The political economy of european integration

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Abstract

We propose a simple model that explains the major stylized facts of european integration: the formation of a community of nations and its enlargement. The interesting idea of the model is the driving force of integration: to share the benefits of an excludable public good among the members of a community.

Keywords Clubs, Coalition formation, Federalism, Majority voting

JEL Classification: D71, H41

1 Introduction

Our motivation is to provide theoretical foundation for the recent political debate about the future of the European Union.

Let's start by presenting the major stylized facts about european integration:

- 1951: Treaty of Paris: European Coal and Steel Community (ECSC) (members: Belgium, France, Germany, Italy, Luxembourg and Netherlands)
- 1957: Treaty of Rome: European Economic Community (EEC), European Atomic Energy Community (Euratom)

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- 1973: 3 new members (Denmark, Ireland and U-K)
- 1981: new member (Greece)
- 1986: European Single Act: introduction of qualified majority voting, 2 new members (Portugal and Spain)
- 1993: Maastricht Treaty: the Communities become the European Union (EU), extended use of the qualified majority voting, extended power of the European Parliament
- 1995: 3 new members (Austria, Finland, Sweden)
- 2000: Treaty of Nice: voting weights readjusted to better represent states' population, extension of the qualified majority voting
- 2004: Constitution (project): double majority voting (50% states, 60% population), marginal use of unanimity, extended power of the European Parliament, 10 new members (Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia)

In summary, it is easy to see that the evolution of european integration is a move towards enlargement and centralization.

How does it work? What is the driving force for this process? To answer these questions, we need to build a model that is consistent with the major historical features stated above.

The basic structure of our model is built on two economic theories. The first one is the theory of clubs where clubs emerge in the economy to govern the production of excludable public goods (for an excellent survey on club theory see Cornes and Sandler, 1996). Such goods cannot be efficiently allocated through the market mechanism. Club theory characterizes an efficient structure of clubs for the economy, but does not say anything about how such a structure will be achieved.

This is why we turn to the game theory approach to coalition formation. In a coalition formation game, it is necessary to specify two institutional aspects for an equilibrium coalition structure to emerge: (i) first we need a rule that governs the decision making inside a coalition, (ii) second we need a rule that specifies how different wishes for coalition structure are matched and gives rise to a coalition structure – called the coalition formation rule. For examples of coalition formation games see Hart and Kurz (1983), Bloch (1996), Ray and Vohra (1997,1999), Yi (1997).

2 Simple model of integration

The agents of our economy are nation-states indexed by $i = 1, \ldots, n$. It is assumed that each nation state is composed of k_i identical individuals. The utility of an individual in state i is an increasing function in one private good and one *excludable* public good, with the standard assumption of convexity of preferences:

$$u_i(y_i, d_i) \text{ for } i = 1, \ldots, n \tag{1}$$

where y_i is the amount of private good consumed per capita and d_i the amount of public good in nation i. Each state has an endowment, w_i, of private good. The public good is excludable – a nation can exclude other nations from the benefits of the public good provided in her territory – and is financed by taxes of private good. The total amount of taxes collected in state i is noted x_i so the budgetary constraint of a nation is $y_i = \frac{w_i - x_i}{k_i}$. The public good supply is an increasing function of contributions. We assume simply that $d_i = x_i$, i.e. there is a linear production function.

2.1 Step 1: Status quo

The status quo is the initial setting in which all states are singletons, i.e. there is no political integration across states. In this case public goods are excludable and accessible only for nationals of given state – there are no externalities

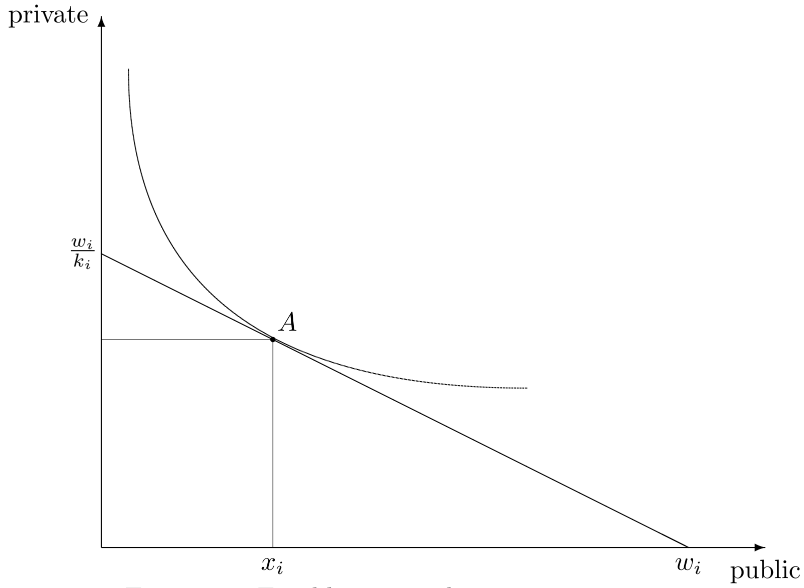

FIGURE 1: Equilibrium in the status-quo.

between states. Each state maximizes the utility of his citizens:

$$\max_{x_i} \left\{ k_i u_i \left(\frac{w_i - x_i}{k_i}, x_i \right) \right\} \tag{2}$$

This gives a standard solution represented in Figure 1 (point A) where the marginal rate of substitution equals the marginal rate of transformation between the two goods.

The outcome of this first step is a vector of state's excludable public good supplies $(x_1, x_2, \ldots, x_n)$ which will serve as an input for the second step discussed below.

2.2 Step 2: Coalition formation

Starting from the status quo, we give the states the possibility to form communities, i.e. we analyze coalition formation for a given vector $(x_1, x_2, \ldots, x_n)$.

Definition 1 *A community is a coalition of states that gives mutual access to the excludable public good of all the members of the coalition.*

In this section the words community and coalition are interchangeable. Then, if member of a coalition, a state have access to his public good supply, plus the public good supplies of all other members of the coalition, minus a loss due to operating or transaction costs (coming from distance for instance). Let us assume that this cost is constant per partner and denote it $\gamma \geq 0$. Then if state i forms a coalition with state j for example, the public good supply in state i and j will be given by: $x_i + x_j - \gamma$. Note N the set of countries. Then, if a coalition $S \subseteq N$ forms, the public good supply for the members of this coalition will be $x_S = \sum_{i \in S} x_i - \gamma(s-1)$ where $s = |S|$. The membership in a coalition changes the public good supply for a member state. The consumption of private good is not altered for the citizens of the member state. Then the gain from coalition formation for state i is:

$$v_i(x_S | i \in S) \equiv u_i(w_i - x_i, x_S) - u_i(w_i - x_i, x_i) \tag{3}$$

From now on, the coalition formation game is defined as follows.

1. A coalition structure Q is a partition $Q = \{S_1, S_2, \ldots, S_m\}$ of the set N. Each state can evaluate every coalition structure in the following way (coalition structure value)

$$\phi_i(\{S_1, S_2, \ldots, S_m\}) \equiv v_i(x_{S_j} | i \in S_j). \tag{4}$$

2. The set of strategies of i is $\Sigma^i = \{S \subseteq N | i \in S\}$, i.e. to announce a list of partners and himself.

3. For a n-tuple of strategies $\sigma = (S_1, \ldots, S_n)$ the coalition structure is determinate by the rule Γ defined in Hart and Kurz (1983), i.e. $Q_\sigma =$

$\{T_\sigma^i | i \in N\}$ where

$$T_\sigma^i = \begin{cases} S_i & \text{if } S_j = S_i \text{ for all } j \in S_i, \\ \{i\} & \text{otherwise} \end{cases} \tag{5}$$

To solve the game of coalition formation we first define the net public good supply that a country can bring to a coalition: $\Delta_i \equiv x_i - \gamma$. Second, we order the states in the following way $\Delta_1 \leq \Delta_2 \leq \cdots \leq \Delta_n$. Then we identify a particular country k such that $\Delta_k \geq 0$ and $\Delta_{k-1} < 0$. The following result is easily established.

Proposition 1 *A core stable coalition structure is characterized by:*

$$Q_{\sigma^*} = \{\{n, n-1, \ldots, k\}, \{k-1\}, \ldots, \{1\}\} \tag{6}$$

with k being the smallest integer in $\{1, 2, \ldots, n\}$, such that, $\Delta_k \geq 0$. The size of the coalition $\bar{S} = \{n, n-1, \ldots, k\}$ is inversely related with γ.

Proof. The equilibrium strategies are derived as follows

- For $1 \leq i < k$, the strategy that maximizes i's valuation, ϕ_i, is: $\sigma^{i*} = \{i, k, \ldots, n\}$.
- For $k \leq i \leq n$, the strategy that maximizes i's valuation, ϕ_i, is: $\sigma^{i*} = \{k, \ldots, n\}$.

Then the rule (5)[1] determines the coalition structure (6). To see that Q_{σ^*} is core stable note that there is no nonempty coalition $T \subset N$ and a coalition structure $Q' \neq Q_{\sigma^*}$ such that $T \in Q'$ and $\phi_i(Q') > \phi_i(Q_{\sigma^*})$ for all $i \in T$. This is because $\forall i$, strategy σ^{i*} already maximizes ϕ_i. It is also easy to see that for a given status quo vector $(x_1, x_2, \ldots, x_n)$ the integer k is bigger if the inefficiencies lost γ is bigger, which implies that the size of the formed coalition, $\bar{S}$, decreases with γ. ■

[1]Actually, the rule Δ defined in Hart and Kurz will give the same outcome in our game.

Core stability is a very restrictive stability concept. Actually, if a coalition structure is core stable, then it is also γ stable, δ stable, β stable and α stable: see Hart and Kurz (1983) and Bloch (1996) for definitions of these stability concepts and demonstration of the statement. Thus the result in Proposition 1 is robust to any stability concept developed by game theorists.

The fact that, $\Delta_{k-1} < 0$, imply that states k to 1 would rather remain singletons than forming coalitions among themselves. On the other hand, these states would like to join the coalition as this will increase their public good supply (this is visible from equilibrium strategies, i.e. non-members have proposed coalition members as partners). So we have a situation in which external states would like to join $\bar{S}$ but members of that coalition would not like to accept them.

So in a subsequent step the question of coalition enlargement will be considered.

2.3 Step 3: Reoptimization and coalition enlargement

The only way to analyze coalition enlargement in a coalition formation game is to assume that once a coalition has formed, it does not exit the game, but the formed coalition continue to play the game like a single player[2]. Thus we must have a form of "dynamic coalition formation", i.e. in each step a coalition structure is formed given the "state of the economy" and this coalition structure can evolve as the state of the economy evolves and time goes on.

Then in this step, the game will be played by coalition $\bar{S}$ and non-member states k to 1. The only way for coalition enlargement to take place is that a non-member change his public good level such that his accession is profitable for the members of $\bar{S}$. Then we must allow the possibility for states to reoptimize their public good production levels, given the coalition structure formed in step 2. This possibility is allowed for all the players. Then we distinguish two cases: reoptimization by the members of the coalition and reoptimization by

[2]This assumption is opposite to the one in Bloch (1996) where once a coalition forms it exits the game, and only remaining players continue to play the game.

non-members.

2.3.1 Reoptimization inside a coalition

The benchmark production levels, $x_i \; i \in \bar{S}$, are not first-best production levels for the members of $\bar{S}$. Thus, ones the coalition is formed the members can decide to readjust their production levels in order to increase the welfare of the coalition. The coalition must solve a problem:

$$\max_{(x_i)_{i\in\bar{S}}} \left\{ \sum_{i\in\bar{S}} k_i u_i \left(w_i - x_i, \sum_{i\in\bar{S}} x_i - \gamma(\bar{s}-1) \right) \right\} \tag{7}$$

The first order conditions give a system of $\bar{s}$ equations with $\bar{s}$ variables. The explicit solution might be difficult to characterize but the qualitative result is well known (see the seminal paper of Samuelson, 1954): the production level of each member state should be increased, i.e. $x_i^* \geq x_i$ where x_i^* is the first best production level for member i. This result comes from the fact that the public good level produced by each member of the coalition have a *positive external* effect on the other members.

Paul Samuelson writes in his seminal paper: "The solution 'exists'; the problem is how to 'find' it." In fact, the members of the coalition face a typical problem of cooperation in an environment with non excludable public good. The problem in (7) can be solved by a central planner[3]. But, in reality, there are obstacles for the problem to be solved: (i) in the model we have sovereign nations and there is no way to enforce them to a given production level; (ii) this means that the planner have to design a system of side-payments in order to incite states to achieve a given level and (iii) generally countries' preferences are private information so a central planner face a revelation problem in order to find solution of (7).

A realistic approach to the problem of optimal provision of a public good should search a decentralized mechanism in an environment of incomplete in-

[3]This gives an explanation of the creation of central institutions on european level, like the High Authority after the creation of the European Coal and Steel Community in 1951

formation about individual preferences. Since the work of Clark (1971), Groves (1973), Groves and Ledyard (1977) a research effort was made to design mechanisms that induces incentives (through a tax scheme) for individuals to report true preferences as a dominant strategy. These mechanisms are rather complicated and do not have a balanced tax scheme. This research end up to an impossibility result: there exist no mechanism that (i) induces incentives for truthful revelation of preferences; (ii) efficient provision of the public good and (iii) balanced budget (see Green and Laffont, 1979, and Laffont and Maskin, 1980).

Then we have to relax one of the requirements in order to find positive results. The requirement of truthful revelation seems to be a natural candidate, as it is not necessary in order to obtain efficient public good provision. Continuing this analysis here is beyond the scope of the paper. We refer the reader to Diev and Hichri (2004) where a simple mechanism of voluntary contributions is designed and experimented.

2.3.2 Reoptimization for non-members and coalition enlargement

In the previous step non-members have learned that if they have a positive Δ they will be accepted in the coalition. Now they have the possibility to reoptimize their public good supply in the light of future accession. The trade off for a non-member will be to scarify private good consumption in order to increase his public good level up to a point that guarantees him accession in $\bar{S}$. This point will be given by $\bar{x} = \gamma$. The gain from accession for the non-member country is to access coalition's public good supply $x_{\bar{S}}$. Then the question is what are the non-member countries for whom enlargement will be profitable?

To simplify the analysis of the enlargement game we restrict attention to the following Cobb-Douglas utility: $u_i = y_i^{1-\alpha_i} x_i^{\alpha_i}$ with $\alpha_i \in [0, 1]$. Then the status quo consumption bundle for $i \in N$ is given by $y_i = \frac{(1-\alpha_i)w_i}{k_i}$, $x_i = \alpha_i w_i$. Thus, for all non member states, $i \in N \setminus \bar{S}$, we must have $\alpha_i w_i < \gamma$. We establish the following result.

Proposition 2 *Accession in coalition $\bar{S}$ will be profitable for non-members that have, ceteris paribus:*

i. higher preference for the public good;

ii. higher wealth;

iii. lower population.

Proof. We first characterize the utility change coming from accession for a non-member i:

$$du_i(y_i, x_i) = \frac{\partial u_i}{\partial y_i}(y_i, x_i)dy_i + \frac{\partial u_i}{\partial x_i}(y_i, x_i)dx_i \tag{8}$$

where (y_i, x_i) is the status quo consumption bundle, i.e. $\left(\frac{(1-\alpha_i)w_i}{k_i}, \alpha_i w_i\right)$. The Cobb-Douglas utility permits to calculate the partial derivatives. Furthermore, the change in private good compatible with accession is $dy_i = \alpha_i w_i - \gamma$, the change in public good coming from accession is $dx_i = x_{\bar{S}} - \alpha_i w_i$. Then the utility change from accession can be written

$$du_i = (1-\alpha_i)\left(\frac{(1-\alpha_i)w_i}{k_i}\right)^{-\alpha_i}(\alpha_i w_i)^{\alpha_i}[\alpha_i w_i - \gamma] \\ + \alpha_i\left(\frac{(1-\alpha_i)w_i}{k_i}\right)^{1-\alpha_i}(\alpha_i w_i)^{\alpha_i - 1}[x_{\bar{S}} - \alpha_i w_i]$$

which simplify to

$$du_i = (1-\alpha_i)^{(1-\alpha_i)}(\alpha_i)^{\alpha_i}(k_i)^{\alpha_i}\left[\alpha_i w_i\left(1 - \frac{1}{k_i}\right) + \frac{x_{\bar{S}}}{k_i} - \gamma\right] \tag{9}$$

Then we have

$$\text{Sign}[du_i] = \text{Sign}\left[\alpha_i w_i\left(1 - \frac{1}{k_i}\right) + \frac{x_{\bar{S}}}{k_i} - \gamma\right]$$

The sign of the change will be positive (negative) if the positive expression, $\alpha_i w_i\left(1 - \frac{1}{k_i}\right) + \frac{x_{\bar{S}}}{k_i}$, is bigger (lower) than γ. Then to establish the result we

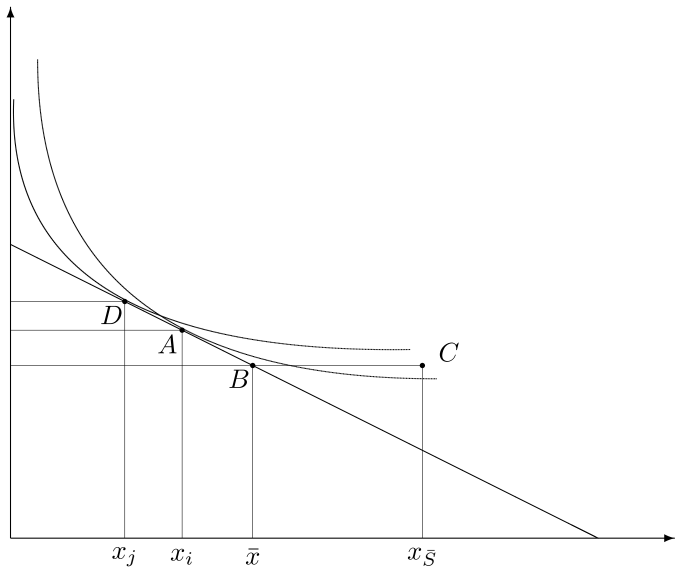

FIGURE 2: Enlargement game

study the function:

$$f(\alpha_i, w_i, k_i) \equiv \alpha_i w_i \left(1 - \frac{1}{k_i}\right) + \frac{x_{\bar{S}}}{k_i}$$

It is easy to see that $\frac{\partial f}{\partial \alpha_i} > 0$ (part i.), $\frac{\partial f}{\partial w_i} > 0$ (part ii.) and $\frac{\partial f}{\partial k_i} < 0$ (part iii.)
■

In Figure 2 we provide an illustration for the case in which all non-members have identical wealth and population and only differ in preferences. Take state i, the investment in public good is costly in terms of private good (point A shift to point B). But this guarantees accession (shift from point B to C) so the utility gain from accession is higher than the cost.

On the other hand, non-member j have no advantage to bring the investment cost as this will result in a move from point D to C (via B) where the utility is lower than in the status quo. In fact, if non-members have identical wealth and population the enlargement game will be profitable only for countries with sufficiently high preference for the public good.

From political point of view, the more interesting result in Proposition 2 is that enlargement will be "easier" for smaller countries. To interpret the result note that the statement is *ceteris paribus*, i.e. for non-members with identical wealth, bigger population means lower per capita income, so the per capita investment effort is higher for the citizens of bigger states. The interpretation of the two other statements of Proposition 2 is obvious.

3 Community vs. federation

It was shown in the previous section that a coalition have to solve a complicated problem (7) which requires that states' preferences are known by a central planner. The solution of the problem implies the production of a specific public good level in each member. From political point of view, this solution could be implemented only in a highly centralized coalition, a real example is the former Soviet union. However, in democratic societies decisions are taken by majority voting.

The objective of this section is to analyze the case where once a community, S, is formed, the members decide to "go ahead" in their political integration by federating. We start by defining what we mean by *federation*.

Definition 2 *A federation is a coalition of states where the public good supply, d, is determinate by majority voting and is financed by an uniform tax on every citizen of the federation, $\frac{d}{k_S}$, with $k_S = \sum_{i \in S} k_i$ being the total population of the federation.*

For a decision to be taken we need 50% of the total population, k_S. We assume the same Cobb-Douglas utility function as in section 2.3.2 and to simplify the analysis we assume without loss of generality[4] that $\gamma = 0$. We now characterize the proposed public good supply, d^i, by the representative of state

[4] The parameter γ play a role in the coalition formation game. Here we reason in an already formed coalition.

i. Each i solves:

$$\max_{d^i} \left\{ k_i \left(\frac{w_i}{k_i} - \frac{d^i}{k_S} \right)^{1-\alpha_i} (d^i)^{\alpha_i} \right\} \tag{10}$$

which gives a simple solution $d^i = \frac{k_S}{k_i}\alpha_i w_i$. In other terms, each state i would like that his public good production level in a federation be the same as his staus quo production level (the best production level in state i is $\frac{k_i}{k_S}\frac{k_S}{k_i}\alpha_i w_i = \alpha_i w_i$, see also section 2.3.2). Then the median voter theorem can be applied and the winner of the vote will be the median voter proposal, which we denote by $d^m = \frac{k_S}{k_m}\alpha_m w_m$.

To simplify the presentation of the result we further restrict attention to states that only differ in preferences, i.e. have identical wealth and population.

Proposition 3 *If states only differ in preferences, note α_m the preference for the public good of the median state and $\bar{\alpha} \equiv \frac{1}{s}\sum_{i \in S} \alpha_i$ the mean preference for the public good, then if the median is such that:*

i. $\alpha_m \leq \tilde{\alpha} < \bar{\alpha}$, to federate decreases the utility for all the members of the community;

ii. $\tilde{\alpha} < \alpha_m < \bar{\alpha}$, to federate increases the utility for a minority of the members of the community;

iii. $\bar{\alpha} \leq \alpha_m < 1$, to federate increases the utility for a majority of the members of the community;

where $\tilde{\alpha}$ is the solution of:

$$\frac{\bar{\alpha}(1-\tilde{\alpha})}{e\tilde{\alpha}} + \ln\left(\frac{\tilde{\alpha}}{\bar{\alpha}}\right) = 0 \tag{11}$$

Proof. To prove the result we first construct a function that measure the utility change of federating relative to a community. The utility of member i in a federation is:

$$u_i = k_i \left(\frac{w_i - \frac{k_i}{k_m}\alpha_m w_m}{k_i} \right)^{1-\alpha_i} \left(\frac{k_S}{k_m}\alpha_m w_m\right)^{\alpha_i} \tag{12}$$

The utility of the same member i in a community is:

$$u_i = k_i \left(\frac{w_i - \alpha_i w_i}{k_i} \right)^{1-\alpha_i} \left(\sum_{i \in S} \alpha_i w_i\right)^{\alpha_i} \tag{13}$$

Then by taking the ratio of (12)/(13) and the fact that states have identical wealth ($w_i = w_j = w \ \forall i, j \in S$) and population ($k_i = k_j = k \ \forall i, j \in S$), we obtain:

$$\left(\frac{1 - \alpha_m}{1 - \alpha_i} \right)^{1-\alpha_i} \left(\frac{\alpha_m}{\bar{\alpha}} \right)^{\alpha_i} \tag{14}$$

Then the utility change function is defined as:

$$g(\alpha_m, \alpha_i) \equiv \left(\frac{1 - \alpha_m}{1 - \alpha_i} \right)^{1-\alpha_i} \left(\frac{\alpha_m}{\bar{\alpha}} \right)^{\alpha_i} - 1 \tag{15}$$

For a given α_i if g is positive then federation increases the utility for i relative to community. In Figure 3 we plot the zero iso-curves for g in (α_m, α_i) space (g increases to the up-left). The plot is parameterized by $\bar{\alpha}$. It is clear that for a given α_i, g is maximized when $\alpha_m = \alpha_i$ (i.e. on the diagonal of the plot).

From (15) it is clear that if $\alpha_m \geq \bar{\alpha}$ then g is positive for a majority of states (in fact, g is positive for every i with $\alpha_i \geq \alpha_m \geq \bar{\alpha}$). This proves part iii.

To prove the rest we maximize g keeping α_m constant. This problem is equivalent to:

$$\max_{\alpha_i} \left\{ \ln \left[\left(\frac{1 - \alpha_m}{1 - \alpha_i} \right)^{1-\alpha_i} \left(\frac{\alpha_m}{\bar{\alpha}} \right)^{\alpha_i} \right] \right\} \tag{16}$$

which is easy to solve and gives

$$\alpha_i^* = 1 - \frac{(1 - \alpha_m)\bar{\alpha}}{e\alpha_m} \tag{17}$$

In the last expression α_i^* is a function of α_m, i.e. $\alpha_i^*(\alpha_m)$. We must have $\alpha_i^* \geq 0$

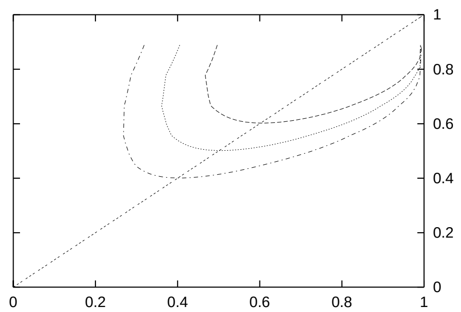

FIGURE 3: Iso-curves for $g(\alpha_m, \alpha_i) = 0$ with $\bar{\alpha} = 0.4, 0.5, 0.6$.

which gives the following condition:

$$\alpha_m \geq \frac{\bar{\alpha}}{e + \bar{\alpha}} \tag{18}$$

Then the state that obtains the maximum utility change from federation is identified as a function of the median state:

$$\alpha_i^*(\alpha_m) = \begin{cases} 1 - \frac{(1-\alpha_m)\bar{\alpha}}{e\alpha_m} & \text{if } \alpha_m \geq \frac{\bar{\alpha}}{e+\bar{\alpha}}, \\ 0 & \text{otherwise} \end{cases} \tag{19}$$

By replacing (19) in (15) we obtain the maximum value utility change as a function of α_m:

$$G(\alpha_m) \equiv g(\alpha_m, \alpha_i^*(\alpha_m)) = \begin{cases} e^{\frac{(1-\alpha_m)\bar{\alpha}}{e\alpha_m}} \left(\frac{\alpha_m}{\bar{\alpha}}\right) - 1 & \text{if } \alpha_m \geq \frac{\bar{\alpha}}{e+\bar{\alpha}}, \\ -\alpha_m & \text{otherwise} \end{cases} \tag{20}$$

Then the study of G shows that there exist an unique $\tilde{\alpha} \in (0, 1)$ such that

$G(\tilde{\alpha}) = 0$. This cut off value is defined by:

$$\frac{\bar{\alpha}(1-\tilde{\alpha})}{e\tilde{\alpha}} + \ln\left(\frac{\tilde{\alpha}}{\bar{\alpha}}\right) = 0 \tag{21}$$

For all $\alpha_m \in (0, \tilde{\alpha})$ the maximum value utility change is negative, i.e. the utility change is negative for all members states: this shows part i. The proof of part ii. is easily deducted: if $\tilde{\alpha} < \alpha_m < \bar{\alpha}$ then the utility for all states with $\alpha_i \leq \alpha_m$ decreases (they are a majority). The utility for some states with α_i close to $\alpha_i^*(\alpha_m)$ increases but they are only a minority. ■

The proposition is illustrated in Figure 3. The vertical lecture of this figure, i.e. for a fixed median, shows the set of preferences for which federation will be profitable. It is easy to see that if α_m is relatively low this set is empty.

The interpretation of Proposition 3 is not straightforward. If $\alpha_m < \bar{\alpha}$ then a majority of member states have relatively low public good preferences, i.e. low public good production levels in the status quo. However, few states have relatively high public good preferences and thus high public good production levels. In a community all member states take advantage from these high public good levels, while in a federation states with high levels will be aligned to low production by the median voter. Then for a majority of states, i.e. $\forall i$ with $\alpha_i < \alpha_m$, we have a decrease in public good consumption together with a decrease in private good consumption. The interpretation of the case where $\alpha_m > \bar{\alpha}$ is deducted in a similar way.

Probably the more interesting result in Proposition 3 is that there is a case in which federation decreases the utility for all the members of the community. Then community Pareto dominates federation in this case.

It is also possible to show two additional results.

Corollary 1 *If all members are completely identical, i.e. have identical wealth population and preferences, then federation and community are equivalent political organization inside a coalition.*

The proof is immediate from (15) by replacing $\alpha_m = \bar{\alpha} = \alpha_i$. We have also an obvious, but important result.

Corollary 2 *If countries are not completely identical, then federating decreases the utility of at least one member of the community.*

The last result have an important political interpretation: if the institutional decision to transform a community into a federation have to be adopted by the unanimous consent of all member states, there is at least one state that will oppose this decision.

3.1 Empirical data

From the point of view of applied economics, it is interesting to confront the result stated in this section with empirical data available on EU level. In fact, the parameter α_i could be approximated by the ratio of public expenditure to GDP (remember that $\alpha_i w_i$ was the public good expenditure and w_i the wealth of state i.). This data is available from national accounts.

Data is provided in Table 1 for EU15 members (unfortunately data on public expenditure for new members, i.e. that have joined the EU in 2004, was not available). This table shows the important diversity of public expenditure ratios across EU15 member states – staring from 35.9% of GDP for Ireland and going to more than 60% of GDP for Sweden. This without doubt give evidence to the diversity of states' preferences.

We do not further pursue the empirical analysis in this paper and give the reader the possibility to freely interpret the data. We just point out that we calculate the mean public expenditure $\bar{\alpha}$, level-headed by population weights, and we obtain $\bar{\alpha} = 48.2$. We also identify the median state with European convention's decision-making rule (50% states, 60% population) which is Italy[5], with $\alpha_m = 49.9$.

An empirical analysis of the model developed here is possible, but if we would like to pursue it, we first need data for new members and second we

[5] Germany would be the median state if the cumulated population weight corresponding to this state was 60% instead of 59.16%.

Table 1: Data on EU15 level

	Total general government expenditure (% of GDP)										Population (% of total in 2000)	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	Mean		
ie	41.6	39.7	37.2	34.9	34.7	32	33.7	33.7	:	35.9	1.01	1.01
es	:	:	:	:	40.2	40	39.6	39.9	:	39.9	10.63	11.64
uk	44.9	42.9	41.3	40.1	39.6	39.7	40.8	41.7	43.5	41.6	15.82	27.46
lu	45.5	45.6	43.3	42	41.3	38.5	39.1	43.5	45.5	42.7	0.12	27.58
pt	45	45.8	44.8	44.1	45.3	45.2	46.3	46	47.9	45.6	2.71	30.29
nl	56.4	49.6	48.2	47.2	46.9	45.3	46.7	47.8	49	48.6	4.22	34.51
gr	51	49.2	47.8	47.8	47.6	52.1	50.2	49.1	48.3	49.2	2.89	37.40
de	56.1	50.3	49.3	48.8	48.7	45.7	48.3	48.7	48.8	49.4	21.76	59.16
it	53.4	53.2	51.1	49.9	48.9	46.9	48.7	48	49	49.9	15.29	74.45
be	52.9	52.9	51.4	50.7	50.1	49.3	49.4	50.2	51	50.9	2.71	77.16
at	56	55.4	53.1	53.4	53.2	51.4	50.9	50.6	50.8	52.8	2.12	79.28
fi	59.6	59.7	56.4	52.8	52.1	49.1	49.2	50	50.9	53.3	1.37	80.65
fr	55.2	55.4	54.9	53.7	53.4	52.6	52.5	53.5	:	53.9	15.59	96.24
dk	60.3	59.8	58	57.6	56.3	54.8	55.3	55.8	56.2	57.1	1.41	97.65
se	67.7	65.3	63	60.7	60.3	57.3	57	58.2	58.5	60.9	2.35	100,00

Source: Eurostat

need to extend the result of this section to states that also differ in wealth and population, as this is the case in reality. Future research can consider this possibility.

4 Conclusion

Here we develop a model that captures the major historical features of european integration: a community of countries is formed; the members of the community have the highest public good levels in the economy; countries with lowest public good levels are left out and if they want to join the community they have to increase their level of public good. The model explains why in the recent enlargement of the EU new members were asked to make investments in order to bring their public good sectors close to "european standards".

The interesting idea of the model is the driving force for integration. Traditionally integration is viewed as a way to internalize externalities between countries. Here there is no externalities between countries because the public good is excludable. Then a simple way to generate integration is to allow the possibility for countries to sign a treaty that gives them mutual access to the excludable public good. Thus, integration can be viewed as the sharing of excludable public goods.

We also analyze a recent political question about the reform of the EU. We show that a reform through federalism, as the one proposed by the European convention, could not be unanimously ratified by heterogeneous members of a community.

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