide the same amount of public goods independently from their dimension (moreover, in their model taxes are unrelated with the size of public spending). Staal (2004) has recently extended their basic framework to public spending and taxation exogenously dependent on the size of the countries and substantially confirmed their results. Here, I endogenize

the size of public spending[1] and derive the optimal size of nations and of their public spending together.

Initially, I abstract from issues of globalization and show that the optimal geography may not be a stable equilibrium because it may imply too large countries from which citizens at the borders would prefer to escape. More exactly, a stable equilibrium geography implies suboptimal size of nations when public and private consumption are close substitutes, while it may imply overoptimal size of nations when they are imperfect substitutes; in this case average public spending is always below the optimal level. This suggests that the historical process of the XXth century toward nations of smaller size may be associated with the increased substitutability between private and public goods. Notice that publicly provided private goods (as education, health and social security) are closer substitutes with private goods and are characterized by less relevant scale economies in their production and by deeper heterogeneity of views in the preferences of citizens.

The next step is to bring into the picture the other crucial factor in the secular decline of the size of nations, the increase in openness (Alesina, Spolaore & Wacziarg, 2000). I show that an exogenous increase in the degree of openness tends to reduce the size of countries but also to increase the size of their public sector. Such a result is consistent with the empirical evidence of Rodrik (1998), who finds a clear correlation between openness and size of the public sector. Rodrik offers an explanation based on the greater need of open countries for a stabilizing role of the public sector. My explanation however, supports the empirical results of Alesina and Wacziarg (1998) who show that the crucial channel which drives the above correlation is the fact that more open countries are smaller and more homogeneous countries and hence they are more likely to agree on higher public good provision.

Finally, I show that, when the degree of openness or globalization is endogenous, multiple equilibria may emerge. These equilibria display a negative correlation between size of countries and both openness and the size of the public sector: there can be equilibria with globalization backlash associated with large nations, small governments and high protectionism and equilibria with smaller countries, bigger governments and high openness. Despite the latter kind of equilibrium tends to be Pareto superior, stable equilibria may be characterized by excessive globalization, too many countries and excessive public spending.

The paper is organized as follows. Section 2 introduces the model abstracting from the degree of globalization, derives the optimal organization of the world in terms of number of nations and size of their governments and studies equilibrium outcomes. Section 3 introduces globalization and endogenizes the three factors: size of nations, size of governments and globalization. Section 4 concludes.

2. The Model

The analysis is based on a spatial model a' la Hotelling (1929). The map of the world is unidimensional and composed by a continuum of agents distributed on the uniform interval [0,1]. In the world there are many countries each one with a "capital city" set in the middle of the country (since this would be both optimal and an equilibrium outcome). In the capital, the government provides a public good whose size is endogenous: the utility provided by this public good depends on the location of citizens and decreases with the distance from the capital.[2]

Each citizen pays taxes in its own country and enjoys the benefits from public spending according to his or her distance from the public good. Utility for agent i in country j has the following functional form:

$$U_{ij} = u(c_j) + \alpha_{ij} H(g_j) \quad \alpha_{ij} = \lambda - a l_{ij} \tag{1}$$

where $H(\cdot)$ is the utility from public spending g_j in country j (I will use the less proper expression "public good" interchangeably) and $u(\cdot)$ is utility from private consumption, which is income net of effective taxation, while α_{ij} summarizes preference heterogeneity across citizens in a way discussed below. AS do not need to impose any assumption on the utility from public goods and on the necessary taxation of each agent to finance the latter: indeed these are two separate and exogenous parameters in their model. Since I am going to endogenize public spending, I need to be more precise. Many of the following results will hold within a general model with a well-behaved utility function, but to obtain closed form solutions, I will focus on linear utility from consumption and isoelastic utility from public spending.

Finally, I need to assume something on the technology of production of public goods and on the distortions induced by the corresponding individual tax t_j in country j. Ideally, one would like to assume some form of diminishing marginal returns in the production process and a distortion of taxes which is increasing and convex in the taxation level. In our simple context I am going to take a short cut and summarize both these elements with a convex cost function of taxation, and in particular a quadratic one. I have worked out the model in the case of a linear function obtaining the same qualitative results.[3] In conclusion, utility is the following:

$$U_{ij} = \frac{g_j^{1-\theta}}{1-\theta}(\lambda - a l_{ij}) + y_j - \frac{t_j^2}{2} \tag{2}$$

where the parameter $\theta \in [0, 1)$ represents the elasticity of marginal utility of public expenditure (the lower it is, the more substitutable are public and private consumption), l_{ij} is distance from the public good and the parameter a reflects the costs of heterogeneity. Finally, $\lambda > 0$ parametrizes the absolute

utility provided by the public good (for a citizen at distance zero from it).[4] In this section, the tax independent output $y_j = y$ is assumed constant across countries. Let us define the size of country j as s_j and the per capita provision of public goods as given by the revenue constraint:

$$t_j = \frac{g_j}{s_j}$$

Our focus will be on these two variables.

Our interpretation of the utility function deserves some more comments. I think of the substitutability between private and public goods (summarized by the parameter θ) in a very simple and, hopefully, intuitive way. If publicly provided goods belong to a wide range which starts with purely private goods (drugs or school's books) and arrives to purely public goods (defense), the former typology corresponds to goods with perfect substitutability with the private goods and the latter one with those that are less substitutable for the private goods.

Also the assumptions on the costs of heterogeneity which are linear in the distance from the public good require a remark. First of all, the same distance must be interpreted *latu sensu* and not literally, however it is typically recognized that regions far away from the capital of a country are the most likely to have at least different preferences from the regions close to the capital, and at most a separatist tendency (the experience of many European countries is quite clear in this direction). Such a correlation between geographical distance and preference distance is all what we need. Having said this, one may think that the costs of distance from the location of public expenditure are not necessarily linear in this distance. It is probably reasonable to suppose that they are convex in it and I will discuss what such a change implies later on.

2.1. *Optimal political geography*

Let us now examine the social planner solution, that is the optimal organization of the world. It is easy to prove that, because of the uniform distribution of citizens, a social planner would choose countries of equal size s and it would set the public good at the centre of each country. Moreover, it would choose the size of nations and the provision of national public goods so as to maximize:

$$W = \int_0^1 \left[\frac{g_j^{1-\theta}}{1-\theta}[\lambda - a l_{ij}] + y - \frac{t_j^2}{2} \right] di \quad \text{s.v.: } s t_j = g_j$$

or, after simple manipulations, it would solve the problem:[5]

$$\max_{g \geq 0,\ s \in [0,1]} \quad W = \frac{g^{1-\theta}}{1-\theta}\left(\lambda - \frac{a}{4}s\right) - \frac{1}{2}\left(\frac{g}{s}\right)^2 + y \tag{3}$$

If we apply the Alesina-Spolaore rule for the optimal size of nations as a function of public good provision, that is we maximize welfare with respect to s we obtain the first order condition:

$$W_s = -a\frac{g^{1-\theta}}{4(1-\theta)} + \frac{g^2}{s^3} = 0 \quad \Longleftrightarrow \quad s = g^{\frac{1+\theta}{3}}\sqrt[3]{\frac{4(1-\theta)}{a}} \tag{4}$$

The higher is the provision of the public good, the greater should be the optimal size of nations so as to properly exploit the scale economies, while the higher are heterogeneity costs, the smaller countries should be. Finally, the absolute utility from the public good does not affect the optimal size for a given amount of public good. Summarizing, we have:

Proposition 1. The optimal size of nations is an increasing and concave function of the provision of public goods.

This optimality condition gives us a first relationship between optimal size of countries and the optimal per capita provision of public goods:

$$t^* = s^{\frac{2-\theta}{1+\theta}}\left(\frac{a}{4(1-\theta)}\right)^{\frac{1}{1+\theta}} \equiv \psi^*(s) \tag{5}$$

which is an increasing function of s as shown in Figure 1. Notice that this relationship suggests a positive correlation between size of countries and their public spending per capita. Alesina and Wacziarg (1998) have shown a robust empirical negative correlation between these two variables, hence the simple AS model does not provide a consistent view of this phenomenon.

On the other side, a modified Samuelson rule for optimal public good provision (after Samuelson, 1955) gives us a function of the size of a country

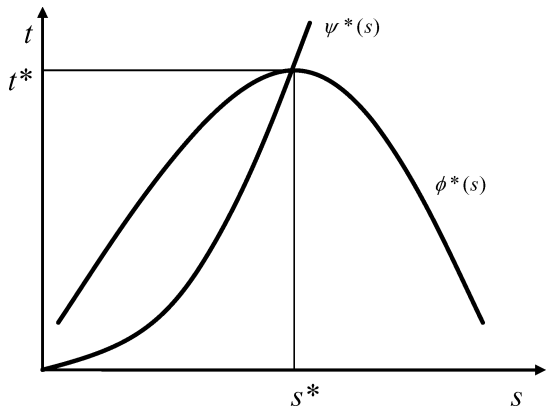

Figure 1. Optimal political geography.

satisfying the first order condition:

$$W_g = g^{-\theta}\left(\lambda - \frac{a}{4}s\right) - \frac{g}{s^2} = 0 \quad \Longleftrightarrow \quad g = s^{\frac{2}{1+\theta}}\left(\lambda - \frac{a}{4}s\right)^{\frac{1}{1+\theta}} \tag{6}$$

which has a non monotomic shape with a peak at $8\lambda/3a$:

Proposition 2. The optimal provision of public goods is an inverted U function of the size of a nation.

This can be rewritten as a second relationship between optimal size of countries and the optimal per capita provision of public goods:

$$t^* = s^{\frac{1-\theta}{1+\theta}}\left(\lambda - \frac{a}{4}s\right)^{\frac{1}{1+\theta}} \equiv \phi^*(s) \tag{7}$$

which is also shown in Figure 1. As expected, this is decreasing in the costs of heterogeneity a: less public spending and hence less taxation are better if the costs of benefiting from the public spending are higher. More importantly, the optimal per capita provision of public spending is first increasing in the size of countries and then decreasing, with a peak at $(4\lambda/a)(\frac{1-\theta}{2-\theta})$. The intuition is simple. There is a trade off between heterogeneity costs and benefits from scale economies, and both increase in the size of a country. The net benefit from public goods provision is maximized at an intermediate size and the higher are the costs of heterogeneity, the smaller are both the size at which maximum spending is achieved and the same maximum spending. Summarizing, the optimal per capita provision of public goods is a non-monotonic function of the size of a nation: small and large countries should have lower taxes and countries of intermediate size should have higher taxes.

In the real world, the nature of this non-monotonic relationship is also affected by the nature of the public good. If this is a pure public good, scale economies are quite relevant and the negative relationship between taxes and size should be more important, but if the good has private features – as in the case of schools and hospitals – scale economies may be less important and the positive relationship should be more relevant.

The full optimal solution is obtained by solving the system of the two Equations (5)–(7). To make the problem interesting, from now on we will assume $a \geq 4\lambda$ which will guarantee the optimality of at least two countries. Notice that the second order conditions are satisfied.[6]

Solving the system of optimality conditions we obtain:

$$s^* = \frac{4\lambda}{a}\left(\frac{1-\theta}{2-\theta}\right) \tag{8}$$

$$t^* = \left[\frac{4(1-\theta)}{a}\right]^{\frac{1-\theta}{1+\theta}}\left(\frac{\lambda}{2-\theta}\right)^{\frac{2-\theta}{1+\theta}} \tag{9}$$

In general, the optimal world is composed by $N^* = \frac{a}{4\lambda}(\frac{2-\theta}{1-\theta})$ countries, each one with a total provision of the public good:

$$g^* = \left[\frac{4(1-\theta)}{a}\right]^{\frac{2}{1+\theta}} \left(\frac{\lambda}{2-\theta}\right)^{\frac{3}{1+\theta}}$$

and we can summarize our findings in:

Proposition 3. (Optimal Political Geography). The optimal size of nations and both total and average public spending are decreasing in the costs of heterogeneity and increasing in the absolute utility from the public good.

These intuitive results are in contrast with the basic AS model where an increase in the costs of heterogeneity was reducing the equilibrium size of countries but also increasing per capita public spending – see (4). Finally, we can notice that the optimal number of nations maximizes per capita provision of public goods and it is also increasing in the elasticity of marginal utility of public expenditure θ: the less substitutable are the public and the private goods (the higher θ) the higher is the optimal number of countries – and so it is optimal to have more separate public goods. Finally, world welfare is:

$$W^* = \left[\frac{4(1-\theta)}{a}\right]^{\frac{2(1-\theta)}{1+\theta}} \left(\frac{\lambda}{2-\theta}\right)^{\frac{2(2-\theta)}{1+\theta}} \frac{1+\theta}{2(1-\theta)} + y$$

2.2. *Equilibrium geography*

We now switch to a decentralized world where public spending is chosen by majority voting in each country and agents at a border between a country and another can choose whether to live in one of them or in autarchy (that is without a public good). In equilibrium we require that no one wants to move from a country to another or to move to autarchy.[7] It is easy to verify that such an equilibrium must be symmetric, that is with countries of equal size.

In a country of size s, the favourite public expenditure by citizen i is:

$$\hat{g}_i = \arg\max \left\{ \frac{g^{1-\theta}}{1-\theta}[\lambda - a l_i] + y - \frac{(g/s)^2}{2} \right\} = [\lambda - a l_i]^{\frac{1}{1+\theta}} s^{\frac{2}{1+\theta}} \quad (10)$$

which is clearly a decreasing function of the distance from the capital. Since single peakedness holds,[8] the median voter theorem implies the expenditure preferred by the median citizen, that is the citizen at distance $l_m = s/4$ from the centre:

$$\hat{g}_m = \left[\lambda s^2 - \frac{a}{4} s^3\right]^{\frac{1}{1+\theta}}$$

which is the same as the optimal one for any country size, since the median citizen is the same as the average in each country. This result is due to the uniform distribution of preferences and to the linear costs in the distance from the public good. Under these special circumstances, the equilibrium political geography can perfectly replicate the optimal geography.[9] However, any equilibrium size of countries different from the optimal one must be associated with sub-optimal average public spending: indeed, as we have just shown, the optimal size of countries maximizes $\hat{g}_m$.

Notice that if each country can implement a system of redistribution from the centre to the periphery which compensates distant citizens maximizing average utility, the emergence of the first best outcome is the natural result. Unfortunately, under majority voting on taxes and transfers, any redistribution scheme like this is time-inconsistent, as AS (1997) have shown, and only a credible commitment to it can enforce it.

Anyway, the optimal geography may not be robust to voting on borders and break-ups of countries or may simply be unstable. Stability is probably the most important feature of equilibria, hence, to pin down the set of admissible equilibria, I will impose a new stability requirement. The crucial question will be whether the optimal solution derived earlier belongs to the set of stable equilibria.

First of all, notice that the expected utility for a citizen at distance l from the public good in a country of size s is:

$$\begin{aligned} V(l) &= \frac{\hat{g}_m^{1-\theta}}{1-\theta}[\lambda - al] + y - \frac{1}{2}\left(\frac{\hat{g}_m}{s}\right)^2 \\ &= \left(\frac{\lambda - al}{1-\theta}\right)\left(\lambda s^2 - \frac{a}{4}s^3\right)^{\frac{1-\theta}{1+\theta}} + y - \frac{1}{2s^2}\left(\lambda s^2 - \frac{a}{4}s^3\right)^{\frac{2}{1+\theta}} \end{aligned}$$

from which we have:

$$V(l) = \left(\lambda s^2 - \frac{a}{4}s^3\right)^{\frac{1-\theta}{1+\theta}}\left[\frac{\lambda(1+\theta) - 2al}{2(1-\theta)} + \frac{a}{8}s\right] + y \qquad (11)$$

which is an inverted-U curve in the size of the country s. This function of s has a unique peak which is decreasing in l. For a citizen at the border of a country of size s, that is at distance $s/2$ from the centre, utility is:

$$V(s/2) = \left(\frac{\lambda(1+\theta) - as(3+\theta)/4}{2(1-\theta)}\right)\left(\lambda s^2 - \frac{a}{4}s^3\right)^{\frac{1-\theta}{1+\theta}} + y \qquad (12)$$

A stable equilibrium requires that these agents are at least as well as under anarchy, that is $V(s/2) \geq y$, which implies $s \leq \bar{s}(\theta) \equiv (4\lambda/a)(1+\theta)/(3+\theta)$.[10] Moreover, in a stable equilibrium, when a shock creates two countries of

different sizes sharing a border, the citizens at the border of the bigger country must prefer to migrate toward the smaller one, so as to re-equilibrate the symmetric outcome. In other words, we require that utility is decreasing in size for the borderline citizens: $V_s(s/2) \leq 0$. Some tedious algebra delivers the final set of stable equilibria:

$$s \in [\underline{s}(\theta), \bar{s}(\theta)] \tag{13}$$

where $\underline{s}(\theta) \equiv 4\lambda(3 - \theta^2 - \sqrt{3 + \theta + \theta^2 - \theta^3})/a(6 - \theta - \theta^2)$.

In other words, countries cannot be too small or too large in a stable equilibrium. It can be verified that the lower limit to the equilibrium size is below or equal to the optimal size, while the upper limit is increasing in θ and below (above) the optimal size if $\theta < (>)1/3$. For instance, if $\theta = 0$ we have $s^* = 2\lambda/a$ and $s \in [s^*(1 - 1/\sqrt{3}), (2/3)s^*]$, which implies that any stable equilibrium is characterized by suboptimal size of nations (as in AS). This is always true for any $\theta \in [0, 1/3)$ since in this case the upper bound on the equilibrium size of nations is always below the optimal size. The suboptimal size of nations is associated with suboptimal spending (both in total and average terms). However, for higher enough θ the optimal geography can be a stable equilibrium. Moreover, for $\theta > 1/3$ there is the possibility of overoptimal size of nations associated with overoptimal total government spending (the average level is always suboptimal): indeed, when $\theta \to 1$ we have $s^* \to 0$, but a stable equilibrium belongs to the set $s \in [0, 2\lambda/a]$. Summarizing, we have:

Proposition 4 (Equilibrium Political Geography). The stable size of nations is suboptimal when private and public spending are close substitutes and it may be over-optimal when they are imperfect substitutes; the equilibrium average public spending is always (weakly) suboptimal.

2.3. *Discussion*

The characterization of stable equilibrium geography provides interesting comparisons between different geopolitical situations.[11] First of all, notice that a main message of the previous analysis was that the endogenous size of nations and governments is always suboptimal when private and public spending are close substitutes, but it may be overoptimal when they are imperfect substitutes. In this perspective, the historical outcome of the last century characterized by an unprecedented high number of nations (witnessed by AS, 2003) may be seen partly as a consequence of the increased substitutability between private and public goods. One may view publicly provided private goods as close substitutes with private goods, while pure public goods are less substitutable with private goods. It is a well known fact that the diffusion of Communism around the world since the first half of the XXth century and the

diffusion of the Welfare State in Western countries in the second half of the XXth century have extended government activity toward publicly provided private goods as education, health and social security. Since scale economies are much less powerful and heterogeneity of views is more acute for these kinds of activities than for the traditional public goods, our model suggests that we may be experiencing excessive proliferation of small independent countries in part because of this switch of focus in government activities.

Let us now look at further limitations on the set of geographical equilibria. These limitations could be obtained by putting more structure on the political way borders are changed. For instance, AS assume that a majority of all countries interested by a reshape of the borders has to accept this change foreseeing the new associated political geography after the change. It turns out that the associated equilibrium is unique and maximizes the utility of the border line citizens. In our context this would correspond to the lower bound of the set of stable equilibria: hence the AS conclusion that equilibrium size is smaller than optimal always holds. An alternative reasonable assumption is that the size of a country can be reduced through a secession of borderline citizens only if a majority agrees, but that the capital of the country remains where it was. Such a system avoids the shift of capitals in all the countries associated with the AS system and hence it may appear more reasonable (at least in certain historical periods). It implies convergence toward the optimal size of countries for any $\theta > 1/3$ and the maximum stable and suboptimal size otherwise. Hence, in this case the AS presumption in favour of suboptimal size of nations is (weakly) confirmed.

The previous results seem to suggest that the AS claim concerning the suboptimal size of nations is quite robust. Deep down, nevertheless, they point out a possible source of failure for the AS result: whenever citizens closer to the centre have more power than others in determining government policy on public spending, excessive spending and excessive size of countries can emerge.[12] One case where this happens is when central governments are not democratic and extract rents from the taxation of their citizens. In Etro (2003) I have shown an example and derived different cases where the equilibrium size of countries (and taxes) can be above the optimal level. An excessive size of countries may emerge even in a democratic context as the one studied here depending on the relationship between preferences and distance from the centre: in this sense the assumption of linear costs of distance is quite crucial. For instance, in a version of the model with convex costs of heterogeneity in the distance from the public good, the cost of distance for the median citizen is lower than the average cost (while they are equal with linear costs of heterogeneity). Hence, the AS result of suboptimal size of nations may break up because the median citizen of each country votes for a bigger size government than the one desired by the average citizen and opposes to secessions which would limit the scale economies of its own country. Under

these circumstances it may be optimal to coordinate the design of borders so as to limit the centralization bias:[13] this can be done by choosing a size of countries above the first best level.

The model could be extended with spillovers between public good provision in different countries and allowing countries to join in fiscal unions, as in Alesina, Angeloni and Etro (2005). This would allow to study the relationship between size of nations and size of unions.[14] Recent history has been characterized, especially in Europe, by the co-existence of centrifugal forces within nations (pressure towards regional autonomy in most Western European countries and the break-up of some Eastern European nations) and centripetal forces at a supranational level (the tendency to delegate policies to supernational entities like the European Union). In Etro (2003) I have augmented the model with externalities from foreign public spending (assuming that the subutility from public goods is $H(g_j+\beta\bar{g}_{-j})$ where $\bar{g}_{-j}$ is average provision in the other countries and β parametrizes the spillovers), showing that increases in the benefits from participating in international unions to internalize those externalities reduce the equilibrium size of nations.[15] Separatism within nations and delegation of policies to supernational entities can be seen as complementary parts of the same process.[16] If we look at globalization as a determinant of political geography, it is not surprising that globalization delivers break-up of nations and enlargement of international unions. In the next section, however, we look at a different source of globalization, that is market integration, which creates spillovers between productions of different countries.

3. Globalization

I will now investigate the consequences of globalization on the size of nations and governments assuming that some externalities can be obtained from foreign countries if a country is open, but their importance is reduced when a country is already large, as many models of endogenous growth for open and trading economies (Rivera-Batiz & Romer, 1990; Grossman & Helpman, 1991; Etro, 2005) suggest. Building on these models, Alesina and Spolaore (2003) provide a microfoundation for the same functional form I adopt here. In particular, output of country j is increasing in its size, s_j, and in the the size of the rest of the world, which is $1-s_j$, in proportion to its degree of openness $\varphi_j \in [0, 1]$. Assuming a linear realtionship, we have:

$$y_j = hs_j + h\varphi_j(1-s_j) - f(\varphi_j) \tag{14}$$

where $h > 0$ parameterizes the relevance of the scale effects, that is the importance of size for economic performance[17] and the function $f(\varphi)$, with $f(0) = 0$, $f'(\varphi) > 0$, $f''(\varphi) > 0$ represents the costs of openness, or of

reduction of trade barriers, which are assumed increasing and convex in the degree of openness. This assumption can be motivated in different ways. First of all, lowering barriers to trade can entail administrative and political costs, organizational and infrastructural investments, adjustment costs for firms and consumers, and even cultural costs of adaptation (in part witnessed by the activity of many "no-global" organizations). Moreover, there are some theoretical arguments which can motivate increasing costs of openness: a standard terms of trade argument suggests that the optimal trade policy for large countries requires some level of protectionism, and hence that there are gross costs from increasing the degree of openness,[18] and there are even uncertainty costs due to openness.[19]

Notice that I am taking a short cut by assuming that what determines the openness of country j is just the choice φ_j made by the same country j. Clearly, in the real world also the choices of all the other countries affect the effective openness of country j. This complication would imply an interdependence between countries leading to well known a bias toward excessive protectionism due to lack of coordination. Such a limitation should be kept in mind in the evaluation of the future results.

For simplicity let us focus on the case in which $\lambda = 1$ and $\theta = 0$. The utility of agent i in country j becomes:

$$U_{ij} = g_j(1 - al_{ij}) + hs_j + h\varphi_j(1 - s_j) - f(\varphi_j) - \frac{t_j^2}{2}$$

which clearly corresponds to the case of the previous section when $\varphi_j = 1$, that is under complete globalization.

First, let us reconsider the optimal political geography for a given and common degree of openness. World welfare is:

$$W = g\left(1 - \frac{as}{4}\right) + h[\varphi + s(1 - \varphi)] - f(\varphi) - \frac{1}{2}\left(\frac{g}{s}\right)^2$$

The AS rule for the optimal size of countries becomes:

$$-\frac{ag}{4} + \frac{g^2}{s^3} + h(1 - \varphi) = 0 \tag{15}$$

As Alesina, Spolaore and Wacziarg (2000) have emphasized, this implies that the higher is the degree of openness the smaller is the optimal size of countries.[20] Inverting this rule and solving for the per capita public spending we obtain the relevant root:

$$t^* = \frac{s^2}{2}\left(\frac{a}{4} + \sqrt{\left(\frac{a}{4}\right)^2 - \frac{4h(1 - \varphi)}{s^{*3}}}\right) \equiv \psi^*(s, \varphi)$$

under the regularity condition that h is small enough. This function is increasing in the size of countries ($\psi_s^*(s, \varphi) > 0$) and in the degree of openness ($\psi_\varphi^*(s, \varphi) > 0$). Notice also that $\psi^*(0, \varphi) = 0$ for any φ and $\psi_{ss}^*(s, \varphi) > 0$ under weak conditions. The Samuelson rule for the optimal provision of public goods gives us:

$$g^* = s^2\left(1 - \frac{a}{4}s\right) \tag{16}$$

from which the per capita version:

$$t^* = s\left(1 - \frac{a}{4}s\right) \equiv \phi^*(s)$$

which is independent from the degree of openness.

Let us represent the degree of globalization with the parameter φ. Figure 2 clearly shows that *globalization reduces the optimal size of nations* $s^*(\varphi)$. Moreover one can show that the curve $\psi^*(s, \varphi)$ always crosses the curve $\phi^*(s)$ after its peak,[21] hence it follows:

Proposition 5. Globalization reduces the optimal size of nations and increases the optimal size of average public spending.

This result has a crucial intuition: when market integration increases for some exogenous reason, it becomes optimal to reduce the size of countries so as to decrease heterogeneity within each country while enjoying spillovers from the rest of the world. Such a process is associated with a greater willingness to increase per capita public spending because more homogeneous

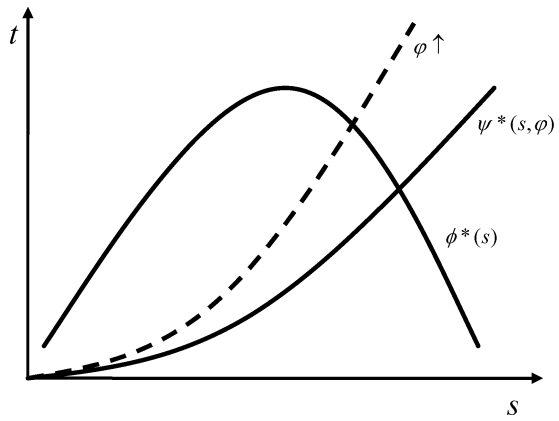

Figure 2. The effect of globalization.

countries gain more from their public good provision.[22] Such a conclusion provides an alternative explanation for the empirical finding of Rodrik (1998) who links the correlation between openness and public spending with a greater need for risk sharing and stabilizing activities. Our explanation supports the view of Alesina and Waicziarg (1998) that the crucial channel to explain that correlation is the size of countries: more open countries have larger governments because they are smaller and hence more homogeneous.

3.1. *Optimal political geography and openness*

Imagine now that the degree of openness is also optimally chosen. Applying the envelope theorem we can focus on the direct effects on output. The optimality condition implies:

$$h(1-s) = f'(\varphi) \tag{17}$$

Since $d\varphi/ds = -h/f'' < 0$, this shows:

Proposition 6. The optimal degree of openness is decreasing in the size of nations.

In general there is a negative relationship which goes from size to openness which is in line with standard results in the normative theory of trade policy: some level of protectionism is always optimal for large countries.

Together, the optimality conditions (15), (16) and (17) determine the optimal geography, including the optimal size of nations, the optimal public spending and the optimal degree of globalization (it is easy to verify that the second order conditions hold again). The first two are decreasing in the costs of heterogeneity, while the optimal level of globalization is increasing in the costs of heterogeneity. In general, an increase in the scale effects has ambiguous effects, but neater results can be obtained within special cases.

As an example, let us consider the case in which $f(\varphi) = h\varphi^2/2$ (and we need the regularity condition $h \leq 1/8$ to avoid degenerate results). This implies the optimal degree of openness $\varphi = 1 - s$ for each given size of countries s. Putting together the three optimality conditions one obtains the optimal size:

$$s^* = \frac{3}{a} - \frac{\sqrt{1-8h}}{a} \tag{18}$$

the optimal per capita public spending:

$$t^* = \frac{1+\sqrt{1-8h}}{2a} + \frac{2h}{a} \tag{19}$$

and the optimal globalization:

$$\varphi^* = \frac{a - 3 + \sqrt{1 - 8h}}{a} \tag{20}$$

Notice that the optimal size of countries is increasing in h, while the optimal public spending and the optimal degree of globalization are decreasing in the size of the scale effects. Hence, in this particular example, a reduction in the importance of the scale effects for economic performance has the consequence of decreasing the optimal size of countries, increasing the optimal level of average public spending and increasing the optimal level of openness. Clearly, for $h \to 0$ the optimal geography converges to the one we obtained in the previous section where openness did not play a role.

3.2. *Equilibrium geography and openness*

Let us switch to an equilibrium analysis. The natural assumption is that first borders are chosen and countries are created, then each country votes on its provision of public goods, and finally each country votes on the degree of openness. This sequential structure depicts the fact that borders are the most difficult variable to change, while the degree of openness is the simplest to intervene on. Under this assumption, a given country j of size s and spending g will choose its own level of openness. The utility of the citizen at distance l from the centre is:

$$V(l) = g[1 - al] - \frac{1}{2}\left(\frac{g}{s}\right)^2 + hs + h\varphi_j(1 - s) - f(\varphi_j)$$

hence every citizen will agree on the optimal degree of openness which satisfies:

$$h(1 - s) = f'(\varphi_j) \tag{21}$$

exactly as under optimality. Again, this matches a well known principle of trade theory: *small economies prefer to be open, while large economies prefer to be close*. Formally, (21) defines a negative relation between openness and size of a country. In the space $(s, \varphi) : [0, 1] \times [0, 1]$ it depicts a decreasing curve, but its shape depends on the third derivative of the $f(\cdot)$ function, on which there are no economic conjectures to be made, hence it could be either concave, convex or alternate concave and convex parts.

I will now focus on symmetric equilibria where all countries are of equal size and choose the same degree of openness. A symmetric equilibrium must be characterized by a size of countries and a level of public spending chosen

by majority voting as functions of the expected degree of openness, and by a subsequent choice of openness for each country such that the expectations are fulfilled. In other words, the size of nations and their public spending are chosen in function of an expected degree of globalization, but the choice of globalization must ex post confirm this expectation.

First, I will show that multiple equilibria may emerge under rational expectations. Notice that the choice on public spending, under majority voting for a country of any size, is again the optimal one. Then, imagine that countries can also implement redistribution schemes so as to replicate the optimal size of nations as a function of the expected degree of openness. One can use the AS and Samuelson rules (15) and (16), which are now equilibrium conditions as well, and solve $\psi^*(s, \varphi) = \phi^*(s)$ for the optimal size of countries s as a function of the degree of globalization φ. Inverting this relationship, one obtains:

$$\varphi = 1 - \frac{3as^2}{4h} + \frac{s}{h} + \frac{a^2 s^3}{8h} \tag{22}$$

which in the space $(s, \varphi) : [0, 1] \times [0, 1]$ is a U-curve, and in particular it is decreasing for intermediate sizes of countries.

Under rational expectations the two equilibrium conditions (21) and (22) must be consistent. In other words any crossing of the two corresponding relations in the space (s, φ) represents an equilibrium. The global optimum is always one equilibrium, but there may be other equilibria since both equilibrium relationships are downward sloping at least in a part of the space (s, φ).[23]

To make sure that multiple equilibria are a concrete possibility, let us just consider the example with $f(\varphi) = h\varphi^2/2$. In this case $f(\cdot)$ is characterized by a zero third derivative and the relation (21) becomes linear:

$$\varphi = 1 - s \tag{23}$$

This linear relation is shown in Figure 3 together with the relation (22), which is however independent from our functional assumption on the costs of openness. In this case there are two rational expectations equilibria, one of which coincides with the optimal geography (s^*, φ^*): in this one, the size of countries and public spending are optimally chosen under the expectation of a high degree of openness and, ex post, this same degree is optimally chosen by each country.

In the other equilibrium $(\tilde{s}, \tilde{\varphi})$, the size of countries and public spending are still optimally chosen, but under the expectation of a lower degree of openness and, ex post, the same lower degree of openness is optimally chosen. However, this equilibrium corresponds to a local minimum for the average utility and it

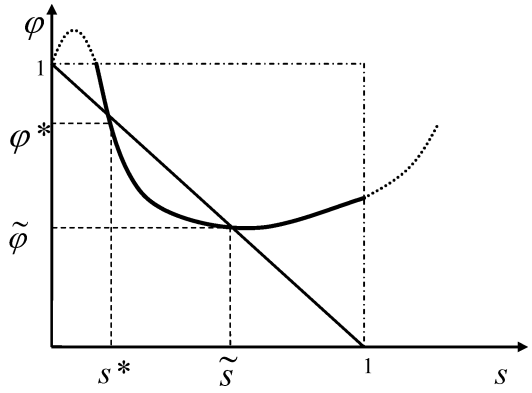

Figure 3. Equilibrium Geography and Globalization.

is characterized by too few countries with size:

$$\tilde{s} = \frac{3 + \sqrt{1 - 8h}}{a} > s^*$$

too small governments with average spending:

$$\tilde{t} = \frac{1 + 4h - \sqrt{1 - 8h}}{2a} < t^*$$

and too little openness:

$$\tilde{\varphi} = 1 - \frac{3 + \sqrt{1 - 8h}}{a} < \varphi^*$$

In this case the two equilibria are Pareto rankable and we have a problem of coordination failure. With a more complex $f(\cdot)$ function, one could easily derive more equilibria. Moreover, since both the equilibrium relationships must be negatively sloped, any set of equilibria is always characterized by a negative correlation between openness and size of nations and between public spending and openness. Even if a more general analysis is beyond our scope, the same possibility of multiple equilibria of this kind is an interesting outcome in itself, which we summarize in:

Proposition 7. There can be multiple equilibria with endogenous openness, some with globalization backlash associated with large nations, small governments and high protectionism and others with smaller nations, bigger governments and lower protectionism.

The possibility of multiple equilibria where periods of globalization are associated with smaller countries and larger governments (like in the current age) broadly matches the historical experience (see Etro, 2003) and could be analyzed in future empirical research.

If we depart from the possibility of implementing optimal redistribution schemes, things become more complex. As in the previous section we can focus on the conditions for stability, to verify whether the optimal geography can satisfy these conditions. As the model without globalization (and $\theta = 0$) suggested, we may expect the optimal geography not to belong to the set of stable equilibria because it implies too large countries. But surprising results could arise from the public spending side. Indeed, as we have seen analyzing the social planner solution, when openness was exogenous, a decrease in the size of countries below the optimal level (due to more openness) is associated with an increase in homogeneity and hence in public spending: this suggests that we may face stable equilibria with too many countries and excessive spending associated to excessive globalization.

Let us focus once more on the example with $f(\varphi) = h\varphi^2/2$. Given the foreseen degree of openness adopted in a country $\varphi = 1 - s$, and the level of public spending chosen by majority voting in the same country $\hat{g}_m = s^2(1 - as/4)$, the indirect utility of an agent at distance l from the center of such a country is:

$$\begin{aligned} V(l) &= \hat{g}_m(1 - al) + hs + h\varphi(1 - s) - \frac{h\varphi^2}{2} - \frac{1}{2}\left(\frac{\hat{g}_m}{s}\right)^2 \\ &= s^2\left(1 - \frac{a}{4}s\right)(1 - al) + \frac{s^2}{2}\left[h - \left(1 - \frac{a}{4}s\right)^2\right] + \frac{h}{2} \end{aligned} \tag{24}$$

which boils down to (11) for $h \to 0$. The stability analysis is similar to the one under exogenous globalization, and it provides the stable set:

$$s \in \left[\frac{2}{a}\left(1 - \sqrt{\frac{1 - 2h}{3}}\right); \frac{4}{3a}(2 - \sqrt{1 - 3h})\right]$$

which corresponds to the one previously derived (with $\theta = 0$) for $h \to 0$. In this case and, by continuity for h small enough, that is when scale effects in trade are not that relevant, the optimal geography is not a stable equilibrium and any equilibrium must be characterized by suboptimal size of nations and governments and by excessive openness. However, notice that the set of stable sizes of countries shifts toward larger sizes when h increases. Hence, when scale effects are relevant and openness is costly, that is for h large enough, there are stable equilibria characterized by suboptimal size of nations and excessive openness, but also by excessive average public spending.[24]

More in general, especially when the substitutability between public and private spending is lower (θ is higher), we can have stable equilibria with suboptimal size of nations associated with excessive public spending (above the optimal level) and too much openness. This is always the case when the optimal geography is a stable equilibrium as well. Under these conditions a new possible case for excessive public spending is associated with excessive globalization.

Further research may try to generalize these results, study more realistic and precise procedures for the definitions of borders and focus on a dynamic perspective on the globalization process.[25]

4. Conclusion

We have studied optimal and equilibrium political geography in a simple model where size of countries, public spending by their governments and globalization are endogenous. The optimal geography may not be a stable equilibrium and the Alesina-Spolaore bias toward too many nations tends to be confirmed in some cases but not in others. More importantly, multiple equilibria can emerge with globalization backlash associated with large nations with low public spending and high protectionism and equilibria with smaller countries, higher public spending and high openness which are also Pareto superior.

The analysis can be extended to a dynamic set up microfounding the intertemporal links leading to break up of nations and change of policies and introducing geopolitical risk to study how this affects the equilibrium geography (think of the impact of terrorism on political geography).

Our model can also be used to study the political organization of a federal country rather than the whole world. In this terms, it should be exploited interpreting the degree of openness as a degree of market integration within the country, which is likely to be homogenous but possibly changing over time. From a normative point of view, our model suggests that optimal decentralization would require an increasing number of local districts and an increasing level of average spending in public goods associated with the process of market integration. Nevertheless, the positive analysis suggests also that wild decentralization may create excessively small local districts and that local governments would provide inefficient amounts of local public goods. One could augment this analysis considering a national public good and alternative institutional rules.

Finally, it would be interesting to integrate the theory of political geography and the theory of economic geography. On the latter, recent important progress has been made by the pathbreaking contribution of Krugman (1991) who has been able to describe phenomena of industrial and urban location, regional specialization and international trade (see also Fujita, Krugman & Venables,

1999). Spatial heterogeneity, density population and scale economies are crucial there as here, but the interdependence between political and economic choices and political and economic geography still remains to be studied.

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Notes

1. Alesina, Angeloni and Etro (2005) and Etro (2002a, 2004) adopt a similar approach to study international unions. For surveys on this literature also with reference to the size of nations and fiscal federalism issues see Pouget (2004a), Ruta (2005) and Lockwood (2005).
2. For related models of political geography see also Staal (2004), Stegarescu (2004), Hartsad (2005) and Haimanko, Le Breton and Weber (2005).
3. AS do not need to make any assumption on this point because their utility from the exogenous public spending is a given parameter and the cost of production and tax distortions is another unrelated and exogenous parameter.
4. Notice that the model by AS (2003) is also different because their costs of heterogeneity are separate from the absolute utility derived from public spending. That assumption would avoid any heterogenity in preferences for public spending, which is clearly an essential element in our model.
5. Clearly, the optimal number of countries N^* should be the smallest integer above $1/s^*$, where s^* solves the social planner problem. However, for simplicity, I will refer to s^* as the optimal size of countries and $N^* = 1/s^*$ through all the paper.
6. Indeed:
$$W_{ss} = -3g^2/s^4 < 0,$$
$$W_{gg} = -\theta g^{-\theta-1}(\lambda - as/4) - 1/s^2 < 0$$
and
$$W_{ss}W_{gg} - W_{gs}^2 = \frac{g^2}{s^6}(1+\theta)(2-\theta) > 0$$
7. Notice that in case autarchy is attractive for borderline citizens, it is even better for these citizens to create a separate country. Hence, the equilibrium condition amounts to exclude separatism at the borders of a country.
8. To verify this notice that the distribution of preferences is uniform and symmetric on the right and on the left of the centre. Hence, there are two median citizens with identical preferences, one on the right and one on the left of the centre.

9. In general, however, also the equilibrium implies an inverted U relation between size of countries and public spending. I provided preliminary empirical evidence on in this in Etro (2003), where I used data on US counties of the United States.
10. Notice that this constraint is not explicitly taken in consideration by AS where the exogenous amount of public spending requires a fixed and exogenous investment: implicitly they assume that parameters are such that anarchy is never attractive.
11. However one should keep in mind that a dynamic analysis requires a full consideration of factors which affect equilibria. For instance, in the next section I will study how equilibria change when an exogenous degree of openness changes. This allows to derive results on the correlation between size of nations and public spending due to changes in the degree of openness, while such an analysis cannot be done in the current framework. I am grateful to a referee for clarifying this point.
12. A related centralization bias emerging in international unions of countries is pointed out by Alesina, Angeloni and Etro (2005) and discussed further in AS (2003).
13. One may view a similar task in the geographical organization of ex-colonies in states, provinces and counties. Where history matters less, efficiency reasons are more likely to shape the size of countries and districts within countries. This appears to be the case in US.
14. Recent developments in the related political economy literature are by Wrede (2004), Pouget (2004b), Dur and Roelfsema (2005), Kothenburger (2005), Loeper (2005), Chiang and Mahmud (2005), Kessler, Lulfesmann and Myers (2005) and Lorz and Willmann (2005).
15. Formally, under our isoelastic specification, the increases in β do not affect the optimal size of countries (while increase their optimal spending), but decrease the equilibrium size in absence of coordination.
16. Related discussions from a political science point of view with particular reference to the European Union are in Rector (2002), Tabellini (2004), Desai (2005), Subacchi (2005) and Ward (2005).
17. Whether this has been increasing or decreasing with the process of market integration is an interesting empirical question. Our specification reasonably implies that closed countries will gain relatively more from large sizes and open countries from smaller ones: $\partial^2 y_j / \partial s_j \partial \varphi_j < 0$.
18. In particular, following the theory of endogenous growth for open economies, we have associated the gains from openess with the size of the rest of the world, with whom a country is trading. Transport costs and tariffs reduce imports of foreign goods in a natural way. Nevertheless, as well known from the trade literature, the optimal tariff is positive because it affects the terms of trade or shifts profits toward domestic firms (and export subsidies are always positive for profit shifting reasons; see Etro, 2002b). Translating this in our stylized model, this means that there are costs of openness which imply the optimality of less than maximum openness.
19. Moreover, an increase in openness generates gains from somebody and losses for others but it does so with a considerable amount of uncertainty on who is the winner and who is the loser: as well known, under risk aversion, such a situation can induce expected losses from openness even if the average citizen gains from it.
20. For an excellent related empirical work see Stegarescu (2004).
21. This follows since $\psi^*(s, 1) > \psi^*(s, \varphi)$ for any $\varphi < 1$ but $\psi^*(s, 1)$ crosses the curve $\phi^*(s)$ at its peak.
22. Notice that average public spending goes up even if total spending in each country goes down. This also implies that total world public spending is increasing. I am thankful to a referee to clarify this point.

23. Notice that the multiplicity of equilibria can be limited imposing stability requirements of the AS kind or of a dynamic kind (see Etro, 2003).
24. This can be verified for $h = 1/9$.
25. See Etro (2003) and Grieben (2004).

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