# International Unions

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*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 nonuniform policies that reduce these inefficiencies, focusing particularly on arrangements that are relevant to the ongoing debate on the institutional structure of the European Union.* (JEL D71, H11, H41)

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, and military alliances.

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—in addition to 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 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

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

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

[3] Alesina et al. (2005) document this trend empirically.

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 Wallace Oates, 1972), 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 alternative 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 Oates (1972). There is first a tendency toward 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 that are relevant to 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 among a subset of members of the union. We show under which conditions these institutional arrangements help limit the inefficiencies 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 individually to 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 that 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 "free riding by voting" changes according to the hierarchy between the union

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[4] See Alesina and Romain Wacziarg (1999), Alesina et al. (2001a, b), Guido Tabellini (2003), and Marco Buti et al. (2003).

[5] Alesina 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 policy-making at the union level.

and its members, and it is lower when countries have priority over the union.

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

## I. 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:

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

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 $\alpha_1 \leq \alpha_2 \leq \cdots$. 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

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

Membership in the union is a necessary condition for receiving the externalities.[6] Decentral-

ized choices imply underprovision of public goods, as is well known. The first best union would include all countries and satisfy the system of Samuelson optimality conditions:

$$(3) \quad \alpha_i H_g\left(g_i + \beta \sum_{j \neq i} g_j\right)$$

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

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. 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]

### A. *Rigid Unions*

The simplest alternative, following the standard theory of fiscal federalism (Oates, 1972), is that every member adopt the same policy ("rigid union"). To determine such a policy, we assume a one-country-one-vote rule and majority voting in the union. The one-country-one-vote rule 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 United States). 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:

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[6] This 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.

[7] See also Etro (2004).

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

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

### B. *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 $\alpha_m$ and spillovers $\beta$ is:

(5)  $V_i^{\text{in}}(\alpha_m, N) = y - g(\alpha_m, N, \beta)$

$+ \alpha_i H\{g(\alpha_m, N, \beta)[1 + \beta(N - 1)]\}.$

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

$$\Delta(\alpha_i, \beta, N) = \left( \frac{1}{1 - \theta} \right)$$

$$\times \left\{ [1 + \beta(N - 1)]^{(1 - \theta)/\theta} \alpha_m^{(1/\theta)} \right.$$

$$\times \left[ \frac{\alpha_i}{\alpha_m} - (1 - \theta) \right] - \theta \alpha_i^{(1/\theta)} \right\}$$

which is an inverted U curve in $\alpha_i$ 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 of 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 of internalizing spillovers in policymaking and the cost of giving up to adaptability to local preferences. Under uniform provision of public goods, however, the rigidity of central policymaking limits the size of the union and hence it reduces total spillovers.

### C. *Enlargement*

Under which conditions will the members of an existing equilibrium union decide to accept a

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[8] There 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.

new candidate country? This is an important question for the EU today. After its initial formation, many new countries have joined, 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 therefore 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 existing union are accepted; hence our model rationalizes a form of status quo bias in union reforms. If the approval of a new entrant requires a qualified majority rule, it is easy to see that the status quo bias is only reinforced. The limiting case is the one in which approval of a new entrant requires unanimity, like in the EU. The pivotal country is the one with the preferences farthest 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 NATO. No such solution is currently envisaged in the EU.

### D. *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, $\beta_1 > \beta_2 > \cdots > \beta_F$. Assuming separability between subutilities, the utility function is now:

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

According to the voting procedure in the union, different results may arise. We consider two rules that 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 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 those policies, 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 are 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 member-

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[9] We 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.

ship 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 $\alpha_m$, providing a set of public goods G, such that:

(a) Rule $X \in (A, B)$ applies;
(b) For each country i within the union, $\Pi(\alpha_i, G) > 0$;
(c) 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 under 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 were 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 farther 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 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 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]

## II. 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; and 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.,

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[10] In 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.

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

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 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 country's preferences.[12]

## A. *Shared Responsibility*

In many policy areas the final policy outcome is the result of joint efforts of the EU and of member countries. In fact, the prosed draft of the EU Constitution contains a very long list of policy areas on which members agree.

*Subsidiary.*—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 goods provision in a decentralized way. Further, the union votes on a common level of spending to be provided by all members. Hence, the union cannot commit 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 "subsidiarity."[13]

We formalize this principle imagining a two-stage process in which: (a) member countries independently choose their policies $g_i^s \geq 0$; and then (b) 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 free-riding behavior of each country in the provision of public goods, but it allows differentiation of 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:

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

while the common expenditure chosen by majority voting satisfies:

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

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 goods provision is always greater than one and increasing in the number of countries and in the spillovers. Remembering that the desired level of public spending is increasing in $\alpha_i$, we can prove that:

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

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 fewer public goods, but on the other hand, coun-

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

[13] The 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.

tries can to some extent individually compensate for this. Interestingly, precisely those countries that 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]

$$g_1^s = g_2^s = 0$$

$$g_3^s = \frac{(1 + 2\beta)\alpha_3}{1 + \beta} - \frac{(1 + 2\beta)\alpha_2}{1 - \beta}$$

$$g_m^U = \frac{\alpha_2}{(1 - \beta)} - \frac{\beta\alpha_3}{(1 + \beta)}.$$

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.

*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 expenditures, 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 (a) the union chooses the federal mandate and then (b) 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 goods 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:

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

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

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

The adoption of a federal standard induces free-riding behavior of the union. For the union, the marginal cost of public spending is greater than one, which remains the marginal cost of each 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 (a) the federal mandate is lower than the expenditure of a rigid union; and (b) 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.*

The free riding by voting induced by a low federal mandate increases the incentives of countries with higher preference for public goods individually to 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.

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[14] This 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 no 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).

However, their free riding may induce 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 $\beta < \frac{1}{2}$, we have:

$$g_1^f = g_2^f = 0$$

$$g_3^f = \frac{\alpha_3}{(1 - \beta)} - \alpha_2(1 + 2\beta)$$

$$f_m^U = \alpha_2 - \frac{\alpha_3 \beta}{(1 - \beta)(1 + 2\beta)}$$

which now can make country 3 worse off compared to the rigid union: in that case, the adoption of federal mandates would be supported by just the two countries with weaker preferences for public goods.[16]

The main message of comparative politics that 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 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 differ-

ence between indirect utility with federal mandates and subsidiarity makes the trade-off explicit for each country $i$:

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

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 goods 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).

### B. 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 goods 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 of its choice of spending, and the union budget constraint is always satisfied. Each country $i$ has utility

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

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

[16] The interior equilibrium requires $\beta < \frac{1}{2}$ 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 no extra expenditure by any country (like in the rigid union). When $\beta > \frac{1}{2}$, 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:

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

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

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

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 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 $\alpha_i$, hence the median voter theorem holds, and the political equilibrium subsidy $s_m$ satisfies the following condition:

(13)

$$\left[ \frac{N - 1}{1 + s_m} \right] \left[ \frac{g_m(s_m)}{\bar{g}_{-m}} + \beta(N - 1) - (1 + s_m) \right]$$

$$= [s_m - \beta(N - 1)] \left[ \frac{\sum_{j \neq m} g_j'(s_m)}{\bar{g}_{-m}} \right]$$

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 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 give 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 coincides with the optimal subsidy only if the median preference $\alpha_m$ 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 toward 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 preference for public

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

spending, and may be hardly implementable in 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.

### C. *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) introduced a formal framework for enhanced cooperation, whereby any group of (at least eight) members can 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]

### III. 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 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. 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 EU constitutional form. These flexible schemes can improve welfare

[19] Massimo 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.

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

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, they may generate inefficiencies. More flexible unions may require complex organizational arrangements that could be complex and difficult to implement. 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 and hence move its median toward $\alpha_i$ 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 $V_i^{\text{in}}(\alpha', N + 1) > V_i^{\text{in}}(\alpha_m, N)$ for a majority of members, and $V_i^{\text{in}}(\alpha', N + 1) > V_i^{\text{out}}$ for all of them, where $\alpha'$ 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 the set that has the highest spill-overs. Then, in a union $(\alpha_m, N, K)$, 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 $A_F \subset A_{F-1} \subset \cdots \subset A_1$. 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 $S_F \subset S_{F-1} \subset \cdots \subset S_1$, and that for each $\alpha_i$ there is a favorite number of centralized policies $K_i$ with $1 \subseteq K_1 \subseteq K_2 \cdots \subseteq K_m = F$. By construction it must be that $\Delta(\alpha_i, \beta_K, N) \gtrless 0$ iff $K \lessgtr K_i$. Using this and (14) it follows that:

$$\Pi(\alpha_i, K) \gtrless \Pi(\alpha_i, K - 1) \qquad \text{iff } K \lessgtr K_i,$$

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

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 vice versa. 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:

$$\alpha_i H_g(G_i^s)$$

$$\leq \frac{1 + \dfrac{\partial g_m^U}{\partial g_i^s}}{1 + [1 + \beta(N - 1)]\dfrac{\partial g_m^U}{\partial g_i^s}}, \; g_i^s \geq 0$$

$$i = 1, 2, \ldots, N.$$

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:

$$\alpha_i H_g(G_i^f) \leq 1, \; g_i^f \geq 0 \qquad i = 1, 2, \ldots, N.$$

For a given $f^U$, this system pins down the $\tilde{N}$ countries with largest $\alpha_i$ 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 $\beta(dg_i^f/df^U)$ and summing over all $j \in \tilde{N}$, we have:

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

$$= -\frac{\tilde{N}[1 + \beta(N-1)]}{[1 + \beta(\tilde{N}-1)]}.$$

Substituting the last equation into the preceding one and rearranging, one easily shows that the provision of public goods by each of these countries is linearly decreasing in the federal mandate, with slope $-[1 + \beta(N-1)]/[1 + \beta(\tilde{N}-1)]$. The slope becomes steeper every time 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 the right-hand side of the latter to be 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 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 be satisfied only if $g_m(s_m) = \bar{g}_{-m}$, which implies $g_m(s_m) = (1/N) \sum_{j=1}^{N} g_j(s_m)$.

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[21] When 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 $\alpha_m H_g[\beta \sum_{j>m} g_j^f + f^U[1 + \beta(N-1)]] = 1$ 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).

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