

International Unions*

By Alberto Alesina, Ignazio Angeloni, and Federico Etro

We model an international union as a group of countries deciding to centralize the provision of public goods, or policies, that generate externalities across union members. The trade-off between the benefits of coordination and the loss of independent policymaking endogenously determines size, composition and scope of the union. Policy uniformity reduces the size of the union, may block the entry of new members and induces excessive centralization. We study flexible rules with non-uniform policies that reduce these inefficiencies, focusing particularly on arrangements that are relevant for the ongoing debate on the institutional structure of the European Union. (JEL H11, H41, D71)

*Alesina: Harvard University, NBER and CEPR. Angeloni: European Central Bank. Etro: Catholic University of Milan. *Email correspondence:* aalesina@harvard.edu, ignazio.angeloni@ecb.int, federicoetro@yahoo.it The views expressed in this paper are those of the authors and are not necessarily shared by institutions to which they are affiliated. We thank Robert Barro, Tim Besley, Massimo Bordignon, Karina Firme, Roger Gordon, David Laibson, Greg Mankiw, Antonio Rangel, Dany Rodrik, Andres Velasco, three anonymous referees and participants in seminars at the Center for Financial Studies, Catholic University of Milan, Harvard-M.I.T., New York University, the European Commission, NBER and the Villa Mondragone Seminar for useful comments. Janina Matuszeski provided outstanding research assistance. Alesina gratefully acknowledges financial support from the NSF through the NBER. Etro acknowledges financial support from Fondazione Luigi Einaudi.

Historically, the nation state has monopolized authority in most policy domains. Recently a more complex institutional picture has emerged, characterized by more autonomy for subnational levels of government and, at the same time, the strengthening of supranational jurisdictions that exercise certain policy prerogatives on behalf of all members; we refer to these as “international unions”. World economic integration is responsible for both developments. On the one hand, in an integrated world subnational jurisdictions can prosper independently because their market is the world.¹ On the other hand, increasing integration leads to more externalities, the need for coordination and the creation of supranational jurisdiction.² Examples are the United Nations, regional trade agreements, currency unions, military alliances, etc.

The most prominent example is the European Union (EU) whose goal has been the provision of public goods and common policies for the member states. Since the 1990s the EU has substantially broadened its scope of action to include, besides a common trade policy and a single internal market, a monetary union, coordinated fiscal policies and various aspects of domestic policies.³ A free trade area improves international specialization and can provide its participants with a hedge against asymmetric economic shocks. A single currency increases price transparency across borders and may foster aggregate price stability in the currency area, to the benefit of all participants. Merging and coordinating certain expensive space communication technologies generates economies of scale.

However, the harmonization of policies across the union (a typical way in

¹See Alesina and Enrico Spolaore (2003) for a discussion about of the size of political jurisdiction in general and with specific reference to trade.

²In a related work, Etro (2003) shows that these centrifugal and centripetal forces may be complementary phenomena, leading to smaller countries joined in international unions.

³Alesina, Angeloni and Ludger Schuknecht (2005) document this trend empirically.

which the EU implements policies) may conflict with diverse national preferences. In fact, the trade-off between the benefits of centralized coordination and the costs of homogeneity is precisely the essence of much of the current discussion in the EU. This debate is also spurred by the preparation of a European Constitution and by the entry in the EU of many new members, mostly from central and eastern Europe with diverse economies. There may be inconsistencies between the deepening of the scope of the EU and its enlargement.⁴ In fact the ongoing Constitutional debate in the EU is struggling with finding the correct balance between coordination and centralization of policies at the EU level and autonomy of member countries. This debate has not reached a consensus by any means.

In order to shed light on these questions we model an international union as a group of countries heterogeneous in preferences that decide to coordinate the provision of certain public goods generating international spillovers across union members. We examine, in particular, the forces that determine the equilibrium size and composition of unions, and discuss normative and positive aspects concerning the attribution of policy prerogatives between the union and the member states; in particular we explore a variety of possible cases of joint responsibility between the union and member countries in the choice of policy.

Our paper is related to two different strands of literature. First, the literature on fiscal federalism, spurred by Oates (1972), and which takes the size of a union as given and assumes a uniform policy across countries – a feature that characterizes what we call a “rigid union”. Recent contributions by Timothy Besley and Stephen Coate (2003) and Ben Lockwood (2002) have explored al-

⁴See Alesina and Romain Wacziarg (1999), Alesina, Angeloni and Etro (2001a,b), Guido Tabellini (2003) and Marco Buti, Sylvester Eijffinger and Daniele Franco (2003).

ternative arrangements that do not impose policy uniformity, taking the size of the union as given. A second strand of the literature discusses the endogenous determination of the size of the union, assuming policy uniformity. Work along this line includes Alesina and Vittorio Grilli (1993) and Alesina and Robert Barro (2002) on monetary unions and Sang-Seung Yi (1996) on custom unions.

We proceed in two steps. First, we consider a rigid union and show that it generates other inefficiencies beyond the lack of adaptability to local preferences pointed out by Wallace Oates (1972). There is first a tendency towards a reduction in the equilibrium size of the union and hence of the externalities associated with it (“small size bias”).⁵ Moreover, the political structure can prevent potentially efficient enlargements because of a form of “status quo bias”. Without a constitutional commitment to centralize only certain policies, a “bias toward excessive centralization” emerges leading to an inefficient size of the union.

Our second step is to remove the assumption of policy uniformity and study simple rules that add flexibility and improve the allocation of resources. We focus on arrangements which are relevant for the debate on the institutional design of the EU or, more generally, in the context of other existing federal structures, in which the final policy outcome is the result of an interaction between the union and member countries, like subsidiarity, federal mandates, systems of subsidies and transfers between the union and its members and enhanced cooperation amongst a subset of members of the union. We show under which conditions these institutional arrangements help limiting the inefficiencies

⁵Alesina and Spolaore (2003) have emphasized a related tendency toward suboptimal size of countries. The two results have however different motivations. The size of countries in that model depends on a trade-off between scale economies and cost of citizens’ distance from an exogenous public good, while here the size of unions depends on a trade-off between the benefits of policy coordination and the cost of endogenous policymaking at the union level.

of a rigid union and when they are politically supported; we highlight the role of the constitutional design of the union, (in particular the hierarchy between governments at the country level and at the union level) in generating Pareto-efficient reforms. For instance, a surprising result emerges if in a rigid union with a uniform provision of public goods, countries are allowed to individually add extra expenditure. One may think that countries with strong preferences for public spending would support such a reform: in reality these are the only countries which may oppose the reform and prefer the rigid union. The reason is that this reform would reduce the uniform provision chosen in political equilibrium at the union level so as to rely on the extra-provision of individual countries. The extent of such a “free riding by voting” changes according to the hierarchy between the union and its members, and it is lower when countries have a priority over the union.

The paper is organized as follows. Section 1 describes the basic model, characterizes the equilibrium size of rigid unions and discusses issues of enlargement and trade-off between the centralization and the size of the union. Section 2 discusses flexible unions, introducing different systems where policies differ across countries because competencies are shared between the union and its members. Section 3 concludes. All proofs of the propositions are in the Appendix.

1 The Basic Model

Consider a group of equally sized countries that differ only in their preferences for public goods. Assuming exogenous income y and lump sum taxes used to finance (with a balanced budget) national public spending $g_i \geq 0$, the utility function for the representative individual of an independent country i is:

$$U_i = y - g_i + \alpha_i H(g_i) \quad (1)$$

which is linear in private consumption ($y - g_i$) and where $H_g(\cdot) > 0$ and $H_{gg}(\cdot) < 0$. The parameters $\alpha_i > 0$ capture how much the representative individual of country i values public consumption relative to private consumption: countries are ordered such that $\alpha_1 \leq \alpha_2 \leq \dots$. Countries can join in a union where public spending creates cross-country spillovers captured by the parameter $\beta \in (0, 1)$. Hence, the representative individual in country i in a union with N members has utility:

$$U_i = y - g_i + \alpha_i H\left(g_i + \beta \sum_{j=1, j \neq i}^N g_j\right) \quad (2)$$

Membership in the union is a necessary condition for receiving the externalities.⁶ Decentralized choices imply underprovision of public goods, as well known. The first best union would include all countries and satisfy the system of Samuelson optimality conditions:

$$\alpha_i H_g(g_i + \beta \sum_{j \neq i} g_j) = 1 - \beta \sum_{j \neq i} \alpha_j H_g(g_j + \beta \sum_{k \neq j} g_k) \quad \forall i \quad (3)$$

which shows that the marginal social cost of public goods is smaller than the unitary marginal private cost. Implementation of the first best requires that the union dictates a different policy for each country, depending on preferences.

⁶This is a simplifying assumption that could be relaxed without essential changes in the results; see Etro (2002). Notice that models where public spending is a public input in the production function (as in Alesina and Wacziarg, 1999) are also nested in our general specification: in that case, preference heterogeneity is endogenized in terms of income heterogeneity between countries and all our results go through.

This seems unrealistic since information about countries' preferences is not publicly available, or at least not verifiable. Even if an independent authority could implement differentiated policies, Besley and Coate (2003) show that a tendency toward strategic delegation of its representatives would create further inefficiencies.⁷

1.1 Rigid unions

The simplest alternative, following the standard theory of fiscal federalism (Oates, 1972), is that every member adopts the same policy ("rigid union"). To determine such a policy, we assume a one-country-one-vote rule and majority voting in the union. One country one vote is reasonable in our model since all countries have equal size. In most real world unions, voting rights are distributed as a function of size, but more equally than would be implied by the relative size of members states; i.e. smaller countries weight more than their size. The EU is no exception (nor is the US). As for majority voting, in the EU many decisions require supermajorities or unanimity, an issue to which we briefly return below.

Given the structure of preferences, the median voter theorem applies and the level of spending chosen by a N -sized union solves the following first order condition:

$$\alpha_m H_g \{g_m [1 + \beta(N - 1)]\} = \frac{1}{1 + \beta(N - 1)} \quad (4)$$

which defines a function $g_m = g(\alpha_m, N, \beta)$ increasing in α_m , the preference parameter of the median country in the union. Let us define $\theta(x) \equiv -H_{xx}(x)x/H_x(x)$

⁷See also Etro (2004).

as the elasticity of the marginal utility of public goods (the lower this is, the more highly substitutable private and public spending are). Then, g_m decreases (increases) with the size of the union and of the spillovers if the elasticity of the marginal utility of public goods is higher (lower) than unity. This ambiguous results are due to the usual substitution and income effects. Entry of a new member with a preference for the public goods lower than the median may determine a greater spending, if the concavity of the utility function is not too strong: the intuition is that in this case the substitution effect (more public goods because there are new spillovers to exploit) more than compensates the income effect (more private consumption because spillovers on public goods already increase with the entry of the additional member) and the change of the median toward the preference of the entrant.

1.2 The equilibrium size of the union

We now analyze an “initial stage” of union formation in which any country can unilaterally join a single union.⁸ The utility of country i in a union of N countries with median α_m and spillovers β is:

$$V_i^{in}(\alpha_m, N) = y - g(\alpha_m, N, \beta) + \alpha_i H\{g(\alpha_m, N, \beta)[1 + \beta(N - 1)]\} \quad (5)$$

Clearly, the utility of a country outside the union is $V_i^{out} = V_i^{in}(\alpha_i, 1)$. The net utility of joining the union is the function $\Delta(\alpha_i, \beta, N) \equiv V_i^{in}(\alpha_m, N) - V_i^{out}$. We define an equilibrium union as one in which all (subsets of) members prefer to be members of the union and *viceversa* for the outsiders. Intuitively, the members of the union will be those countries with preferences not too different

⁸There is a similarity between this model and the theory of club goods. However, in the latter, congestion costs usually limit the size of a club of identical members.

from the median. This result can be easily established under one sufficient (but not necessary) condition, that there is a limit on the heterogeneity of preferences and on the concavity of the utility function, $\alpha_i/\alpha_m > 1 - \theta(g) \forall i$.

An example makes the role of the assumption clear. If the function $H(x)$ is isoelastic, $H(x) = x^{1-\theta}/(1-\theta)$, the net utility of joining a union is:

$$\Delta(\alpha_i, \beta, N) = \left(\frac{1}{1-\theta} \right) \left\{ [1 + \beta(N-1)]^{\frac{1-\theta}{\theta}} \alpha_m^{\frac{1}{\theta}} \left[\frac{\alpha_i}{\alpha_m} - (1-\theta) \right] - \theta \alpha_i^{\frac{1}{\theta}} \right\}$$

which is an inverted U curve in α_i with $\Delta(0, \beta, N) < 0$, $\Delta(\alpha_m, \beta, N) > 0$ and $\Delta_{\alpha\alpha}(\alpha_i, \beta, N) < 0$. Note that under our assumption $\Delta(\alpha_i, \beta, N)$ is always increasing in N . This implies that for a given median, the equilibrium union is the largest group of N^E countries such that $\Delta(\alpha_i, \beta, N^E) > 0$ only for $i \in N^E$: this equilibrium will be unique.

PROPOSITION 1. *An equilibrium union is composed by countries with contiguous preferences and its size is weakly increasing in the size of the spillovers.*

Intuitively, members of the unions are countries close to each other in preferences who gain in the trade-off between the benefits from cooperation and the costs from the loss of independent policymaking; the cost is relatively small precisely because the countries are close in preferences. As in Oates (1972), centralization in a rigid union has the benefit to internalize spillovers in policymaking and the cost of giving up to adaptability to local preferences. But, also, under uniform provision of public goods the rigidity of central policymaking limits the size of the union and hence it reduces the total spillovers.

1.3 Enlargement

Under which conditions the members of an existing equilibrium union will decide to accept a new candidate country? This is an important question for the EU today. After its initial formation many new countries have applied for membership, most recently formerly communist nations from Central and Eastern Europe.

Notice that if two new candidate countries (or equally sized groups of countries) on opposite sides of the median apply, under our assumptions they will unambiguously raise the utility of all the incumbents and so they will be admitted. This implies that the interesting problem is the admission of a single country.⁹ We assume for now that a simple majority of members is sufficient to admit a new entrant. The entry of a new member has two effects: the first is to increase utility by virtue of the internalized externality, the second is to change the median voter in the union. A majority of the members must enjoy a positive net gain from these effects. It is immediate to prove:

PROPOSITION 2. An equilibrium union will accept by majority voting a single new member if and only if the change in the median after entry is small enough.

Only countries close enough to the median of the pre-existing union are accepted; hence our model rationalizes a form of *status-quo* bias in union reforms. If the approval of a new entrants require a qualified majority rule, it is easy to see that the status quo bias is only reinforced. The limiting case is the one in

⁹We examine one and only one instance of entry. Kevin Roberts (1999) studies a model of dynamic enlargement of clubs where the entry of a new member changes the median and subsequent decisions about policy and further enlargement will be taken by a different set of countries.

which approval of a new entrant requires unanimity, like in the EU. The pivotal country is that with the preferences furthest away on the opposite side of the median with respect to the candidate country. A solution to reduce the status quo bias could be to admit members without voting power, which would allow any country to be admitted; this is what recently happened when Russia joined the NATO. No such solution is currently envisaged in the EU.

1.4 Size and scope of the union

We now extend the model to consider the case of multiple policies. Imagine F different policies providing different public goods, ordered by the intensity of spillovers, $\beta_1 > \beta_2 > \dots > \beta_F$. Assuming separability between subutilities, the utility function is now:

$$U_i = y - \sum_{k=1}^F g_i^k + \alpha_i \sum_{k=1}^F H \left[g_i^k + \sum_{j \neq i} \beta_k g_j^k \right] \quad (6)$$

According to the voting procedure in the union, different results may arise. We consider two rules which are of particular interest from the viewpoint of the EU constitutional debate. In the first (Rule A), the union does not reach any prior agreement on which policies are to be centralized and which others should be left to the member states. The provision of each public good by the union is voted with majority rule. In the second (Rule B), the union can commit to centralize just a subset of policies, giving up the potential spillovers from the coordination of the other policies. In this case, the union votes first on the number of policies to centralize, and then, having committed to centralize only them, a second vote takes place on how much of each should be provided.

This setting illustrates an important issue in the recent EU constitutional debate, namely, whether the areas of competence of the EU should be explicitly

listed in the Constitution, and the others explicitly excluded, or if instead, as the EU Treaties do, the range of areas pertaining to the union should be left open or only vaguely defined. In the latter case, the agenda of the union is left open *ex-ante* and is determined case-by-case *ex-post* through secondary legislation. We show here that there is a fundamental difference between the two settings: the size and scope of the resulting union are different in the two cases. In sum, we consider the following alternative voting rules:

RULE A. *The provisions of each public good are chosen by majority voting.*

RULE B. *The policies to centralize are chosen by majority voting and, subsequently, for each centralized policy, the provisions of each public good are chosen by majority voting.*

If G is the set of centralized policies, we define $V_i^G(\alpha_m, N)$ as the indirect utility of country i . Clearly, the net gain from union membership for country i is $\Pi(\alpha_i, G) = \sum_{k \in G} \Delta(\alpha_i, \beta_k, N)$. Consider the following definition:

A X -equilibrium union $(\alpha_m, N, G)^E$ is a group of N countries with a median voter characterized by α_m , providing a set of public goods G , such that:

- 1) *rule $X \in (A, B)$ applies;*
- 2) *for each country i within the union, $\Pi(\alpha_i, G) > 0$;*
- 3) *in the set of the countries outside the union there is not a subset of S countries $\Gamma(S)$ such that:*

$$V_k^G[\alpha'(\Gamma(S), \alpha_m, N), N + S] > V_i^G(\alpha_i, 1) \quad \forall k \in \Gamma(S)$$

where $\alpha'(\cdot)$ is the new median after the entry of the subset of countries.

We can prove:

PROPOSITION 3. *An equilibrium union with multiple policies has a (weakly) larger size and a (weakly) smaller set of centralized policies under Rule B than*

Rule A. Moreover, the equilibrium union under Rule B is preferred to the one under Rule A by at least a majority of its members.

Intuitively, if Rule A is adopted, all policies are centralized according to the median country preferences and the characterization of the equilibrium union is a straight extension of the single policy case. The size of this union is relatively small: some outsiders would have preferred to centralize a lower number of policies, and would have joined the union if this was the case. In the process leading to the formation of the union, a sort of time-inconsistency problem arises: once the union is formed, the median extends excessively its powers, and the expectation of this induces potential members to step back from the beginning.

Under rule B,¹⁰ member countries rationally foresee the provision of public goods chosen by the median for each centralized policy. Each country has a preference on the policies it would like to centralize. The median country would still like to centralize all policies, while the further away from the median preferences a country is, on both sides, the fewer policies this country would want to centralize. In equilibrium the number of centralized policies is typically lower than F , and membership must be at least as great as under rule A. Hence, Rule A generates a further form of small size bias, whose source is the excessive centralization of policies. Though general welfare comparisons are complex, it is easy to build examples in which rule B Pareto dominates rule A, while the

¹⁰In the first stage the policy space is multidimensional but, given the structure of the model, it can be reduced to a unidimensional space (the number of policies with the highest spillovers to centralize) and single-peakedness holds. In the second stage the policy space is multidimensional, but preferences belong to the intermediate class and hence the median voter theorem applies as well.

opposite can never happen.

The insight here is that an ex-ante commitment to centralize only a limited set of policies - those with the strongest spillovers - leads to the creation of a larger union, preferred by a majority of members. In the EU context, this suggests that a clear constitutional commitment to restrict the functions that the union can perform leads to more countries agreeing to participate. Has this “small size bias” already become relevant in the EU? The wave of membership applications in recent years would seem to deny that. However, the increasing reluctance of several countries to endorse parts of the EU agenda, the decreasing popularity of the EU in the public opinion, and even the problems to reach an agreement on the new European Constitution, are clear symptoms of the difficulty of pursuing simultaneously the goal of enlargement and that of building an “ever closer union”.¹¹

2 Flexible Unions

Three potential factors influence the size and scope of a rigid union: policy uniformity reduces memberships and the associated spillovers; a status quo bias limits enlargement when candidate countries differ from the incumbents; in the absence of a commitment to limit delegation of powers to the union, there is excessive centralization leading to further reduction in the size of the union. In this section we look at four forms of “flexible unions”, i.e. unions where policy provision differs among members. We know that optimality requires different policies for different members. However, the organizational costs of discriminating policy across the membership with different and not verifiable preferences

¹¹For a recent discussion of these issues see Alesina and Roberto Perotti (2004).

could be very large. It is therefore useful to examine simple arrangements - easily implementable rules applying equally to all countries and approved by a majority of them - that can improve upon the rigid union without relying on knowledge or verification of the individual countries' preferences.¹²

2.1 Shared Responsibility

In many policy areas the final policy outcome is the result of a joint efforts of the EU and of member countries. In fact the proposed draft of the EU constitutions lists a very long series of policy areas which are shared.

2.1.1 Subsidiarity

The first case of shared responsibility that we consider is one in which the union members are given the opportunity to choose their own public good provision in a decentralized way, but on top of this the union votes on a common level of spending to be provided by all members. Hence, the union cannot commit to *ex ante* to a centralized policy, but can only act *ex post* to limit the inefficiency of decentralized policies. For lack of a better term we label this arrangement as “subsidiarity”.¹³

We formalize this principle imagining a two-stage process in which 1) member countries independently choose their policies $g_i^s \geq 0$ and then 2) the union chooses a common expenditure $g^U \geq 0$ by majority voting. Utility for country i is now $U_i = y - g_i^s - g^U + \alpha_i H(G_i^s)$, where $G_i^s = g_i^s + \beta \sum_{j \neq i} g_j^s + g^U [1 + \beta(N-1)]$. The subsidiary role of the union is going to induce a free-riding behavior of each

¹²For notational simplicity, in this section we assume that N is an odd number.

¹³The term “subsidiarity” in the context of the EU captures the principle that country members have the responsibility on policy first and then the EU may intervene.

country in the provision of public goods, but it allows to differentiate policies according to preferences at least to a certain degree. Under some regularity conditions, in subgame perfect politico-economic equilibrium the countries with stronger preferences for public goods choose individual expenditure according to the following condition:

$$\alpha_i H_g (G_i^s) = \frac{[1 + \beta(N - 2)]}{(1 - \beta)[1 + \beta(N - 1)]} \quad (7)$$

while the common expenditure chosen by majority voting satisfies:

$$\alpha_m H_g (G_m^s) = \frac{1}{[1 + \beta(N - 1)]} \quad (8)$$

Notice that the union expenditure is chosen as in the rigid union (the marginal social cost is unchanged compared to (4)), while the free riding of the single countries is biased: the marginal private cost of public good provision is always greater than 1 and increasing in the number of countries and in the spillovers. Remembering that the desired level of public spending is increasing in α_i we can prove that:

PROPOSITION 4. *In politico-economic equilibrium 1) the expenditure of the union with subsidiarity is lower than in a rigid union; 2) the median country and all countries with weaker preference for public goods do not adopt individual expenditure while only countries with strongest preference do it.*

The outcome is a compromise between a decentralized solution and the rigid union. Would a majority of countries prefer it to a rigid union? The answer is yes. All countries not providing additional individual expenditures will spend less than in a rigid union, while benefiting from the additional expenditure of other countries, which makes them better off. The median country has to be

better off because it could choose (for the union) the same amount of expenditure of a rigid union and it would benefit from the externality arising from the additional public spending of those countries which add above the level provided by the union. Hence, a majority of countries is in favor of the flexible system. Some of the other countries, i.e. those adding on the public spending mandated by the union may be worse off. In fact, on the one hand the union is providing less public good, but on the other hand, they can to some extent individually compensate for this. Interestingly, precisely those countries which exploit the possibility of individual extra provision of public goods may end up worse off even if these are the countries that benefit from public spending the most. An important implication is that the transition from a rigid to a flexible union with subsidiarity tends to be supported with simple majority rules, but may be blocked with qualified majority rules.

Consider the special case with logarithmic preferences and $N = 3$. In case of interior equilibrium, we have:¹⁴

$$g_1^s = g_2^s = 0 \quad g_3^s = \frac{(1+2\beta)\alpha_3}{1+\beta} - \frac{(1+2\beta)\alpha_2}{1-\beta} \quad g_m^U = \frac{\alpha_2}{(1-\beta)} - \frac{\beta\alpha_3}{(1+\beta)}$$

In this example, one can verify that this allocation delivers higher utility to each country than under a rigid union, hence subsidiarity will be adopted by unanimity.

¹⁴This requires intermediate levels of heterogeneity. In particular, $(1+\beta)/(1-\beta) \leq \alpha_3/\alpha_2 \leq (1+\beta)/\beta(1-\beta)$. For low heterogeneity there is not extra expenditure by any country (like in the rigid union) and for high heterogeneity $g_m^U = 0$ and $g_3^s = \alpha_3$ (like in the decentralized outcome).

2.1.2 Federal Mandates

We now turn to a situation where the union can commit *ex ante* to a common policy and countries must take it as given when they choose their extra provision in a decentralized way. Such an institutional organization broadly represents a system of “federal mandates”, an arrangement where each country can choose and independently finance public expenditure, but this must be at least equal to a level decided by the union. This system is widely used in environmental regulation but it can be applied to many public goods or policies with strong externalities. In game theoretic terms, we can think of this situation as a two-stage process where first 1) the union chooses the federal mandate and then 2) each country decides whether to provide further public goods. Jacques Crémer and Thomas Palfrey (2000) have studied this kind of arrangement; however, in their model there are no externalities between countries. In our model, the federal mandate accomplishes an important role: it limits the free-riding of the decentralized equilibrium, internalizing, to some extent, the externalities produced in public good provision.

Formally, utility for country i is $U_i = y - g_i^f - f^U + \alpha_i H(G_i^f)$, where $f^U \geq 0$ is the federal mandate, $g_i^f \geq 0$ the extra provisions of public goods for country i and $G_i^f = g_i^f + \beta \sum_{j \neq i} g_j^f + f^U [1 + \beta(N - 1)]$. Under regularity conditions, in subgame perfect politico-economic equilibrium the federal mandate satisfies:

$$\alpha_m H_g(G_m^f) = \frac{[1 + \beta(\tilde{N} - 1)]}{[1 + \beta(N - 1)](1 - \beta)} \quad (9)$$

where \tilde{N} is the (endogenous) number of countries with strongest preferences for public spending which provide extra public goods according to:

$$\alpha_i H_g(G_i^f) = 1 \quad (10)$$

The adoption of a federal standard induces a free-riding behavior of the union. For the union, the marginal cost of public spending is greater than 1, which remains the marginal cost of each single country as in a decentralized setting, but it is larger than the marginal cost of a rigid union, $1/[1 + \beta(N - 1)]$. Hence, even the equilibrium federal mandate is lower than the common provision chosen by a rigid union. Moreover, we can prove:

PROPOSITION 5. *In politico-economic equilibrium 1) the federal mandate is lower than the expenditure of a rigid union; 2) the median country and all countries with weaker preference for the public good do not add any extra expenditure, while only countries with stronger preference do it.*

The free-riding by voting induced by a low federal mandate increases the incentives of countries with higher preference for public goods to individually provide them and it consequently makes the other countries better off. The median country and all the countries with weaker preference for public goods are in favor of the introduction of federal mandates in a rigid union. However, their free-riding may induce again some countries with stronger preferences for the public good than the median to prefer a rigid union.¹⁵

Consider the special case of logarithmic preferences and three countries. In the relevant interior equilibrium, which requires $\beta < 1/2$, we have:

$$g_1^f = g_2^f = 0 \quad g_3^f = \frac{\alpha_3}{(1 - \beta)} - \alpha_2(1 + 2\beta) \quad f_m^U = \alpha_2 - \frac{\alpha_3\beta}{(1 - \beta)(1 + 2\beta)}$$

which now can make country 3 worse off compared to the rigid union: in that case, the adoption of federal mandates would be supported just by the two

¹⁵A similar result is obtained by Catherine Hafer and Dimitri Landa (2005) who rework our model in presence of income heterogeneity.

countries with weaker preferences for public goods.¹⁶

The main message of comparative politics which should be drawn from this discussion is that a flexible organization which properly shares competencies between countries and the union can be desirable, but the way this organization is built is fundamental to create gains for all members. It is crucial to decide whether the union should commit or not to a centralized policy before its members choose their policies in a decentralized way. A simple comparison of the equilibrium conditions shows that common spending is higher under subsidiarity than with federal mandates ($g_m^U \geq f_m^U$), while individual extra provision is higher under federal mandates ($g_j^f \geq g_j^s$): “free riding by voting” is stronger when the union can commit to its policy. The difference between indirect utility with federal mandates and subsidiarity makes the trade-off explicit for each country i :

$$\Phi(\alpha_i) = \alpha_i \left[H(G_i^f) - H(G_i^s) \right] + (g_i^s - g_i^f) + (g_m^U - f_m^U) \quad (11)$$

Countries with weak enough preferences for public goods always gain under federal mandates because of the greater private consumption, even if utility from public goods is lower, while countries with stronger preferences for public spending gain under subsidiarity from a smaller individual contribution to public

¹⁶The interior equilibrium requires $\beta < 1/2$ and intermediate levels of heterogeneity, that is $(1 + 2\beta)(1 - \beta) \leq \alpha_3/\alpha_2 \leq (1 + 2\beta)(1 - \beta)/\beta$. For low heterogeneity there is not extra expenditure by any country (like in the rigid union). When $\beta > 1/2$, as long as $\alpha_3/\alpha_2 \leq 1/\beta$, the median voter theorem holds but the utility of the median country is not differentiable at its pick. In this case:

$$g_1^f = g_2^f = 0 \quad g_3^f = \frac{\alpha_3 - \alpha_2}{(1 - \beta)} \quad f_m^U = \frac{\alpha_2 - \alpha_3\beta}{(1 - \beta)(1 + 2\beta)}$$

Finally, for high heterogeneity $f_m^U = 0$ and $g_3^f = \alpha_3$ (like in the decentralized outcome).

good provision (but with a lower utility from public goods).¹⁷

Finally, notice that the adoption of subsidiarity and federal mandates can enlarge the equilibrium size of the union since, under these arrangements, all countries with strong enough preferences for public spending will be willing to join the union, and this would create new spillovers (which in turn relaxes the conditions for accepting the enlargement).

2.2 Matching Grants

We now study a simple system of taxes and subsidies which is inspired by widespread forms of intergovernmental transfers usually referred to as matching grants. There are examples of this in the way the EU provides incentives for regional investment; for each euro invested nationally, a supplementary fraction is added by the union. We assume that a constant subsidy s is granted for each unit of national public good expenditure and financed with taxes $T_i = s\bar{g}_{-i}$, where \bar{g}_{-i} is the average of expenditures of all the other countries: hence the tax paid by country i is independent from its choice of spending and the union budget constraint is always satisfied. Each country i has utility:

$$U_i = y - g_i - T_i + \alpha_i H \left[g_i(1 + s) + \beta \sum_{j \neq i} g_j(1 + s) \right] \quad (12)$$

In this analysis we focus on the case where the union commits ex ante to its policy, that is to a subsidy. Subsequently, the choice of each country satisfies $\alpha_i H_g(\cdot)(1 + s) = 1$ and generates individual spending functions $g_i = g_i(s)$ which are increasing (constant) in the subsidy if and only if $\theta < (=) 1$. Hence, indirect

¹⁷In our example $\Phi(\alpha_i) > 0$ for $i = 1, 2$ and $\Phi(\alpha_3) < 0$.

utility for country i is:

$$V_i(s) \equiv y - g_i(s) - s \frac{\sum_{j \neq i} g_j(s)}{N-1} + \alpha_i H \left\{ (1+s) \left[g_i(s) + \beta \sum_{j \neq i} g_j(s) \right] \right\}$$

Maximizing this with respect to the subsidy provides the optimal subsidy for country i . It turns out that under weak conditions, we have an interior equilibrium which is increasing in α_i , hence the median voter theorem holds, and the political equilibrium subsidy s_m satisfies the following condition:

$$\left[\frac{N-1}{1+s_m} \right] \left[\frac{g_m(s_m)}{\bar{g}-m} + \beta(N-1) - (1+s_m) \right] = [s_m - \beta(N-1)] \left[\frac{\sum_{j \neq m} g'_j(s_m)}{\bar{g}-m} \right] \quad (13)$$

where we made use of the optimality condition for individual spending in the median country. In this formula, the left hand side represents the direct effect of a change in the subsidy and it is evaluated according to the preferences of the median country compared to the average one. The right hand side is the indirect effect due to the impact on public spending in other countries: when the subsidy is low (which implies underspending), the indirect marginal effect of an increase in the subsidy is beneficial only if it increases spending by the other countries (if $\theta < 1$). As one can easily verify, the subsidy $s^* = \beta(N-1)$ delivers the first best allocation of public expenditure - equivalent to (3). The intuition for this is quite simple. The additional expenditure in the public good which is provided by the union distorts the incentives to invest in the public good. These incentives are the same for every country as in the first best if the marginal cost of public expenditure equates its social marginal cost. But this is the same for every country and given by $1/[1 + \beta(N-1)]$, hence this equality is satisfied under the proposed subsidy. In general, however, the equilibrium subsidy may be above or below the optimal value. For instance, in the simple case of isoelastic preferences, the politico-economic equilibrium subsidy can be

implicitly expressed as:

$$s_m = s^* + \theta \left[\frac{g_m(s_m) - \bar{g}_{-m}}{\bar{g}_{-m}} \right]$$

More generally, we can conclude with:

PROPOSITION 6. *The politico-economic equilibrium subsidy to national public spending implements the first best allocation of public expenditure only if median public spending is the same as the average. Under this condition, there is always a system of transfers that gives rise to the first best union.*

What this suggests is that efficient coordination is possible if median preferences in the union are close enough to the average preferences. For instance, in the logarithmic utility case we can explicitly derive the equilibrium subsidy as:

$$s_m = \frac{1 + \beta(N - 1)}{1 + \frac{N}{(1-\beta)(N-1)} \left(\frac{\bar{\alpha} - \alpha_m}{\alpha_m} \right)} - 1$$

which boils down to the optimal subsidy only if the median preference α_m coincides with the average preference $\bar{\alpha} = (1/N) \sum_{i=1}^N \alpha_i$.¹⁸ Informally, as long as the median country is not excessively biased towards low or high public expenditure compared to the average country, a union close to the first best can be created with a system of taxes and transfers: in this case the small size bias would disappear. Unfortunately, this does not need to be the case in general: the political equilibrium subsidy might be too low to be accepted by countries with high preference for public spending or too high to be accepted by countries with low preferences for public spending and may be hardly implementable in

¹⁸With general isoelastic utility, the first best allocation requires α_m equal to the heterogeneity index $\left[\sum_{i=1}^N \alpha_i^{1/\theta} / N \right]^\theta$, which is higher (lower) than the average preference for $\theta > (<) 1$.

practice. Nevertheless, our result shows that a system of intergovernmental transfers could be very useful to enlarge the benefits of policy coordination at least in a union with a balanced distribution of preferences.

2.3 Enhanced Cooperation

Under this arrangement, subsets of union members can centralize certain policies among themselves, without the other members of the union participating. This arrangement is explicitly allowed by the proposed new EU Constitution and is already used by the EU in certain policy areas. For example, only some members have adopted the single currency, or agreed to common border controls. The Amsterdam Treaty (1997) has introduced a formal framework for enhanced cooperation, whereby any group of (at least eight) members to take action in particular areas, while other members opt out.¹⁹

The analysis in this case is a direct extension of that with multiple policies, and we omit it here for brevity. The resulting union is (weakly) larger than the one arising under Rule A (and Rule B as well), and is preferred by countries with extreme preferences, while it may hurt the median country.²⁰

3 Conclusions

We have modeled an international union as a set of heterogeneous countries deciding together on the provision of certain public goods (or policies) that generate externalities across union members. Under uniform provision of the

¹⁹Massimo Bordignon and Sandro Brusco (2003) introduce uncertainty on the benefit of coordination in a dynamic model of union formation and rationalize enhanced cooperation as an optimal step toward full coordination.

²⁰More details of the derivation are available from the authors.

public good (“rigid union”) several inefficiencies arise, including a “small union bias”, a “status quo bias” in accepting new members and a trade-off between the size and the scope of the union. Then we have analyzed some simple forms of “flexibility” among those that are either discussed, or could potentially be relevant, in the context of the debate on the EU’s constitutional form. These flexible schemes can improve welfare and even, under restrictive conditions, attain the social optimum.

There is however, an organizational trade-off. Rigid unions are reasonably simple to implement although, as we discussed, may generate inefficiencies. More flexible unions may require complex organizational arrangements that may run into costs of complexity and difficulty of practical implementation. This trade-off is indeed at the forefront of the current constitutional debate in Europe.

APPENDIX

PROOF OF PROPOSITION 1. Under our assumption, we have:

$$\Delta_N(\alpha_i, \beta, N) \propto \Delta_\beta(\alpha_i, \beta, N) \propto 1 - \left(\frac{\alpha_i - \alpha_m}{\alpha_i} \right) \left(1 - \frac{1}{\theta(\cdot)} \right) > 0$$

for any i . Hence, if a country i with preferences such that $\Delta(\alpha_i, \beta, N) > 0$ did not belong to the union, it could join it and hence move its median toward α_i and increase the number of members: both factors would increase its net gain from membership. Then, in equilibrium there is a compact set of preferences around the median satisfying $\Delta(\alpha, \beta, N) > 0$, such that all and only all countries with preferences in this set belong to the union.

PROOF OF PROPOSITION 2. Immediate under our assumption after imposing $V_i^{in}(\alpha', N+1) > V_i^{in}(\alpha_m, N)$ for a majority of members, and $V_i^{in}(\alpha', N+1) > V_i^{out}$ for all of them, where α' is the new median after entry.

PROOF OF PROPOSITION 3. First, notice that for all centralized policies the median country chooses the common provision $g_m^k = g(\alpha_m, N, \beta_k)$ since preferences belong to the intermediate class defined by Jean-Michel Grandmont (1978) and the median voter theorem holds even with multiple policies. Under our assumptions $\Delta_\beta(\alpha_i, \beta_k, N) > 0$. Hence, it must be that whenever a country wants (not) to centralize policy z , the same country wants (not) to centralize any policy $k < (>)z$. This implies that we can identify the set of centralized policies with the index number of the policy in that set which has the highest spillovers. Then, in a union (α_m, N, K) the net gain from union membership can be written as:

$$\Pi(\alpha_i, K) = \sum_{k=1}^K \Delta(\alpha_i, \beta_k, N) = \Pi(\alpha_i, K-1) + \Delta(\alpha_i, \beta_K, N)$$

By Proposition 1, we know that $\Delta(\alpha_i, \beta_k, N) > 0$ for any $\alpha_i \in A_k$ where A_k is a set such that $A_F \subset A_{F-1} \subset \dots \subset A_1$. By the properties of a vertical sum of functions, it follows that $\Pi(\alpha_i, G) > 0$ for any $\alpha_i \in S_G$ where $S_F \subset S_{F-1} \subset \dots \subset S_1$, and that for each α_i there is a favorite number of centralized policies K_i with $1 \subseteq K_1 \subseteq K_2 \dots \subseteq K_m = F$. By construction it must be that $\Delta(\alpha_i, \beta_K, N) \geq 0$ iff $K \leq K_i$. Using this and (14) it follows that:

$$\Pi(\alpha_i, K) \geq \Pi(\alpha_i, K-1) \quad \text{iff} \quad K \leq K_i$$

which implies single-peakedness of $\Pi(\alpha_i, K)$ in K for all α_i .

Under Rule A, $G = F$ and the largest set of countries for which $\Pi(\alpha_i, F) > 0$ joins the union. Under Rule B, in the stage where countries vote on the set of centralized policies, the median voter theorem holds, as we have proved, and $G \supseteq F$. Existence and uniqueness depend on coalition proofness. Imagine that there are two equilibria: $(\alpha_m, N, K)^E$ and $(\alpha_m, N', K')^E$. Our discussion implies that if $N > N'$, then $K \subset K'$ and *viceversa*. Then, the countries excluded by the smallest equilibrium

could form a coalition and be better off joining the smallest union, which contradicts its equilibrium properties. Finally, in equilibrium under Rule B it must be that $\Pi(\alpha, G) > \Pi(\alpha, F)$ for a majority of countries, otherwise a greater set of centralized policies would have been chosen in equilibrium.

PROOF OF PROPOSITION 4. Given individual expenditures chosen in the first stage, preferences are single-peaked in the second stage under weak conditions and (8) defines the common expenditure g_m^U chosen by the median country in case of an interior solution (on which we focus). This is a decreasing function in each g_i^s with slope $dg_m^U/dg_m^s = -1/[1 + \beta(N - 1)]$ and $dg_m^U/dg_i^s = -\beta/[1 + \beta(N - 1)]$ for $i \neq m$. In the first stage, countries choose their individual provision according to the following (differential) system of optimality conditions:

$$\alpha_i H_g(G_i^s) \leq \frac{1 + \frac{\partial g_m^U}{\partial g_i^s}}{1 + [1 + \beta(N - 1)] \frac{\partial g_m^U}{\partial g_i^s}}, \quad g_i^s \geq 0 \quad i = 1, 2, \dots, N$$

Substituting for dg_m^U/dg_i^s we obtain that $g_i^s = 0$ for any $i \leq m$ and that for all countries individually providing additional public goods (7) holds. Comparing (4) and (8), it follows that $g_m^U [1 + \beta(N - 1)] \leq G_m^s = g_m [1 + \beta(N - 1)]$ and hence $g_m^U \leq g_m$ with strict inequality as long as some countries provide individual expenditure, which can be verified to require $\alpha_N/\alpha_m > [1 + \beta(N - 2)]/(1 - \beta)$.

PROOF OF PROPOSITION 5. In the second stage, for a given federal mandate, all countries choose their own extra provisions to satisfy the system:

$$\alpha_i H_g(G_i^f) \leq 1, \quad g_i^f \geq 0 \quad i = 1, 2, \dots, N$$

For a given f^U , this system pins down the \tilde{N} countries with largest α_i providing extra public goods according to (10) and defines their provisions as decreasing functions, $g_i^f = g_i^f(f^U)$. Notice that \tilde{N} is a step function weakly decreasing in the federal mandate. By totally differentiating these conditions for the individual contributions,

we obtain:

$$\frac{dg_i^f}{df^U} = -[1 + \beta(N - 1)] - \beta \sum_{j \in \tilde{N}, j \neq i} \frac{dg_j^f}{df^U}$$

Subtracting from both sides $\beta \left(dg_i^f / df^U \right)$ and summing over all $j \in \tilde{N}$ we have:

$$\sum_{j \in \tilde{N}} \frac{dg_j^f}{df^U} = -\tilde{N} \left\{ \frac{[1 + \beta(N - 1)] + \sum_{j \in \tilde{N}} \frac{dg_j^f}{df^U}}{1 - \beta} \right\} = -\frac{\tilde{N}[1 + \beta(N - 1)]}{[1 + \beta(\tilde{N} - 1)]}$$

It is immediate to derive that the reaction function of these countries is linearly decreasing in the federal mandate with the slope $-[1 + \beta(N - 1)] / [1 + \beta(\tilde{N} - 1)]$, which becomes steeper every time that an increase in f^U induces a new country to stop providing extra public goods (however, as one can easily verify, total public good production $\sum g_j^f(f^U) + Nf^U$ is increasing in f^U). We assume that in the first stage the median voter theorem holds (in general, this may not be the case because indirect utility in the first stage is a continuous function of f^U , but it is not differentiable at the values of the federal mandate where \tilde{N} changes and is not necessarily single-peaked).²¹

The condition for an interior equilibrium is:

$$\alpha_m H_g(G_m^f) = \frac{1}{[1 + \beta(N - 1)] + \beta \sum_{j \in \tilde{N}} \frac{\partial g_j^f}{\partial f_m^U}}$$

Substituting dg_i^f / df^U we can rewrite it as (9). For (10) for $i = m$ and (9) to be consistent in equilibrium we need that the right hand side of the latter is smaller or equal to 1. This sets the constraint $\beta < (N - \tilde{N} - 1) / (N - 1)$ for interior solutions. It follows that $g_i^f = 0$ for any $i \leq m$. Moreover, it can be verified that $\tilde{N} \geq 1$ requires $\alpha_N / \alpha_m > [1 + \beta(N - 1)](1 - \beta)$. Finally, defining f_m^U as the federal mandate

²¹When an interior solution for our system does not exist, the utility of the median country has a local maximum at the least federal mandate such that $g_m^f = 0$: this mandate satisfies $\alpha_m H_g \left[\beta \sum_{j > m} g_j^f + f^U [1 + \beta(N - 1)] \right] = 1$ rather than (9) and is typically a Condorcet winner. In this case Proposition 5 still holds (with all countries to the right of the median providing extra public goods).

preferred by the median country, comparing (9) with (4) and noticing that the right hand side of the former is greater than $1/[1 + \beta(N - 1)]$ if $\tilde{N} \geq 1$, we conclude that $f_m^U [1 + \beta(N - 1)] \leq G_m^f \leq g_m [1 + \beta(N - 1)]$ that is $f_m^U \leq g_m$, with strict inequality if $\tilde{N} \geq 1$.

PROOF OF PROPOSITION 6. When $s_m = s^*$ the right hand side of (13) is zero and the condition can only be satisfied if $g_m(s_m) = \bar{g}_{-m}$, which implies $g_m(s_m) = (1/N) \sum_{j=1}^N g_j(s_m)$.

REFERENCES

Alesina, Alberto, Ignazio Angeloni and Federico Etro, “The Political Economy of International Unions”, NBER Working Paper No. 8645, 2001a.

Alesina, Alberto, Ignazio Angeloni and Federico Etro, “Institutional Rules for Federations”, NBER Working Paper No. 8646, 2001b.

Alesina, Alberto, Ignazio Angeloni and Ludger Schuknecht, “What Does the European Union Do?”, *Public Choice*, forthcoming, 2005.

Alesina, Alberto and Robert Barro, “Currency Unions”, *Quarterly Journal of Economics*, May 2002, 117 (2), pp. 409-36.

Alesina, Alberto and Vittorio Grilli, “On the Feasibility of a One Speed or a Multi Speed European Monetary Union”, *Economics and Politics*, July 1993, 5 (2), pp. 145-66.

Alesina, Alberto and Roberto Perotti, “The European Union: A Politically Incorrect View”, *Journal of Economic Perspectives*, Fall 2004, 18 (4), pp. 27-48.

Alesina, Alberto and Enrico Spolaore, *The Size of Nations*, Cambridge, MA: MIT Press, 2003.

Alesina, Alberto and Romain Wacziarg, “Is Europe Going too far?”,

Carnegie-Rochester Conferences Series on Public Policy, December 1999, 51, pp. 1-42.

Besley, Timothy and Stephen Coate, “Centralized versus Decentralized Provision of Public Goods”, *Journal of Public Economics*, December 2003, 87 (12), pp. 2611-37.

Bordignon, Massimo and Sandro Brusco, “On Enhanced Cooperation”, CESifo Working paper No. 996, 2003.

Buti, Marco, Sylvester Eijffinger and Daniele Franco, “Revisiting the Stability and Growth Pact Design or Internal Adjustment?”, CEPR Discussion Paper No. 3692, 2003.

Cremer, Jacques and Thomas Palfrey, “Federal Mandates by Popular Demand”, *Journal of Political Economy*, October 2000, 108 (5) pp. 905-27.

Etro, Federico, “International Policy Coordination with Economic Unions”, *Rivista Internazionale di Scienze Sociali*, April-June 2002, 110 (2), pp. 187-211.

Etro, Federico, “Globalization and Political Geography”, CESifo Working Paper No. 986, 2003.

Etro, Federico, “The Political Economy of Fiscal and Monetary Unions”, *Giornale degli Economisti e Annali di Economia*, December 2004, 63 (3), pp. 289-328.

Grandmont, Jean-Michel, “Intermediate Preferences and the Majority Rule”, *Econometrica*, March 1978, 46 (2), pp. 317-330.

Hafer, Catherine and Dimitri Landa, “Public Goods in Federal Systems”, Unpublished manuscript, New York University, 2005.

Lockwood, Ben, “Distributive Politics and the Costs of Centralization”, *Review of Economic Studies*, April 2002, 69 (2), pp. 313-37.

Oates, Wallace, *Fiscal Federalism*, New York: Harcourt Brace Jovanovich,

1972.

Roberts, Kevin, “Dynamic Voting in Clubs”, Sticered Discussion Paper No. 367, London, 1999.

Tabellini, Guido, “Principles of Policymaking in the European Union: an Economic Perspective”, *CESifo Economic Studies*, 2003, 49, 1, pp. 75-102.

Yi, Sang-Seung, “Endogenous Formation of Customs Unions under Imperfect Competition: Open Regionalism is Good”, *Journal of International Economics*, August 1996, 41 (1-2), pp. 153-77.