

On the strategic use of strategic delegation in political integration*

Abstract

We consider as endogenous the choice of the delegation's rule in a political integration process between two countries. We study three potential types of delegation: strong, weak or no delegation, this last case corresponding to referendum. According to Schelling (1960), we show that the populations decide to bind themselves by delegate the national policy decision to a "powerfull conservative representative", in order to improve their bargaining position. These non-cooperative behaviours of countries when they decide on their delegation rule induce negative political externalities between countries, which cancel the gains of the internalization of economic externalities in case of political integration. We then propose two extensions. First, we assume a pre-play game where the countries choose whether or not to initiate political integration. Secondly, we examine the effects on political integration of ratification by referendum. We conclude that a significant improvement of the political integration process would be to specify within the international treaty itself the means for its ratification; more precisely, to incorporate a formal ratification procedure, corresponding to an *ex post* referendum.

Keywords: Delegation; Nash Bargaining Solution; Political Integration; Ratification; Referendum.

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1 Introduction

European political integration has come to a halt with the French and Dutch referenda on the European Constitution. Apart from the nature of the Constitution itself, this failure has raised some questions about the ratification procedures for international treaties. If political integration involves, by definition, an agreement between sovereign states, the implementation of this agreement and in particular the ratification process, remains the responsibility of the states themselves. There are as many processes of ratification as there are countries. And, even if the ratification of the European Constitution involves more recourse to citizen opinion by open referendum than ever before (eleven countries), there is still a great diversity of ratification procedures, as shown in Table 1:

Insert Table 1.

This paper does not focus strictly on the negative result of the Dutch and French referenda. We study rather here the consequences of the delegation rule and the effects of the ratification procedure on the final outcome of political integration. We use a two-country model of choices for the provision of a public good with heterogeneous individuals and international policy spillovers. Our framework's assumptions point unambiguously to an efficient centralization of the provision of the public good.

The original feature of our approach is to consider the identity and the "power" of the national representative as endogenous, resulting from a majority vote in each country before any negotiation. According to Schelling (1960), we show that the populations decide to bind themselves by delegate the national policy decision to a "powerful conservative representative",¹ in order to improve their bargaining situation. It appears that the benefit from coordination in terms of aggregate welfare vanishes as long as the delegation rule remains a national prerogative. Indeed, the non-cooperative behaviours of countries when

¹ A "powerful conservative representative" will be formalized through the proposed framework in the next sections. In words, she corresponds to a representative, who remains in place whatever the outcome of international negotiations and who is less keen to public spending than the national median voter.

they choose their political representative and the competences of these latter, eliminate the gains from political integration.

Two extensions are then proposed. First, we study if a country prefers or not initiating the political integration. We highlight a second-mover advantage: the countries are incited to follow the process in order to increase their negotiation power. Second, we consider two domestic ratification procedures, which might improve the terms of political integration by reducing the negative effect of strategic delegation. Note that we adopt a normative point of view in this second extension. Indeed, resorting to referendum for a treaty ratification might be used strategically by one of the two countries.² We consider only ratification procedures which would be accepted simultaneously by both countries. An *ex ante* referendum, which is assumed equivalent to a majority approval of political integration, leads to the rejection of any international treaty. On the other hand, an *ex post* referendum makes the international agreement possible and increases the aggregate welfare by reducing the negative effects of strategic delegations.

The remainder of the paper is organized as follows. Section 2 discusses some of the related literature. Section 3 outlines the framework's assumptions for our analysis. Section 4 then presents the negotiation game and two particular cases, which correspond to two Stackelberg games. Section 5 offers the two extensions: the pre-play game and the two ratification procedures. Section 6 concludes.

2 Related literature

By considering the rules of delegation as endogenous domestic political decisions, we contribute to the literature (essentially in political science), which analyses the sources of strength in international bargaining. Inspiring from Schelling (1960), Putnam (1988) developed the "two-level game" metaphor to apprehend international bargaining: the level I corresponds to the negotiation between the country's representatives, while the level II

² For instance, studying the Amsterdam Intergovernmental Conference, Hug and König (2002) establish empirically that domestic ratification constraints as referendum ratification influence the outcome of the bargaining process in accordance with Schelling conjecture.

describes the relationships between these representatives and their constituency.³ We assume some heterogeneity among country' populations. The political integration which ensures the internalization of economic externalities, has distributional consequences between the countries and inside themselves. We consider here a Nash Bargaining Solution (NBS) to formalize the level I's negotiations. For solving the level II issue, we apply the Median Voter Theorem (MVT), which enable us to link the national representative to her constituency.

Our analysis of political integration also fits into the literature which examines the incentives of regions or countries to separate or to unite. This issue has been renewed by the studies of Alesina and Spolaore (1997) and Bolton and Roland (1997), who focus on the trade-off between the costs of heterogeneity in large populations and the benefits to large countries or unions of countries in providing public goods (see Alesina and Spolaore (2003) and Ruta (2005) for a survey). We extend these works and some of their developments such that Gradstein (2004) or Goyal and Staal (2004),⁴ who consider only direct democracy. This approach does not examine strategic delegation, which usually explains the failures of centralized decision.

Therefore, we follow Persson and Tabellini (1992), Segendorff (1998)⁵ or Besley and Coate (2003), who present strategic delegation as a choice of a representative whom preferred policy differs from the majority's one. In line with these authors, we consider political integration as a negotiation between sovereign states to provide a public good. But, we contrast with them, since our formalization of the international negotiation involves a NBS in case of political integration. Our analysis might be also applied to international trade or environment agreements (see for instance Laussel and Riezman

³ See for instance Tarar (2005) or Hug (2004) for critical surveys and developments.

⁴ Gradstein (2004) establishes a link between Buchanan and Faith (1987) and the Coase Theorem. He explains how an egalitarian bargaining rule through referendum is necessary to extract the full benefits of centralization. Goyal and Staal (2004) extends Alesina and Spolaore (1997) model by analysing the effects of asymmetries among countries on the political integration or separation. They show that the voting rule with two referenda (one in each region) is stable, in the sense that it is chosen by a vote following different rules as well as being normatively appealing.

⁵ The nature of political integration is here not the same as in Persson and Tabellini (1992), who represent European integration as a decrease in the mobility costs of capital, the tax bases, across the borders. Segendorff (1998) does not consider vote and the choice between different delegation rules is exogenous.

(2005), Buchholz and Peters (2005)⁶). Besley and Coate (2003) discuss the desirability of centralization depending on the degree of spillovers: for low spillovers, decentralization is preferable; for high, centralization is the better option. Over-provision of public goods may result from strategic delegation by jurisdictions. Indeed, when the cost of public goods is shared among the members, policymakers have an incentive to delegate their bargaining power to individuals with a stronger preference for the public good.

However, the literature on the relationship between centralization and delegation remains divided. On one hand, Dur and Roelfsema (2004) and Lorz and Willmann (2005) conclude that under-provision of public goods can persist under centralization because policy makers delegate to agents with weaker preferences for public goods.⁷ On the other hand, Redoano and Scharf (2004) compare direct and representative democracy and establish that centralization is more likely to occur under representative democracy than under direct democracy. We broaden these analysis by assuming that the choice between these political regimes is endogenous resulting from a simultaneous move.

Since Crawford and Varian (1979) and Burtraw (1992), it is recognized that misrepresentation might improve players negotiation position in a NBS. We observe a similar tendency and join the results of Dur and Roelfsema (2004), Lorz and Willmann (2005) or Buchholz, Haupt, and Peters (2005)⁸: strategic delegation involves representatives with a lower preference for public spending, which gives a first bargaining advantage. Moreover, we establish that representative democracy is always preferred to direct one: the national median voter chooses to have her hands tied in order to get a second bargaining advantage. Direct democracy is never chosen by voters. We suggest the need to incorporate an *ex post* referendum as the sole method for ratification of the international treaty in order to obtain welfare-enhancing political integration.

⁶ For Buchholz and Peters (2005), the provision of international public goods, such as stopping CFC emissions or cutting back emissions of greenhouse gases, might be interpreted as "some kind of political integration".

⁷ Dur and Roelfsema (2004) allow for costs which cannot be shared among districts, while Lorz and Willmann (2005) consider a continuum of local public goods with interregional spillovers.

⁸ In the International Environmental Agreements context and using a symmetric NBS, Buchholz, Haupt, and Peters (2005) show that each individual delegate to a representant who is less "eco-friendly" than herself.

Finally, our analysis is also complementary to Alesina and Wacziarg (1999) and Alesina, Angeloni, and Schuknecht (2005), who study the optimal distribution of political prerogatives. Focusing on European monetary policies, Alesina and Wacziarg (1999) show that increased economic integration reduces the incentives for political integration. They propose an “optimal delegation of political prerogatives” across levels of government, which is closed to the notion of Functional Overlapping Competing Jurisdictions (FOCJs) developed by Casella and Frey (1992). Alesina and Wacziarg (1999) determine to which level of government the allocation of a public good should be attributed. We highlight here two important elements of institutional design which affect international agreements: the kind of delegation rule which determines the identity and the "power" of the national representatives, and the nature of the treaties' ratification.

3 The model

We model a world consisting of two countries (1 and 2), which might create a union. There is no mobility across countries. We assume that the cost of the public good is not shared between participant countries.⁹ This asymmetry between the two countries which contrasts with Besley and Coate (2003)'s framework and its followers, enables us to distinguish the countries beyond their respective size, their incomes distribution or their distribution of the individual preferences for the public good. According to Gradstein (2004), we assume that country 1 with a population normalized to 1 provides a public good, in quantity g , which generates externalities for the other country, namely country 2. The latter might pay a transfer, denoted T , to country 1 in order to increase the public good's production. The size of country 2 is denoted d , with $d \leq 1$. Given the assumption of our framework, separation corresponds to a free ride for country 2.

The spillover effects motivate political integration. In case of union, Besley and Coate (2003) propose two specifications of international legislative which determines the national

⁹ Some examples of these public goods are NATO's protection of Norway's ports, internal security, immigration policy (see Tabellini (2003)) or more broadly any international public goods, which is produced in a specific site and have no close substitutes in the other country.

policies: a non-cooperative one where each country's representative has a probability $1/2$ to be the minimum winning coalition and to implement her preferred policy; a cooperative legislative which maximizes the surplus of both representatives. We consider here a third specification of legislative behavior, corresponding to a cooperative bargaining between both countries on national policies (g and T).¹⁰ This negotiation is formalized by means of an asymmetric NBS as defined in Muthoo (1999), where the threat point is endogenous and corresponds to the non-cooperative decentralized equilibrium.

Our game is in three stages. At the first stage, the population of each country simultaneously chooses the kind of political representation it wants or, in other terms the rule of delegation.¹¹ Following Segendorff (1998), we consider three kinds of delegation: strong, weak or none. In the case of strong delegation, denoted sd , the representatives choose their preferred policies. These policy-makers remain in place whatever the success or failure of negotiations. The second case, namely weak delegation and denoted wd , involves a new round of elections if negotiations fail: the country's representative is compelled to go back to their voters in the case of failure.¹² In the last case, the referendum denoted ref , the democracy is direct. Policies are then determined through a referendum, *i.e.* the country's median voters decide on policies. At the second stage, depending on the choice of the delegation rule, a simple majority vote fixes on the identity of the political representative in each country (then if, and only if, strong or weak delegation was chosen earlier). At the third and last stage of the game, the countries' representatives (previously chosen) or a referendum settle the national policies: more accurately, the level of public good for country 1 (g) and the level of transfer paid by country 2 (T).

We now specify the heterogeneity of the countries' populations. Each inhabitant has

¹⁰ An other option to apprehend the political integration would be to consider that a vote in both countries determines a unique representative. This solution would suppose the existence of a unique political decision-maker for the two countries, then a much more deeper political integration than the one studied in this paper (see Ellingsen (1998) or Cheikbossian (2000) for a formal development in a federation).

¹¹ We assume that every delegation rule has the same cost.

¹² Note that the European Constitution referendum was an occasion for debates about the resignation of French President Chirac. In contrast, Luxembourg's Prime Minister, Junker, undertook to resign in the case of failure before the referendum result. In terms of our framework and under the assumption that the threat (or promise) to resign in the case of failure is credible, France was under strong delegation rule while Luxembourg opted for weak delegation.

a unique ideal level for the production of the public good. Let a_i (respectively b_j) be the public good's appreciation for inhabitant i in country 1 (respectively inhabitant j in country 2). By assumption, a_i and b_j are distributed over $[\underline{a}, \bar{a}]$ and $[\underline{b}, \bar{b}]$ with respect to the density function $h_1(\cdot)$ and $h_2(\cdot)$. Let A and B denote the mean values of a_i and b_j , whereas A_m and B_m will denote their median values.¹³ Therefore, we pose: $A_m - dB_m \geq \underline{a}$, and $B_m \geq \frac{b}{2}$. This condition will insure that the application of the MVT always yields to an interior solution in the sets $[\underline{a}, \bar{a}]$ and $[\underline{b}, \bar{b}]$. The inhabitants of country 1 are assumed to have preferences that can be described by the following utility function:

$$U(g, T; a_i) = a_i g - e(g) + dT, \quad (1)$$

where $e(g)$ is the effort or the cost of producing the public good. For tractability, we consider a quadratic form of this effort: $e(g) = \frac{g^2}{2}$. In country 2, we assume:¹⁴

$$V(g, T; b_i) = b_i g - T. \quad (2)$$

3.1 Pareto optimum

We consider a Benthamite social welfare function, defined by:

$$\begin{aligned} W(g) &= \int_{\underline{a}}^{\bar{a}} U(g, T; a_i) h_1(a_i) da_i + d \int_{\underline{b}}^{\bar{b}} V(g, T; b_i) h_2(b_i) db_i \\ &= g \left(A + dB - \frac{g}{2} \right) \end{aligned}$$

The Pareto optimum over the two countries is determined by the following program:

$g^{opt} \equiv \arg \max_{g \geq 0} W(g)$. The optimal levels of public good and welfare, respectively denoted

¹³ In contrast to Gradstein (2004) or Goyal and Staal (2004), we do not assume uniform (or even symmetric) distributions, which would induce $A_m = A$ and $B_m = B$. Indeed, Ellingsen (1998) emphasizes the role of the distributions of preferences across countries and their relative size in the political integration process.

¹⁴ This formalisation is used by Gradstein (2004) and it provides a very stylised (and tractable) representation of inter-jurisdictional policy spillovers.

g^{opt} and W^{opt} , are then given by:

$$g^{opt} = A + dB, \quad (3)$$

$$W^{opt} \equiv W(A + dB) = \frac{1}{2}(A + dB)^2. \quad (4)$$

At the Pareto optimum, the level of transfer is undetermined, since by definition of our welfare function compensatory transfers are allowed between the two countries.¹⁵

3.2 Decentralized equilibrium

The decentralized equilibrium serves as the threat point for the negotiations. It is defined by a non-cooperative simultaneous subgame at the third stage of our general game whatever is the kind of delegation chosen at the second stage. Let a_R and b_R be the respective identity of the political representative in country 1 and in country 2. Applying backward induction, we determine the national policies, before we turn to the delegation issue. The national policies are given by the following system:

$$\left\{ \begin{array}{l} g^{dec}(a_R, b_R) \equiv \arg \max_{g \geq 0} \{U(g, T; a_R)\} \\ T^{dec}(a_R, b_R) \equiv \arg \max_{T \geq 0} \{V(g, T; b_R)\} \end{array} \right\} \Leftrightarrow \left\{ \begin{array}{l} g^{dec}(a_R, b_R) \equiv g^{dec}(a_R) = a_R \\ T^{dec}(a_R, b_R) \equiv T^{dec} = 0 \end{array} \right. \quad (5)$$

where the exponent *dec* informs us of the decentralized equilibrium values. We consider the second stage of the game, *i.e.* the choice of the country's representative. Under weak or strong delegation, the representative of country 1 is the unique relevant political decision-maker, since b_R does not appear in the decentralized equilibrium policies: $g^{dec}(a_R)$ and

¹⁵ However, for instance, we might add an egalitarian rule, which gives the same utility for the mean inhabitant of both countries. Formally, the transfer, denoted T^{eg} , will then be the solution of:

$$U(g^{opt}, T^{eg}; A) = V(g^{opt}, T^{eg}; B),$$

which yields to:

$$T^{eg} = \frac{(A + dB)[(2 + d)B - A]}{2(1 + d)}.$$

This transfer is non negative if $\frac{A}{B} < 2 + d$.

T^{dec} . Therefore, we have:

$$a_R^{dec}(a_i) \equiv \arg \max_{a_R \in [\underline{a}, \bar{a}]} \{U^{dec}(a_R; a_i)\} \Leftrightarrow a_R^{dec}(a_i) = a_i.$$

By applying the MVT, we deduce that $a_R^{dec} = A_m$ and then $g^{dec} = A_m$. If national policies are determined directly through majority voting, they are the solution of the following system:

$$\begin{cases} g^{dec}(a_i, b_i) \equiv \arg \max_{g \geq 0} \{U(g, T; a_i)\} \\ T^{dec}(a_i, b_i) \equiv \arg \max_{T \geq 0} \{V(g, T; b_i)\} \end{cases} \Leftrightarrow \begin{cases} g^{dec}(a_i, b_i) \equiv g^{dec}(a_i) = a_i \\ T^{dec}(a_i, b_i) \equiv T^{dec} = 0 \end{cases}$$

Applying the MVT also yields to $g^{dec} = A_m$. Thus, for any kind of delegation, the individual utilities values in both countries and the aggregate welfare are respectively given by:

$$U^{dec}(A_m; a_i) \equiv U(A_m, 0; a_i) = A_m \left(a_i - \frac{A_m}{2} \right), \quad (6)$$

$$V^{dec}(A_m; b_i) \equiv V(A_m, 0; b_i) = A_m b_i, \quad (7)$$

$$W^{dec} \equiv U^{dec}(A_m; A) + dV^{dec}(A_m; B) = A_m \left(A - \frac{A_m}{2} + dB \right). \quad (8)$$

For the rest of the paper, we assume the following condition

$$A_m < A + dB. \quad (9)$$

Under condition (9) and according to the Oates' Theorem, we note that decentralization involves an under-provision of the public good due to the presence of inter-jurisdictional spillovers.¹⁶ Moreover, it is obvious that the decentralized equilibrium aggregate welfare is always sub-optimal.¹⁷ Political integration allows to internalise some externalities and to

¹⁶ If we link these distributions to the national income distributions, as in Bolton and Roland (1997), we note that $A_m < A$ and $B_m < B$ and we deduce that condition (9) is respected.

¹⁷ Indeed, we have:

$$W^{opt} - W^{dec} = \frac{1}{2} (A - A_m + dB)^2 > 0.$$

fill part of the gap between the Pareto optimum and decentralized equilibrium. However, we will show in the next sections that the detail of political decision-making is not neutral and affects the degree to which the gap is filled.

4 Nash Bargaining Solution

Since Binmore, Rubinstein, and Wolinsky (1986), the solution of any sequential bargaining problem à la Rubinstein, where parties alternate in making offers/counter-offers to the other party in order to reach an agreement, is the solution of a cooperative bargaining under appropriate formulation. More specifically, as the discount rate tends to zero, the perfect equilibrium converges to a NBS with the disagreement point being the payoff profile that prevails until the negotiating parties reach an agreement.

We denote $a_{R'}$ the type of the political representative in country 1 in the case of no agreement, equivalent to the decentralized equilibrium. The value of $a_{R'}$ depends on the delegation' rule chosen at the first stage. More accurately, we have: $a_R = a_{R'}$ in the case of strong delegation (the success or failure of the political integration does not affect the identity of the political representative); $a_{R'} = A_m$ in the case of weak delegation (if negotiations for political integration fail, a new election in each separate country fixes on the identity of the representant, who will be the national median voter as in the decentralized situation); and $a_R = a_{R'} = A_m$ in the case of a referendum (no delegation).

Therefore, we determine a perfect equilibrium in a negotiation game where the disagreement payoffs are endogenous, corresponding to the decentralized equilibrium. Whatever the delegation rule in each country, the set of possible agreements is given by $\Psi \equiv \{(g, T) \in \mathbf{R}^{2+} : g \geq 0 \text{ and } T \geq 0\}$. If the regions fail to reach agreement, they obtain the decentralized outcome, denoted by $\Phi \equiv (U^{dec}(a_{R'}; a_R), V^{dec}(a_{R'}; b_R))$, where the utilities values are respectively given by (6) and (7). Let $(g^N(a_{R'}, a_R, b_R), T^N(a_{R'}, a_R, b_R))$

denote the NBS of the problem (Ψ, Φ) :

$$(g^N(\cdot), T^N(\cdot)) \equiv \arg \max_{(g, T) \in \Psi} \left\{ [U(g, T; a_R) - U^{dec}(a_{R'}; a_R)]^\alpha [V(g, T; b_R) - V^{dec}(a_{R'}; b_R)]^{1-\alpha} \right\}, \quad (10)$$

where α is the relative bargaining power of country 1. In the non-degenerate NBS problem, the following conditions must also hold: $U(g, T; a_R) > U^{dec}(a_{R'}; a_R)$ and $V(g, T; b_R) > V^{dec}(a_{R'}; b_R)$. The equilibrium values of g and T are then implicitly characterized by the following system of First Order Conditions (FOCs):

$$\begin{cases} \alpha \frac{\partial U(\cdot)}{\partial g} (V(g, T; b_R) - V^{dec}(a_{R'}; b_R)) + (1 - \alpha) \frac{\partial V(\cdot)}{\partial g} (U(g, T; a_R) - U^{dec}(a_{R'}; a_R)) = 0 \\ \alpha \frac{\partial U(\cdot)}{\partial T} (V(g, T; b_R) - V^{dec}(a_{R'}; b_R)) + (1 - \alpha) \frac{\partial V(\cdot)}{\partial T} (U(g, T; a_R) - U^{dec}(a_{R'}; a_R)) = 0 \end{cases}$$

The unique solution satisfying $U(g, T; a_R) > U^{dec}(a_{R'}; a_R)$ and $V(g, T; b_R) > V^{dec}(a_{R'}; b_R)$ is then given by:

$$\begin{cases} g(a_R, b_R) = a_R + db_R \\ T(a_{R'}, a_R, b_R) = \frac{1}{2d} (a_R - a_{R'} + db_R) ((1 - \alpha)(a_{R'} - a_R) + (1 + \alpha)db_R) \end{cases} \quad (11)$$

By substituting (11) in (1) and (2), we obtain:

$$U(g^N(\cdot), T^N(\cdot); a_i) = \frac{1}{2} \begin{bmatrix} (a_R + db_R)(2a_i - (2 - \alpha)a_R + \alpha db_R) \\ + a_{R'}(2a_R - (1 - \alpha)a_{R'} - 2\alpha(a_R + db_R)) \end{bmatrix}. \quad (12)$$

$$V(g^N(\cdot), T^N(\cdot); b_i) = b_i(a_R + db_R) + \frac{(a_R + db_R - a_{R'})}{2d} \begin{bmatrix} (1 - \alpha)(a_R - a_{R'}) \\ - (1 + \alpha)db_R \end{bmatrix}. \quad (13)$$

We now consider the second stage of the game: the choice of political representative in each country. Note that $\frac{da_{R'}}{da_R} = 1$ in the case of strong delegation since $a_R = a_{R'}$, and $\frac{da_{R'}}{da_R} = 0$ for weak delegation.¹⁸ By definition, under the referendum rule, there is no election of the political representative. The policy variables (g and T) are then chosen

¹⁸ We show in the APPENDIX A.1 the strictly concavity of $U(g^N(a_R, b_R), T^N(a_{R'}, a_R, b_R); a_i)$ and $V(g^N(a_R, b_R), T^N(a_{R'}, a_R, b_R); b_i)$ with respect to a_R and b_R .

directly by the inhabitants. We present the developments in APPENDIX A1.

The first stage of the game concerns the choice of the delegation rule, which corresponds to a simultaneous move for each player. Each country has three pure strategies available: strong delegation (*sd*), weak delegation (*wd*) and referendum (*ref*). Let x define the strategy of country 1 and y the strategy of country 2, with $(x, y) \in \{sd, wd, ref\} \times \{sd, wd, ref\}$. The following table presents the equilibrium values of national policies:¹⁹

Insert Table 2.

From APPENDIX A1, it appears that weak delegation is not relevant in this game for country 2, equivalent to the referendum option. The normal form of the game is given by:

Insert Table 3.

We deduce the following proposition:

Proposition 1 *Under the assumptions of our framework,*

- (i) *the unique Subgame Perfect Nash Equilibrium involves strong delegation in both countries, (sd, sd);*
- (ii) *political integration does not improve aggregate welfare with respect to decentralization ($W^N(sd, sd) = W^{dec}$).*

Proof: see APPENDIX A1.

The first result of PROPOSITION 1 is an illustration of *the paradox of weakness* emphasized by Schelling (1960).²⁰ Each country looks for improving its negotiation position by two ways: the kind of delegation which settles the domestic power of the political repre-

¹⁹ If one or both countries chooses to decide its policy through a referendum at the first stage of the game, it seems unrealistic to imagine a negotiation between the population and the possible political representative in the other country. That is the reason why we assume that there is a "fictitious" delegation in which the representative corresponds exactly to the median voter. This hypothesis is equivalent to that of sincere voting. As Laussel and Riezman (2005), we might also assume that the candidates only motivated by winning the elections commit themselves to the ideal policy of the median voter.

²⁰ This author wrote page 22:

"the power to constrain an adversary may depend on the power to bind oneself; that, in bargaining, weakness is often strength, freedom may be freedom to capitulate, and to burn bridges behind one may suffice to undo an opponent."

sentant and the identity of the political representant. At the equilibrium, both countries choose a "powerfull conservative representative": voters opt for strong delegation (sd, sd) and they strategically delegate to representatives who are more averse to public spending than they are.²¹ Strong delegation is here a credible strategic commitment.²² By choosing this delegation rule, populations bind themselves in order to improve their bargaining situation in a first way. We note that the equilibrium level of public good does not depend on the relative bargaining power of country 1 (α), while the transfer paid by country 2 to country 1 is decreasing in this parameter. The more powerfull country 1 is, the less will be the level of transfer paid by country 2 ($\frac{\partial T^N(\cdot)}{\partial \alpha} < 0$). This paradoxical result is explained by the Schelling conjecture. Through our framework, the vote for a more conservative representative is the second way to make the other country bear the cost of the public good as in any prisoner's dilemma. Like Lorz and Willmann (2005), we observe under condition (9) that strategic delegation systematically involves an under-provision of the public good ($g^N(sd, sd) = A_m = g^{dec} < g^{opt} = A + dB$). Our result also joins Laussel and Riezman (2005), who establish that representative democracy yields to a more aggressive trade policy, *i.e.* a more protectionism than direct democracy.

Since the equilibrium transfer T^N is here strictly positive and the level of public good is the same as the decentralized level ($g^N(sd, sd) = A_m$), we deduce that country 2 is worse as soon as political integration is considered. Indeed, strong delegation in country 1 involves a provision of public good in case of no agreement inferior to the level provided in case of separation: $g^{dec}(sd, sd) = A_m - \frac{1}{1+\alpha}dB_m < g^{dec} = A_m$. In other words, the political integration process ensures country 1 to improve its situation at the detriment of country 2 by threatening to reduce the level of public good through the identity and the power of its political representative.

The second result of PROPOSITION 1 establishes the absence of any gain in the international negotiation at the aggregate level. Not only, does political integration not allow

²¹ We denote $a_R^N(x, y; a_i)$ and $b_R^N(x, y; b_i)$, the ideal representative for individual of type a_i in country 1 and b_i in country 2. From (15) in APPENDIX A.1, we observe that: $a_R^N(sd, sd; a_i) = a_i - \frac{1}{1+\alpha}db_R < a_i$ and $b_R^N(sd, sd; b_i) = \frac{1}{1+\alpha}b_i \leq b_i$.

²² The credibility of our equilibrium corresponds to its subgame perfectness.

the countries to reach the Pareto optimum, it also does not increase the aggregate welfare with respect to decentralization (see APPENDIX A.1). Focusing on International Environment Agreements, Buchholz, Haupt, and Peters (2005) show that political integration might increase ecological damages in comparison with *status quo*. Our result contrasts with Gradstein (2004) who assumes uniform preferences distributions in both countries.²³ As an extreme case of Dur and Roelfsema (2004)'s framework, our model yields a similar conclusion. It is then obvious that the case (ref, ref) where no delegation is possible, yields the maximum aggregate welfare (see APPENDIX A1). The second part of the following section will examine some additional elements in the design of international treaties that might improve the payoffs of political integration by moving the equilibrium closer to the case (ref, ref) .

European Union (EU) has been accused of a "democratic deficit". Although there is no single meaning of this latter expression, Follesdal and Hix (2006) proposes a synthetic approach of recent works on this issue. Among different elements as the European Parliament's weakness or the absence of European elections, one of the key features of the "democratic deficit" is the gap, the "policy drift",²⁴ between the will of national majorities and the policies implemented at the European level. The EU seems to adopt policies that are not supported by national majorities, and the EU policy outcomes are accused to differ perceptibly from those preferred by national majorities. PROPOSITION 1 presents this european "democratic deficit" as a deliberate choice made by country' populations. Indeed, accordingly to the Schelling conjecture, direct democracy (or referendum) is never chosen as political regime at the equilibrium. In order to improve their bargaining position, country' population opt for delegating strategically to a representative less favorable for public good, and thus more reluctant to centralization.

Now, we consider two particular cases of the NBS, where the negotiating power (α) is equal to 1 or to 0. The Stackelberg 1 game²⁵ corresponds to the case where country 1 has

²³ Even if $A = A_m$ and $B = B_m$, we do not observe that $W^N(sd, sd) = W^{opt}$, since the non cooperative strategies of delegation affect the final result.

²⁴ In the international trade's context, Laussel and Riezman (2005) explain why some "protectionism drift" emerges systematically from strategic delegation.

²⁵ This scenario might be considered as an immediate extension of Gradstein (2004).

the political integration' initiative ($\alpha = 1$). It makes an offer in term of national policies (g and T) at the third stage of the game; country 2 accepts and political integration occurs or it rejects and remains separate. Everything happens as if country 1 is the leader of a classic Stackelberg game. In this scenario, country 1 has the agenda setting power. In the second case, named Stackelberg 2, the sequence of the moves is inverse, country 2 playing first ($\alpha = 0$). These two games are named the "take-it-or-leave-it" option. The leader is able to make an offer to the follower such that the latter is indifferent between political union or the separation. This exercise allows us to consider a hegemonic country, which bears the production of the international public good. By comparing the equilibriums of the two Stakelberg games, the following corollary is immediate:

Corollary 1 *Given the equilibriums in the two Stackelberg games (sd, sd), it appears that it is in no country's interest to be the first mover, i.e. to take the initiative of political integration.*

Proof: Indeed, we have:

$$\begin{cases} U_1(ref, sd) = \frac{1}{2}A_m^2 + \frac{1}{8}d^2B_m^2 < U_2(sd, sd) = U_2(sd, ref) = \frac{1}{2}A_m^2 + \frac{1}{2}d^2B_m^2 \\ V_1(ref, sd) = A_mB_m + \frac{1}{4}dB_m^2 > V_2(sd, sd) = V_2(sd, ref) = A_mB_m - \frac{1}{2}dB_m^2 \end{cases}$$

where $U_i(.,.)$ and $V_i(.,.)$ denote the equilibrium values at the Stackelberg game, where country i is the leader.

Each country prefers to be a follower in the Stackelberg game. The player making the offer cannot capture the surplus from an immediate agreement, since the follower would delegate to a representative with a lesser preference for the public good. We will go into this point in greater depth in the following section.

5 Extensions

In this section we propose two extensions of the precedent game. The first one consists in allowing countries to initiate or not the political integration process. In fact, we assume that countries decide their role as first or second mover in a pre-play game. The second examines the effect of a ratification requirement on political integration. We consider two

forms of ratification: an informal procedure, which actually corresponds to an *ex ante* approval of political integration, and a formal ratification which is equivalent to an *ex post* referendum.

5.1 Choosing roles

In the context of competition between firms, the literature has studied the premise that the order of play in a given two-player game ought to result from the players' own pre-play timing decisions. The determination of simultaneity versus sequentiality of moves, as well as the assignment of roles of the players in the latter case, is then completely endogenous (*cf.* d'Aspremont and Gerard-Varet (1980), Gal-Or (1985) or Dowrick (1986)). We consider here a pre-play game at a stage 0, where each country's median voter announces independently its choice of role, as leader or follower. Each country has two possible strategies: *Leads* or *Follows*. In the same way as Dowrick (1986), we assume that if country i chooses leadership (strategy *Leads*), it commits itself to setting its national policy as leader and if it chooses to be a follower (*Follows*), it commits itself to following the other country's decision. If countries choose complementary roles, one of the two Stackelberg games will emerge. If both choose to lead, we assume that there is a negotiation between them, which corresponds to the NBS. However, if both countries choose to follow, we assume that there is no political integration and countries receive their decentralized outputs (each country waiting for a proposition from the other). We then deduce the following normal form for the game:²⁶

Insert Table 4

We obtain the PROPOSITION 2:

Proposition 2 *The unique Subgame Perfect Nash Equilibrium of the game described in Table 4 is (Leads, Follows), which corresponds to the equilibrium of the Stackelberg 1 game (i.e. the NBS with $\alpha = 1$).*

²⁶ We denote $U^i(sd, sd)$ and $V^i(sd, sd)$ the equilibrium utilities of the median voter when country i plays first ($i = 1, 2$).

Proof: From TABLE 3, it is obvious that the strategy *Leads* is always dominated by the strategy *Follows* for country 2. We deduce our result.

Assuming countries populations are able to choose through a majority vote whether they will initiate political integration or not, we conclude that the country which provides the public good, namely country 1, prefers to play first while the second country follows. As has been shown in section 4, this equilibrium is sub-optimal. Gal-Or (1985) establishes that the Stackelberg leader earns lower profits than the follower when the reaction function of the follower is upward sloping. Through TABLE 4, we observe a similar tendency: $U^1(sd, sd) < U^2(sd, sd)$ and $V^1(sd, sd) > V^2(sd, sd)$. The Schelling conjecture might also apply here: the leader is constrained by the participation of the follower; aware of her power on the final negotiation, the follower improves her bargaining position to the detriment of the leader. By comparing PROPOSITION 2 to COROLLARY 1, we deduce that the threat of *status quo* is more restrictive for country 1, which accepts the leader position. Indeed, country 2 is always able to free ride on the public good provision from country 1.

5.2 Ratification requirement

In this subsection, we study the effects of a ratification requirement through a referendum on the political integration issue. We do not consider the strategic use of ratification requirement, *i.e.* the cases where each country looks for increasing its bargaining power by binding itself through a ratification. Our approach is here more normative by examining if a ratification procedure included in the international treaty-itself would improve the aggregate welfare.²⁷ Indeed, PROPOSITION 1 establishes that political integration does not increase the level of the provided public good with respect to its decentralized level (equal to A_m).

Since Putnam (1988), a distinction has been made in principle between formal ratification and more informal forms of approval. Formal ratification presents some decision-

²⁷ The analysis of tactic commitments through ratification procedures will be very interesting, but will impose substantial developments.

makers with a dichotomous strategy space, giving them the choice of either accepting or rejecting a treaty. Informal ratification produces a continuous strategy space. We consider rather that the sequence of decisions is the crucial difference between formal and informal ratification. We focus on both forms of ratification: the informal procedure corresponds to an approval on the process of political integration at the beginning of the game, while formal ratification is achieved through a referendum on the negotiated national policies (g and T) at the end of the game.

5.2.1 Informal ratification

Informal ratification is particularly important in the European Union context, since populations control over policy is usually indirect when it exists. Instead of describing informal ratification through some audience costs which governments have to bear, we prefer to define informal ratification as an *ex ante* referendum. We then imagine an additional stage (stage 0) at the beginning of the game developed in section 4, where a referendum is held on the political integration issue in each country. By backward induction, we have only to establish if national median voters are in favour of political integration or not at the Perfect Nash Equilibrium established in PROPOSITION 1. The result is obvious by comparing the utilities values at the equilibrium given in Table 2 with those at the decentralized equilibrium, whatever is the value of α belonging to $[0, 1]$. We deduce the following proposition:

Proposition 3 *Under the assumptions of our framework, an informal ratification, which corresponds to a referendum on political integration at the beginning of the game, would always lead the populations to reject political integration.*

Proof: see APPENDIX A.2.

The strategic delegation disturbs the results of political integration, in particular for the inhabitants of country 2. Thus, under the assumption of individual perfect anticipations, the political integration process would fail if an informal ratification is proving indispensable.

5.2.2 Formal ratification

We now consider formal ratification, which corresponds to a referendum at the end of the game. We assume that a clause is introduced into the international treaty, which imposes on each participant country formal ratification through a referendum. We restrict our analysis to the symmetric case only: after an agreement is reached, a referendum on the negotiated national policies is held in both countries. The last stage of our game is modified and the maximization program (10) becomes constrained. Let $(g_{Rat}^N(\cdot), T_{Rat}^N(\cdot))$ denote the equilibrium value of the constrained maximization program:

$$(g_{Rat}^N(\cdot), T_{Rat}^N(\cdot)) \equiv \arg \max_{(g,T) \in \Psi} \left\{ [U(g, T; a_R) - U^{dec}(a_{R'}; a_R)]^\alpha [V(g, T; b_R) - V^{dec}(a_{R'}; b_R)]^{1-\alpha} \right\}$$

$$s.t. \quad \begin{cases} U(g, T; A_m) \geq U^{dec}(a_{R'}; A_m) \\ V(g, T; B_m) \geq V^{dec}(a_{R'}; B_m) \end{cases}$$

We deduce the following Lagrangian function:

$$L(g, T; \lambda, \mu) = [U(g, T; a_R) - U^{dec}(a_{R'}; a_R)]^\alpha [V(g, T; b_R) - V^{dec}(a_{R'}; b_R)]^{1-\alpha} - \lambda [U(g, T; A_m) - U^{dec}(A_m; A_m)] - \mu [V(g, T; B_m) - V^{dec}(A_m; B_m)] \quad (14)$$

For each delegation rule, we consider four cases depending on the values of the Lagrange multipliers: $\lambda (> 0$ or $= 0)$ and $\mu (> 0$ or $= 0)$. We obtain the following normal form of the modified game (see developments in APPENDIX A.3):

Insert Table 5

We deduce the following proposition:

Proposition 4 *Under the assumptions of our framework, formal ratification on the international treaty through an ex post referendum yields to the Subgame Perfect Nash Equilibrium: (wd, sd).*

Proof: see APPENDIX A.3.

Formal ratification restrains the harmful delegation in country 1, since the equilibrium strategy, weak delegation (wd), involves by definition at least the satisfaction of the median voter. In the same way as without ratification constraints, we notice that the utility of the median voter in country 1 remains decreasing in α , the bargaining power of this country. Our result contrasts sharply with Redoano and Scharf (2004), who establish that delegation can make centralization possible in situations where a referendum would not support it. However, these authors assume a polar situation where the heterogeneity of the population is represented by a couple of real values. Therefore, in their framework, the strategic delegation is very restricted since there are only two possible types of representatives. Moreover, following Besley and Coate (2003), Redoano and Scharf (2004) formulate political centralization as a gamble where each national representative has a probability (1/2) of being the unique relevant decision maker for the countries' union. There is no bargaining between the representatives.

By comparing the welfare equilibriums with and without a formal ratification requirement, it appears that the median voter of country 1 is worse off, while the median voter of country 2 enjoys an improvement of her (his) utility.²⁸ At the equilibrium, the aggregate welfare remains lower than the Pareto optimum, but it is better than the decentralized level if the distributions of the individual preferences for the public good respect condition (9). From Propositions 3 and 4, a second corollary is immediate:

Corollary 2 *Under the assumptions of our framework, the informal ratification game has a smaller core than the formal.*

In other terms, agreement may be possible under a formal ratification but impossible under an informal one. Thus, the timing of majority approval matters.

²⁸ We observe that: $\forall \alpha \in]0, 1[$,

$$\begin{aligned}
 U_{Rat}^N(wd, sd) &= \frac{1}{2}A_m^2 + \frac{2-\alpha}{8}d^2B_m^2 < U^N(sd, sd) = \frac{1}{2}A_m^2 + \frac{1}{2(1+\alpha)}d^2B_m^2, \\
 V_{Rat}^N(wd, sd) &= A_mB_m + \frac{1+\alpha}{8}dB_m^2 > V^N(sd, sd) = A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2.
 \end{aligned}$$

Before concluding, we go back to the European Constitution. Beyond the determination of the political representatives who will negotiate the international agreement, we have proposed two types of democratic participation in this subsection: a formal and an informal ratification. We establish in PROPOSITION 4 that the formal ratification yields to a welfare enhancing agreement, while the informal one induces the *status quo*, *i.e.* separation. In the light of this last result, a procedure, which would impose treaty's ratification through an *ex post* referendum, might be added to the political integration process. It appears efficient to associate the union with the acceptance of such a ratification procedure. The sovereignty of states does not seem violated, since the initiative for political integration remains a national competence.

6 Concluding remarks

We have studied political centralization in a two-country model with heterogenous policy preferences and international spillovers under different delegation rules. Under the restrictive assumptions of our framework, we have established that countries' inhabitants always prefer representative democracy more accurately strong delegation, in order to reinforce their bargaining power. Moreover, they delegate strategically to representatives who are less keen on public goods than the country's median voter. These behaviours imply an inefficient political integration. Indeed, the choice of delegation rule and the identity of the political representatives generate negative political externalities between countries, which cancel the internalization of economic externalities (resulting from the centralized provision of the public good). We have also observed that no country chooses to initiate political integration, since the follower take an advantage coming from its participation constraint. By considering a pre-play game, we have determined a perfect equilibrium, where the country which produces the public good proposes political integration and the country which pays a transfer remains indifferent between the *status quo* and integration.²⁹

We concluded our analysis by considering two forms of democratic participation. An *ex*

²⁹ This scenario was presented as the Stackelberg 1 game

ante ratification, which corresponds to an approval of the integration by the country's majority, prevents any integration. However, a formal ratification's procedure, equivalent to an *ex post* referendum, would substantially improve the result of political integration by restraining the strategic delegations.

The simplicity of our framework imposes several restrictions. One of them is the one-dimensional nature of the political integration, one public good and one transfer. Thus, in contrast to Lorz and Willmann (2005), the political integration decision remains a binary choice and a further development would be to analyse how the delegation rule would affect the equilibrium degree of political integration. Another weakness is the assumption of perfect information on the individual preferences. However, our results join the analysis of Zantman (1998), who establishes in the presence of informational imperfections on preferences for the public good that strategic delegation decreases welfare with respect to direct democracy.

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A Appendix

A.1 Nash Bargaining Solution

We define $a_R^N(x, y; a_i)$ and $b_R^N(x, y; b_i)$ the ideal representative for individual of type a_i in country 1 and b_i in country 2, in case of the delegation rules (x, y) in both countries. In the same way, we denote $g^N(x, y)$, $T^N(x, y)$, $U^N(x, y)$, $V^N(x, y)$ and $W^N(x, y)$ the equilibrium values of the public good’s quantity, the transfer, the utilities and the aggregate welfare for a couple of strategies (x, y) .

Note that the utility functions $U(g^N(\cdot), T^N(\cdot); a_i)$ and $V(g^N(\cdot), T^N(\cdot); b_i)$ are strictly concave with respect to a_R and b_R . Since $\frac{\partial a_{R'}}{\partial a_R} \in \{0, 1\}$ and $\frac{\partial a_{R'}^2}{\partial a_R^2} = 0$, we have:

$$\begin{aligned} \frac{\partial^2 U(g^N(\cdot), T^N(\cdot); a_i)}{\partial a_R^2} &= -2 + \alpha + (1 - \alpha) \left(2 - \frac{\partial a_{R'}}{\partial a_R} \right) \frac{\partial a_{R'}}{\partial a_R} < 0, \\ \frac{\partial^2 V(g^N(\cdot), T^N(\cdot); b_i)}{\partial b_R^2} &= -d(1 + \alpha) < 0. \end{aligned}$$

Now, we consider the nine possible cases.

1. For (sd, sd) , we have : $a_{R'} = a_R$ and $b_{R'} = b_R$. The system (11) becomes:

$$\begin{cases} g(a_R, b_R) = a_R + db_R \\ T(a_R, a_R, b_R) = \frac{(1+\alpha)}{2} db_R^2 \end{cases}$$

Substituting these expressions in (12) and (13), one can determine the optimal policies chosen by the representatives in the case of strong delegation. These choices are solution of the following system:

$$\begin{cases} a_R^N(sd, sd; a_i) \equiv \arg \max_{a_R \in [\underline{a}, \bar{a}]} \{U(g^N(a_R, b_R), T^N(a_R, a_R, b_R); a_i)\} \\ b_R^N(sd, sd; b_i) \equiv \arg \max_{b_R \in [\underline{b}, \bar{b}]} \{V(g^N(a_R, b_R), T^N(a_R, a_R, b_R); b_i)\} \end{cases}$$

which yields to:

$$\begin{cases} a_R^N(sd, sd; a_i) = a_i - \frac{1}{1+\alpha} db_R \\ b_R^N(sd, sd; b_i) = \frac{b_i}{1+\alpha} \end{cases} \quad (15)$$

Applying the MVT to (15) involves:

$$\begin{cases} a_R^N(sd, sd; A_m) = A_m - \frac{1}{1+\alpha} dB_m \\ b_R^N(sd, sd; B_m) = \frac{B_m}{1+\alpha} \end{cases} \quad (16)$$

We deduce that

$$\begin{cases} g^N(sd, sd) = A_m \\ T^N(sd, sd) = \frac{1}{2(1+\alpha)} dB_m^2 \end{cases}$$

and

$$\begin{aligned} U^N(sd, sd) &= \frac{1}{2}A_m^2 + \frac{1}{2(1+\alpha)}d^2B_m^2, \\ V^N(sd, sd) &= A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2, \\ W^N(sd, sd) &= A_m \left(A - \frac{A_m}{2} + dB \right). \end{aligned}$$

2. For (sd, wd) , country 1 chooses strong delegation while country 2 prefers weak delegation, we have the same results as for (sd, sd) . Indeed, weak delegation in country 2 does not affect behavior in country 1, since in the case of disagreement, every inhabitant in country 2 prefers to pay no transfer to country 1.
3. For (sd, ref) , $a_{R'} = a_R$ and $b_{R'} = b_R = B_m$, the system (11) becomes:

$$\begin{cases} g(a_R, B_m) = a_R + dB_m \\ T(a_R, a_R, B_m) = \frac{1+\alpha}{2}dB_m^2 \end{cases}$$

We determine the optimal choice of the representative in country 1, solution of:

$$a_R^N(sd, ref; a_i) \equiv \arg \max_{a_R \in [\underline{a}, \bar{a}]} \{U(g^N(a_R, B_m), T^N(a_R, a_R, B_m); a_i)\} \quad (17)$$

The FOC of (17) involves $a_R^N(sd, ref; a_i) = a_i - dB_m$, which gives after applying the MVT: $a_R^N(sd, ref; A_m) = A_m - dB_m$. We deduce that

$$\begin{cases} g^N(sd, ref) = A_m \\ T^N(sd, ref) = \frac{(1+\alpha)}{2}dB_m^2 \end{cases}$$

and

$$\begin{aligned} U^N(sd, ref) &= \frac{1}{2}A_m^2 + \frac{1+\alpha}{2}d^2B_m^2, \\ V^N(sd, ref) &= A_mB_m - \frac{1+\alpha}{2}dB_m^2, \\ W^N(sd, ref) &= A_m \left(A - \frac{A_m}{2} + dB \right). \end{aligned}$$

4. For (wd, sd) , $a_{R'} = A_m$, the system (11) becomes:

$$\begin{cases} g(a_R, b_R) = a_R + db_R \\ T(A_m, a_R, b_R) = \frac{1}{2d}(a_R - A_m + db_R)((1-\alpha)(A_m - a_R) + (1+\alpha)db_R) \end{cases}$$

The optimal choices of the political representatives in this case induce:

$$\begin{cases} a_R^N(wd, sd; a_i) \equiv \arg \max_{a_R \in [\underline{a}, \bar{a}]} \{U(g^N(a_R, b_R), T^N(A_m, a_{R'}, b_R); a_i)\} \\ b_R^N(wd, sd; b_i) \equiv \arg \max_{b_R \in [\underline{b}, \bar{b}]} \{V(g^N(a_R, b_R), T^N(A_m, a_{R'}, b_R); b_i)\} \end{cases}$$

which yields to:

$$\begin{cases} a_R^N(wd, sd; a_i) = \frac{1}{2}(a_i - db_i + A_m + \alpha(a_i + db_i - A_m)) \\ b_R^N(wd, sd; b_i) = b_i - \frac{\alpha}{2d}(a_i + db_i - A_m) \end{cases}$$

Applying the MVT, it yields to:

$$\begin{cases} a_R^N(wd, sd; A_m) = A_m - \frac{1-\alpha}{2}dB_m \\ b_R^N(wd, sd; B_m) = \frac{2-\alpha}{2}B_m \end{cases}$$

We deduce that

$$\begin{cases} g^N(wd, sd) = A_m + \frac{1}{2}dB_m \\ T^N(wd, sd) = \frac{3-\alpha}{8}dB_m^2 \end{cases}$$

and

$$\begin{aligned} U^N(wd, sd) &= \frac{1}{2}A_m^2 + \frac{2-\alpha}{8}d^2B_m^2, \\ V^N(wd, sd) &= A_mB_m + \frac{1+\alpha}{8}dB_m^2, \\ W^N(wd, sd) &= \frac{1}{8}(2A_m + dB_m)[4A - 2A_m + d(4B - B_m)]. \end{aligned}$$

5. For (wd, wd) , the results are identical.

6. For (wd, ref) , $a_{R'} = A_m$ and $b_R = B_m$, the system (11) becomes:

$$\begin{cases} g(a_R, b_R) = a_R + dB_m \\ T(A_m, a_R, B_m) = \frac{1}{2d}(a_R - A_m + dB_m)((1-\alpha)(A_m - a_R) + (1+\alpha)dB_m) \end{cases}$$

The optimal choice of the representatives in country 1 is given by:

$$a_R^N(wd, ref; a_i) \equiv \arg \max_{a_R \in [\underline{a}, \bar{a}]} \{U(g^N(a_R, B_m), T^N(A_m, a_R, B_m); a_i)\}$$

which yields to: $a_R^N(wd, ref; a_i) = \frac{1}{2-\alpha}[a_i - (1-\alpha)(A_m - dB_m)]$. Applying the MVT involves:

$$a_R^N(wd, ref; A_m) = A_m - \frac{1-\alpha}{2-\alpha}dB_m.$$

We deduce that:

$$\begin{cases} g^N(wd, ref) = A_m + \frac{1}{2-\alpha}dB_m \\ T^N(wd, ref) = \frac{(3-\alpha)}{8(2-\alpha)^2}dB_m^2 \end{cases}$$

and

$$\begin{aligned} U^N(wd, ref) &= \frac{1}{2}A_m^2 + \frac{1}{2(2-\alpha)}d^2B_m^2, \\ V^N(wd, ref) &= A_mB_m + \frac{1-\alpha}{2(2-\alpha)^2}dB_m^2, \\ W^N(wd, ref) &= \frac{((2-\alpha)A_m + dB_m)[(2-\alpha)(2A - A_m) + d(2(2-\alpha)B - B_m)]}{2(2-\alpha)^2}. \end{aligned}$$

7. For (ref, sd) , $a_{R'} = a_R = A_m$ and $b_{R'} = b_R$, the system (11) becomes:

$$\begin{cases} g(a_R, B_m) = A_m + db_R \\ T(a_R, a_R, B_m) = \frac{1+\alpha}{2d}db_R^2 \end{cases}$$

One can determine the optimal choice of the representative in country 2. It yields:

$$b_R^N(ref, sd; b_i) \equiv \arg \max_{b_R \in [\underline{b}, \bar{b}]} \{V(g^N(A_m, b_R), T^N(A_m, A_m, b_R); b_i)\}$$

The FOC gives: $b_R^N(\text{ref}, sd; b_i) = \frac{b_i}{1+\alpha}$, which involves by applying the MVT $b_R^N(\text{ref}, sd; B_m) = \frac{B_m}{1+\alpha}$. We deduce that

$$\begin{cases} g^N(\text{ref}, sd) = A_m + \frac{1}{1+\alpha}dB_m \\ T^N(\text{ref}, sd) = \frac{1}{2(1+\alpha)}dB_m^2 \end{cases}$$

and

$$\begin{aligned} U^N(\text{ref}, sd) &= \frac{1}{2}A_m^2 + \frac{\alpha}{2(1+\alpha)^2}d^2B_m^2, \\ V^N(\text{ref}, sd) &= A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2, \\ W^N(\text{ref}, sd) &= -\frac{1}{2(1+\alpha)^2}[(1+\alpha)A_m + dB_m][(1+\alpha)(A_m - 2A) + d(B_m - 2(1+\alpha)B)]. \end{aligned}$$

8. For (ref, wd) , the results are identical.

9. For (ref, ref) , $a_{R'} = a_R = A_m$ and $b_{R'} = b_R = B_m$, the system (11) becomes:

$$\begin{cases} g^N(A_m, B_m) = g^N(\text{ref}, \text{ref}) = A_m + dB_m \\ T^N(A_m, A_m, B_m) = T^N(\text{ref}, \text{ref}) = \frac{1+\alpha}{2}dB_m^2 \end{cases}$$

We deduce that

$$\begin{aligned} U^N(\text{ref}, \text{ref}) &= \frac{1}{2}A_m^2 + \frac{\alpha}{2}d^2B_m^2, \\ V^N(\text{ref}, \text{ref}) &= A_mB_m + \frac{1-\alpha}{2}dB_m^2, \\ W^N(\text{ref}, \text{ref}) &= \frac{1}{2}(A_m + dB_m)[(2A - A_m) + d(2B - B_m)]. \end{aligned}$$

Note that for country 1, the strategy wd and ref are strictly dominated by the strategy sd . Indeed, we have:

$$\begin{aligned} U^N(sd, sd) - U^N(wd, sd) &= \frac{2-\alpha+\alpha^2}{8(1+\alpha)}d^2B_m^2 > 0, \\ U^N(sd, sd) - U^N(\text{ref}, sd) &= U^N(sd, \text{ref}) - U^N(\text{ref}, \text{ref}) = \frac{1}{2(1+\alpha)^2}d^2B_m^2 > 0, \\ U^N(sd, \text{ref}) - U^N(wd, \text{ref}) &= \frac{1+\alpha-\alpha^2}{2(2-\alpha)}d^2B_m^2 > 0. \end{aligned}$$

If country 1 plays sd , country 2 will play sd since $V^N(sd, sd) > V^N(sd, \text{ref})$.³⁰ We can conclude that (sd, sd) is the unique Perfect Nash Equilibrium of the game.

Note that: $\forall (x, y) \in \{sd, wd, \text{ref}\}^2$, $W^N(x, y) = W_1(x, y)$ for $\alpha = 1$ and $W^N(x, y) = W_2(x, y)$ for $\alpha = 0$. Using the preceding results yields to:

$$\begin{aligned} W^N(\text{ref}, \text{ref}) - W^N(sd, sd) &= W^N(\text{ref}, \text{ref}) - W^N(sd, \text{ref}) \\ &= \frac{1}{2}dB_m[2(A - A_m) + d(2B - B_m)], \\ W^N(\text{ref}, \text{ref}) - W^N(\text{ref}, sd) &= \frac{\alpha}{2(1+\alpha)^2}dB_m[2(1+\alpha)(A - A_m) + d(2(1+\alpha)B - (2+\alpha)B_m)], \\ W^N(\text{ref}, \text{ref}) - W^N(wd, sd) &= \frac{1}{8}dB_m[4(A - A_m) + d(4B - 3B_m)], \\ W^N(\text{ref}, \text{ref}) - W^N(wd, \text{ref}) &= \frac{1-\alpha}{2(2-\alpha)^2}dB_m[2(2-\alpha)(A - A_m) + d(2(2-\alpha)B - (3-\alpha)B_m)]. \end{aligned}$$

³⁰ Note that: $\frac{1}{2(1+\alpha)} < \frac{1}{2} < \frac{1+\alpha}{2}$, $\forall \alpha \in [0, 1]$.

We deduce that $\forall \alpha \in [0, 1]$, if $A_m \leq A$ and $B_m \leq \frac{4}{3}B$, we have:

$$W^N(ref, ref) = \max \{W^N(sd, sd), W^N(ref, sd), W^N(wd, sd), W^N(wd, ref)\}.$$

A.2 *Ex ante* Referendum

Using Table 2, we observe that:

$$\begin{aligned} U^1(sd, sd) &= \frac{1}{2}A_m^2 + \frac{1}{4}d^2B_m^2 > U^{dec}(A_m; A_m) = \frac{A_m^2}{2}, \\ V^1(sd, sd) &= A_mB_m - \frac{1}{4}dB_m^2 < V^{dec}(A_m; B_m) = A_mB_m, \\ U^2(sd, sd) &= U^2(sd, ref) = \frac{1}{2}A_m^2 + \frac{1}{2}d^2B_m^2 > U^{dec}(A_m; A_m), \\ V^2(sd, sd) &= V^2(sd, ref) = A_mB_m - \frac{1}{2}dB_m^2 < V^{dec}(A_m; B_m), \\ U^N(sd, sd) &= \frac{1}{2}A_m^2 + \frac{1}{2(1+\alpha)}d^2B_m^2 > U^{dec}(A_m; A_m), \\ V^N(sd, sd) &= A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2 < V^{dec}(A_m; B_m). \end{aligned}$$

A.3 *Ex post* Referendum

We denote $U_{Rat}^N(x, y)$, $V_{Rat}^N(x, y)$ and $W_{Rat}^N(x, y)$ the equilibrium values of the utilities and the aggregate welfare for the couple strategies (x, y) . We consider the nine possible cases of the NBS as developed in the preceding annexes.

1. For (sd, sd) , we have: $a_{R'} = a_R$ and $b_{R'} = b_R$. We consider four cases, depending on the values of the Lagrange multipliers, λ and μ .
 - If $\lambda = 0$ and $\mu = 0$, we obtain the same solution as in the non-constrained case, which yields to reject this case since: $V^N(sd, sd) = A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2 < V^{dec}(A_m, B_m)$ (see Table 3).
 - If $\lambda \neq 0$ and $\mu \neq 0$, we are back to the decentralized equilibrium: $U_{Rat}^N(sd, sd) = U^{dec}(A_m, B_m)$ and $V_{Rat}^N(sd, sd) = V^{dec}(A_m, B_m)$.
 - If $\lambda \neq 0$ and $\mu = 0$, the first constraint is binding: $U(g, T; A_m) = U^{dec}(a_{R'}; A_m)$. The maximization of (14) yields to:

$$\left\{ \begin{array}{l} g = a_R + db_R + \frac{d\lambda(A_m - a_R)}{1-\alpha} \\ T = \frac{d[\lambda(a_R - A_m) - (1-\alpha)b_R][(A_m - a_R)\lambda(-1+\alpha+d\lambda) - (1-\alpha)b_R(1+\alpha-d\lambda)]}{2(1-\alpha)^2(1-d\lambda)} \end{array} \right.$$

Substituting these expressions of T and g , we determine the identity of the representatives:

$$\left\{ \begin{array}{l} a_R = \frac{A_m[(1-\lambda d)\alpha^3 - (1-2\lambda d)\alpha^2 + (1-\lambda d)^2\alpha + (1-\lambda d)^3] - dB_m(1-\alpha)^2(1-d\lambda)^2}{\alpha^3(1-\lambda d) - \alpha^2(1-2\lambda d) + \alpha(1-\lambda d)^2 + (1-\lambda d)^3} \\ b_R = \frac{B_m(1-\lambda d)(1-\alpha-\lambda d)[1-\alpha-\lambda d(2-\alpha)]}{\alpha^3(1-\lambda d) - \alpha^2(1-2\lambda d) + \alpha(1-\lambda d)^2 + (1-\lambda d)^3} \end{array} \right.$$

Using the expressions of g, T , a_R and b_R , we determine for which value of $\lambda (> 0)$, the other constraint, formally $U(g, T; A_m) = U^{dec}(a_{R'}; A_m)$, is respected. Excepted for $\lambda = \frac{1}{d}$, which yields to an indeterminate form of T and thus of $U(\cdot)$ and $V(\cdot)$, there are only two possible solutions for λ : $\lambda_1 = \frac{1-\alpha}{d}$ and $\lambda_2 = \frac{1-\alpha}{d(2-\alpha)}$. Considering λ_1 , both constraints are binding, since $g = A_m$ and $T = 0$. The utilities values are then equivalent to those at the decentralized equilibrium. For $\lambda_2 = \frac{1-\alpha}{d(2-\alpha)}$, we observe that $g_{Rat}^N(sd, sd) = A_m - (1-\alpha)dB_m < g^{dec}$ and $T > 0$, it is then obvious that the median voter of country 2 would be better under separation and reject political integration.

- If $\lambda = 0$ and $\mu \neq 0$, the second constraint is binding: $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$, which involves: $T = B_m(g - A_m)$ or equivalently $g = A_m + \frac{T}{B_m}$. The maximization of (14) involves:

$$\begin{cases} g = \frac{(1-\alpha)(a_R + db_R) + \mu(a_R + dB_m)}{1-\alpha+\mu} \\ T = \frac{d[b_R(1-\alpha) + \mu B_m][(1+\alpha)b_R + \mu B_m]}{2(1+\mu)(1-\alpha+\mu)} \end{cases}$$

After substitution, we deduce the identity of the country's representative:

$$\begin{cases} a_R = A_m - \frac{dB_m}{1+\alpha} \\ b_R = \frac{[1-\alpha(1+\mu)]B_m}{1-\alpha^2} \end{cases}$$

Using these expressions, we determine the value of μ which insures that $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$. It yields: $\mu = \frac{1-\alpha}{2\alpha-1}$. Note that $\mu > 0$ involves that $\alpha > \frac{1}{2}$. Under this assumption, the equilibrium levels of the utility function correspond to the decentralized one.

To resume the case (sd, sd) , we obtain systematically the decentralized equilibrium's values, with: $U_{Rat}^N(sd, sd) = \frac{A_m^2}{2}$ and $V_{Rat}^N(sd, sd) = A_m B_m$.

2. For (sd, wd) , the results are identical.

3. For (sd, ref) , $a_{R'} = a_R$ and $b_{R'} = b_R = B_m$, we still have four cases.

- If $\lambda = 0$ and $\mu = 0$, we obtain the same solution than in the non-constrained case (see table 3). Note that: $U^N(wd, sd) > U^{dec}(A_m, A_m)$ and $V^N(wd, sd) > U^{dec}(B_m, A_m)$.
- If $\lambda \neq 0$ and $\mu \neq 0$, we are back to the decentralized equilibrium.
- If $\lambda \neq 0$ and $\mu = 0$, the maximization of (14) yields to:

$$\begin{cases} g = a_R + db_R + \frac{d\lambda(A_m - a_R)}{1-\alpha} \\ T = \frac{d[\lambda(a_R - A_m) - (1-\alpha)B_m][(A_m - a_R)\lambda(-1+\alpha+d\lambda) - (1-\alpha)B_m(1+\alpha-d\lambda)]}{2(1-\alpha)^2(1-d\lambda)} \end{cases}$$

Substituting these expressions of T and g , we determine the identity of the country 1's representative:

$$a_R = A_m + dB_m \left(\frac{\alpha}{1-\alpha-d\lambda} - \frac{1}{1-\alpha-(2-\alpha)d\lambda} \right)$$

Using the expressions of g , T , a_R and b_R , we observe that no positive real value of $\lambda (> 0)$ allows to respect the constraint: $U(g, T; A_m) = U^{dec}(a_{R'}; A_m)$. This case must be rejected.

- If $\lambda = 0$ and $\mu \neq 0$, the second constraint is binding: $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$, which involves: $T = B_m(g - A_m)$ or equivalently $g = A_m + \frac{T}{B_m}$. The maximization of (14) involves:

$$\begin{cases} g = a_R + dB_m \\ T = \frac{(1+\alpha+\mu)}{2(1+\mu)} dB_m^2 \end{cases}$$

After substitution, we deduce the identity of the country 1's representative:

$$a_R = A_m - dB_m.$$

Using these expressions, the unique value of μ is negative, equal to $-1 - \alpha$ and this case is not relevant.

Thus, we deduce that: $U_{Rat}^N(sd, sd) = \frac{A_m^2}{2}$ and $V_{Rat}^N(sd, sd) = A_m B_m$.

4. For (wd, sd) , $a_{R'} = A_m$,

- If $\lambda = 0$ and $\mu = 0$, we obtain the same solution than in the non-constrained case, which yields to:

$$\begin{cases} U^N(wd, sd) = \frac{1}{2}A_m^2 + \frac{2-\alpha}{8}d^2B_m^2 > U^{dec}(A_m, B_m) \\ V^N(wd, sd) = A_mB_m + \frac{1+\alpha}{8}dB_m^2 > V^{dec}(A_m, B_m) \end{cases}$$

- If $\lambda \neq 0$ and $\mu \neq 0$, we are back to the decentralized equilibrium.
- If $\lambda \neq 0$ and $\mu = 0$, the maximization of (14) yields to:

$$\begin{cases} g = a_R + dB_m + \frac{d\lambda(A_m - a_R)}{1-\alpha} \\ T = \frac{[(1-\alpha)(A_m - a_R - db_R) + d\lambda(a_R - A_m)][(1-\alpha)^2(a_R - A_m) + (1-\alpha^2)db_R - (1-\alpha)d^2\lambda b_R + d^2\lambda^2(A_m - a_R)]}{2d(1-\alpha)^2(1-d\lambda)} \end{cases}$$

Substituting these expressions of T and g , we determine the identity of the country 1's representative:

$$\begin{cases} a_R = A_m - \frac{(1-\alpha)^2(1-d\lambda)}{(2-\lambda d)(1-\alpha-\lambda d)}dB_m \\ b_R = \frac{B_m(1-\lambda d)(2-\alpha)}{2-\lambda d} \end{cases}$$

Using the expressions of g, T, a_R and b_R , we observe that the unique solution of $U(g, T; A_m) = U^{dec}(a_R; A_m)$ yields to $\lambda = \frac{1}{d}$, which involves an indeterminate form for T .

- If $\lambda = 0$ and $\mu \neq 0$, the second constraint is binding: $V(g, T; B_m) = V^{dec}(a_R; B_m)$. The maximization of (14) involves:

$$\begin{cases} g = \frac{(1-\alpha)(a_R + db_R) + \mu(a_R + dB_m)}{1-\alpha+\mu} \\ T = \frac{[(1-\alpha)(a_R - A_m + db_R) + \mu(a_R - A_m + dB_m)][(1-\alpha+\mu)(A_m - a_R) + d[(1+\alpha)b_R + \mu B_m]]}{2d(1-\alpha+\mu)(1+\mu)} \end{cases}$$

After substitution, we deduce the identity of the representatives:

$$\begin{cases} a_R = A_m + \frac{1+\mu-2\alpha+\alpha^2-(1-\alpha)\alpha\mu}{\alpha(2+\mu)-2(1+\mu)}dB_m \\ b_R = \frac{\alpha\mu(3+\mu)-\alpha^2(1+\mu)+3\alpha-2(1+\mu)}{\alpha(2+\mu)-2(1+\mu)}B_m \end{cases}$$

Using these expressions, the solution of $V(g, T; B_m) = V^{dec}(a_R; B_m)$ in μ is negative. Thus, we deduce that: $U_{Rat}^N(wd, sd) = \frac{1}{2}A_m^2 + \frac{2-\alpha}{8}d^2B_m^2$ and $V_{Rat}^N(wd, sd) = A_mB_m + \frac{1+\alpha}{8}dB_m^2$.

5. For (wd, wd) , the results are identical.

6. For (wd, ref) , we have:

- If $\lambda = 0$ and $\mu = 0$, we obtain the same solution than in the non-constrained case, which yields to:

$$\begin{cases} U^N(wd, ref) = \frac{1}{2}A_m^2 + \frac{1}{2(2-\alpha)}d^2B_m^2 > U^{dec}(A_m, B_m) \\ V^N(wd, ref) = A_mB_m + \frac{1-\alpha}{2(2-\alpha)^2}dB_m^2 > V^{dec}(A_m, B_m) \end{cases}$$

- If $\lambda \neq 0$ and $\mu \neq 0$, we are back to the decentralized equilibrium.
- If $\lambda \neq 0$ and $\mu = 0$, the maximization of (14) yields to:

$$\begin{cases} g = a_R + dB_m + \frac{d\lambda(A_m - a_R)}{1-\alpha} \\ T = \frac{[(1-\alpha)(A_m - a_R - dB_m) + d\lambda(a_R - A_m)][(1-\alpha)^2(a_R - A_m) + (1-\alpha^2)dB_m - (1-\alpha)d^2\lambda B_m + d^2\lambda^2(A_m - a_R)]}{2d(1-\alpha)^2(1-d\lambda)} \end{cases}$$

Substituting these expressions of T and g , we determine the identity of the country 1's representative:

$$a_R = A_m - \frac{(1-\alpha)^2}{(2-\alpha)(1-\alpha-\lambda d)}dB_m.$$

Using the expressions of g, T, a_R and b_R , we observe that there is no solution of $U(g, T; A_m) = U^{dec}(a_{R'}; A_m)$ in λ .

- If $\lambda = 0$ and $\mu \neq 0$, the second constraint is binding: $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$. The maximization of (14) involves:

$$\begin{cases} g = a_R + dB_m \\ T = \frac{(a_R - A_m + db_R)[(1 - \alpha + \mu)(A_m - a_R) + (1 + \alpha + \mu)dB_m]}{2d(1 + \mu)} \end{cases}$$

After substitution, we deduce the identity of the country 1's representatives:

$$a_R = A_m - \frac{1 - \alpha + \mu}{2(1 + \mu) - \alpha} dB_m.$$

Using these expressions, the solution of μ for $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$ is negative. Thus, we deduce that: $U_{Rat}^N(wd, ref) = \frac{1}{2}A_m^2 + \frac{1}{2(2 - \alpha)}d^2B_m^2$ and $V_{Rat}^N(wd, sd) = A_mB_m + \frac{1 - \alpha}{2(2 - \alpha)^2}dB_m^2$.

7. For (ref, sd) , $a_{R'} = a_R = A_m$ and $b_{R'} = b_R$, it yields:

- If $\lambda = 0$ and $\mu = 0$, we obtain the same solution than in the non-constrained case, which yields to:

$$\begin{cases} U^N(ref, sd) = \frac{1}{2}A_m^2 + \frac{\alpha}{2(1 + \alpha)^2}d^2B_m^2 > U^{dec}(A_m, B_m) \\ V^N(ref, sd) = A_mB_m - \frac{1}{2(1 + \alpha)}dB_m^2 < V^{dec}(A_m, B_m) \end{cases}$$

- If $\lambda \neq 0$ and $\mu \neq 0$, we are back to the decentralized equilibrium.
- If $\lambda \neq 0$ and $\mu = 0$, the maximization of (14) yields to:

$$\begin{cases} g = A_m + db_R \\ T = \frac{(1 + \alpha - d\lambda)}{2(1 - d\lambda)}db_R^2 \end{cases}$$

Substituting these expressions of T and g , we determine the identity of the country 2's representative:

$$b_R = B_m - \frac{\alpha B_m}{1 + \alpha - \lambda d}.$$

Using the expressions of g, T, a_R and b_R , we observe that there is no solution of $U(g, T; A_m) = U^{dec}(a_{R'}; A_m)$ in λ .

- If $\lambda = 0$ and $\mu \neq 0$, the second constraint is binding: $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$. The maximization of (14) involves:

$$\begin{cases} g = \frac{(1 - \alpha)(A_m + db_R) + \mu(A_m + dB_m)}{1 - \alpha + \mu} \\ T = \frac{d[(1 - \alpha)b_R + \mu B_m][(1 + \alpha)b_R + \mu B_m]}{2(1 - \alpha + \mu)(1 + \mu)} \end{cases}$$

After substitution, we deduce the identity of the country 2's representatives:

$$b_R = \frac{1 - \alpha - \alpha\mu}{1 - \alpha^2}B_m.$$

Using these expressions, the solution of $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$ in μ is negative, equal to $-1 + \alpha$.

Thus, we deduce that: $U_{Rat}^N(ref, sd) = \frac{1}{2}A_m^2$ and $V_{Rat}^N(ref, sd) = A_mB_m$.

8. For (ref, wd) , the results are identical.

9. For (ref, ref) , $a_{R'} = a_R = A_m$ and $b_{R'} = b_R = B_m$, it yields:

- If $\lambda = 0$ and $\mu = 0$, we obtain the same solution than in the non-constrained case, which yields to:

$$\begin{cases} U^N(ref, ref) = \frac{1}{2}A_m^2 + \frac{\alpha}{2}d^2B_m^2 > U^{dec}(A_m, B_m) \\ V^N(ref, ref) = A_mB_m + \frac{1-\alpha}{2}dB_m^2 > V^{dec}(A_m, B_m) \end{cases}$$

- If $\lambda \neq 0$ and $\mu \neq 0$, we are back to the decentralized equilibrium.
- If $\lambda \neq 0$ and $\mu = 0$, the maximization of (14) yields to:

$$\begin{cases} g = A_m + dB_m \\ T = \frac{(1+\alpha-d\lambda)}{2(1-d\lambda)}dB_m^2 \end{cases}$$

Using the expressions of g and T , we observe that there is no solution of $U(g, T; A_m) = U^{dec}(a_{R'}; A_m)$ in λ .

- If $\lambda = 0$ and $\mu \neq 0$, the second constraint is binding : $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$. The maximization of (14) involves:

$$\begin{cases} g = A_m + dB_m \\ T = \frac{dB_m^2(1+\alpha+\mu)}{2(1+\mu)} \end{cases}$$

Using these expressions, it appears that there is no positive solution of $V(g, T; B_m) = V^{dec}(a_{R'}; B_m)$ in μ .

Thus, we deduce that: $U_{Rat}^N(ref, sd) = \frac{1}{2}A_m^2 + \frac{\alpha}{2}d^2B_m^2$ and $V_{Rat}^N(ref, sd) = A_mB_m + \frac{1-\alpha}{2}dB_m^2$.

The equilibrium payments are presented in Table 4. Note that for country 1, the strategies sd and ref are strictly dominated by the strategy wd . Indeed, we have:

$$\begin{aligned} U_{Rat}^N(wd, sd) - U_{Rat}^N(sd, sd) &= U_{Rat}^N(wd, sd) - U_{Rat}^N(ref, sd) = \frac{2-\alpha}{8}d^2B_m^2 > 0, \\ U_{Rat}^N(wd, ref) - U_{Rat}^N(sd, ref) &= \frac{1}{2(1+\alpha)^2}d^2B_m^2 > 0, \\ U_{Rat}^N(wd, ref) - U_{Rat}^N(ref, ref) &= \frac{(1-\alpha)^2}{2(2-\alpha)}d^2B_m^2 > 0. \end{aligned}$$

If country 1 plays wd , country 2 will play sd since $V_{Rat}^N(wd, sd) - V_{Rat}^N(wd, ref) = \frac{\alpha(4-3\alpha+\alpha^2)}{8(2-\alpha)^2}dB_m^2 > 0$. We can conclude that (wd, sd) is the unique Nash equilibrium of the game.

A.4 Tables³¹

³¹ The normal form of Stackelberg game 1 (respectively 2) corresponds to the same following matrix where the parameter α is equal to 1 (respectively to 2).

Country	Referendum on the Constitution	Previous Referendums on the EU	Parliamentary Ratification Procedures
Germany	No	No	By law. Majority of two thirds of the Bundestag and two thirds of the Bundesrat (Art. 23 and 79).
France	Yes	Enlargement (1972), Maastricht (1992).	By law (Articles 52-55 and 88). Discretionary referendum at the initiative of the President (Art. 11).
UK	Yes	Membership (1975)	Parliamentary majority.
Italy	No	Constituent mandate for the EP (1989)	Ratification by both Houses; no referendum (Art. 80 and 75).
Spain	Yes	No	Absolute Majority of both Houses (Art. 93).
Poland	Yes	No	By parliamentary procedure, the conditions of which are established in another Act of Parliament (Article 90).
Netherlands	Yes	No	By 2/3 parliamentary majority (Art. 91)
Greece	Probably not	No	By law, majority of three fifths (Art. 28)
Portugal	Yes	No	Parliamentary majority (Art. 161)
Belgium	Yes	No	Treaties affecting citizen rights must be approved by both Houses. If they affect the competences of the Regions, the Councils of both must also approve them (Art. 163).
Czech Rep.	Undecided	Membership (2003)	Approval by three fifths of the Congress and the Senate (Art. 10 and 39).
Hungary	Probably not	Membership (2003)	Majority of two thirds of both Houses (Art. 2a).
Sweden	No	Membership (1994), Adoption of the euro (2003)	Approval by three quarter of the members of the Riksdag (Art. 10.5)
Austria	Undecided	Membership (1994).	Simple majority of the Congress and of the Senate if its competences are affected, of 2/3 of the Congress and of the Senate, if the transfer of powers implies Constitutional reform (Art. 50, 42 and 44).
Denmark	Yes	Membership(1972), SingleAct(1986), Maastricht I (1992), Maastricht II (1993), Amsterdam (1998), Adoption of the euro (2000).	Approval by a majority of 5/6; otherwise, a referendum (Art. 20 and 42).
Slovakia	Probably not	Membership (2003).	Majority of 3/5 (Art. 7 and 84).
Finland	Undecided	Membership (1995).	By law. Simple majority or 2/3 majority if it affects the Constitution (Art. 94).
Ireland	Yes	Membership (1972), Single Act (1987), Maastricht (1992), Amsterdam(1998), Nice I (2001), Nice II (2002).	No specific rule.
Latvia	Probably not	Membership (2003).	Parliamentary ratification, but if half the parliamentarians so wish, a referendum must be held (Art. 68).
Lithuania	Undecided	Membership (2003).	Parliamentary ratification; referendum required for treaties affecting major aspects of the lives of Lithuanians (Art. 135,1 and 5).
Slovenia	Probably yes	Membership (2003).	Majority of 3/5 (Art. 3 and 8)
Estonia	Probably not	Membership (2003).	Simple majority and other procedures (Art. 120 and 121).
Cyprus	Probably not	No(*).	Adopted by the Cabinet and approved by the House of Representatives (Art. 169).
Luxembourg	Yes	No.	By law approved by 2/3 of members of parliament (Art. 37, 49 and 114).
Malta	Yes	Membership (2003).	No constitutional regulations.

(*)The referendum of 24 April 2004 in Cyprus was on reunification of the island.

Sources: <http://www.uc3m.es/uc3m/inst/MGP/NCR/portada.htm>; see also: <http://www.european-referendum.org/materials/di/refsum.pdf>.

		Country 2	
		<i>sd</i>	<i>ref</i>
Country 1	<i>sd</i>	$g^N(sd, sd) = A_m,$ $T^N(sd, sd) = \frac{1}{2(1+\alpha)}dB_m^2.$	$g^N(sd, ref) = A_m,$ $T^N(sd, ref) = \frac{1+\alpha}{2}dB_m^2.$
	<i>wd</i>	$g^N(wd, sd) = A_m + \frac{1}{2}dB_m,$ $T^N(wd, sd) = \frac{3-\alpha}{8}dB_m^2.$	$g^N(wd, ref) = A_m + \frac{1}{2-\alpha}dB_m,$ $T^N(wd, ref) = \frac{3-\alpha}{8(2-\alpha)^2}dB_m^2.$
	<i>ref</i>	$g^N(ref, sd) = A_m + \frac{1}{1+\alpha}dB_m,$ $T^N(ref, sd) = \frac{1}{2(1+\alpha)}dB_m^2.$	$g^N(ref, ref) = A_m + dB_m,$ $T^N(ref, ref) = \frac{1+\alpha}{2}dB_m^2.$

Table 1: Equilibrium national policies in the Negotiation game

		Country 2	
		<i>sd</i>	<i>ref</i>
Country 1	<i>sd</i>	$U^N(sd, sd) = \frac{1}{2}A_m^2 + \frac{1}{2(1+\alpha)}d^2B_m^2,$ $V^N(sd, sd) = A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2.$	$U^N(sd, ref) = \frac{1}{2}A_m^2 + \frac{1+\alpha}{2}d^2B_m^2,$ $V^N(sd, ref) = A_mB_m - \frac{1+\alpha}{2}dB_m^2.$
	<i>wd</i>	$U^N(wd, sd) = \frac{1}{2}A_m^2 + \frac{2-\alpha}{8}d^2B_m^2,$ $V^N(wd, sd) = A_mB_m + \frac{1+\alpha}{8}dB_m^2.$	$U^N(wd, ref) = \frac{1}{2}A_m^2 + \frac{1}{2(2-\alpha)}d^2B_m^2,$ $V^N(wd, ref) = A_mB_m + \frac{1-\alpha}{2(2-\alpha)^2}dB_m^2.$
	<i>ref</i>	$U^N(ref, sd) = \frac{1}{2}A_m^2 + \frac{\alpha}{2(1+\alpha)^2}d^2B_m^2,$ $V^N(ref, sd) = A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2.$	$U^N(ref, ref) = \frac{1}{2}A_m^2 + \frac{\alpha}{2}d^2B_m^2,$ $V^N(ref, ref) = A_mB_m + \frac{1-\alpha}{2}dB_m^2.$

Table 2: Normal form of the Negotiation game.

		Country 2	
		<i>Leads</i>	<i>Follows</i>
Country 1	<i>Leads</i>	$U^N(sd, sd) = \frac{1}{2}A_m^2 + \frac{1}{2(1+\alpha)}d^2B_m^2,$ $V^N(sd, sd) = A_mB_m - \frac{1}{2(1+\alpha)}dB_m^2.$	$U^1(sd, sd) = \frac{1}{2}A_m^2 + \frac{1}{4}d^2B_m^2,$ $V^1(sd, sd) = A_mB_m - \frac{1}{4}dB_m^2.$
	<i>Follows</i>	$U^2(sd, sd) = \frac{1}{2}A_m^2 + \frac{1}{2}d^2B_m^2,$ $V^2(sd, sd) = A_mB_m - \frac{1}{2}dB_m^2.$	$U^{dec} = \frac{1}{2}A_m^2,$ $V^{dec} = A_mB_m.$

Table 3: Normal form of the Preplay game

		Country 2	
		<i>sd</i>	<i>ref</i>
Country 1	<i>sd</i>	$U_{Rat}^N(sd, sd) = \frac{1}{2}A_m^2,$ $V_{Rat}^N(sd, sd) = A_mB_m.$	$U_{Rat}^N(sd, ref) = \frac{1}{2}A_m^2,$ $V_{Rat}^N(sd, ref) = A_mB_m.$
	<i>wd</i>	$U_{Rat}^N(wd, sd) = \frac{1}{2}A_m^2 + \frac{2-\alpha}{8}d^2B_m^2,$ $V_{Rat}^N(wd, sd) = A_mB_m + \frac{1+\alpha}{8}dB_m^2.$	$U_{Rat}^N(wd, ref) = \frac{1}{2}A_m^2 + \frac{1}{2(2-\alpha)}d^2B_m^2,$ $V_{Rat}^N(wd, ref) = A_mB_m + \frac{1-\alpha}{2(2-\alpha)^2}dB_m^2.$
	<i>ref</i>	$U_{Rat}^N(ref, sd) = \frac{1}{2}A_m^2,$ $V_{Rat}^N(ref, sd) = A_mB_m.$	$U_{Rat}^N(ref, ref) = \frac{1}{2}A_m^2 + \frac{\alpha}{2}d^2B_m^2,$ $V_{Rat}^N(ref, ref) = A_mB_m + \frac{1-\alpha}{2}dB_m^2.$

Table 4: Normal form of the Negotiation game with an ex post referendum.