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**Working Paper**

## On the Endogenous Allocation of Decision Powers in Federal Structures

cege Discussion Papers, No. 25

**Provided in Cooperation with:**

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*Suggested Citation:* Lorz, Jens Oliver; Willmann, Gerald (2004) : On the Endogenous Allocation of Decision Powers in Federal Structures, cege Discussion Papers, No. 25, University of Göttingen, Center for European, Governance and Economic Development Research (cege), Göttingen

This Version is available at:

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# *CeGE-Discussion Paper*

25

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Gerald Willmann**

## ***On the Endogenous Allocation of Decision Powers in Federal Structures***



**GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN**

*June 2004*

ISSN 1439-2305

This paper is based on a presentation at the “6th Göttingen Workshop on International Economic Relations” at the Georg-August-University of Göttingen in collaboration with the Center of Globalization and Europeanization of the Economy (*CeGE*), March 11-13, 2004.

The aim of this annual workshop is to offer a forum for young researchers from the field of International Economics to present and to discuss their current topics of research with other experts. The workshop also provides the opportunity to gain an overview of recent developments, problems and methodological approaches in this field.

Detailed information on past workshops and the planning for the 2005 workshop are available at <http://www.vwl.wiso.uni-goettingen.de/workshop>. Do not hesitate to contact Dr. Carsten Eckel, *CeGE* (carsten.eckel@wiwi.uni-goettingen.de) for further questions.

# On the Endogenous Allocation of Decision Powers in Federal Structures\*

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April 14, 2004

## Abstract

This paper provides a political-economy explanation of the degree of centralization in economic policy making. To determine which policies are to be centralized, regions select representatives who then negotiate the degree of centralization and the regional cost shares of centrally decided policies. We show that the resulting degree of centralization is suboptimally low. Voters strategically delegate to representatives who are averse to public spending and hence prefer decentralized decisions in order to reduce their region's cost share. When spill-overs are asymmetric, strategic delegation is stronger at the periphery than at the center.

*JEL-Codes:* H11, H41, H77.

*Keywords:* Political Economy, Fiscal Federalism, Endogenous Centralization, Constitutional Design.

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\*We are grateful to seminar and workshop participants at the Universities of Konstanz, Goettingen and Illinois for helpful comments and discussions. The usual caveat applies: all errors are ours.

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# 1 Introduction

Most countries have more than one layer of government. Supra-national entities, such as the European Union, feature federal structures by construction. One of the most important questions arising in this context is how much decision power to allocate to each level of government. In Europe, this issue goes by the name “subsidiarity” and has been hotly debated for years. Economists have contributed to this debate by analyzing the costs and benefits of centralization. Hardly anyone, however, expects a purely normative outcome, given the high profile of the issue and the political heat surrounding it. And indeed, most European summits are mired by stories of shady backroom deals, be it in Nice or elsewhere.

This paper breaks new ground by providing a political-economy explanation of the degree of centralization in economic policy making. For concreteness, we focus on the provision of regional public goods which exhibit interregional spill-overs. We develop a model of local public good provision that incorporates a continuum of local public goods. These goods differ with respect to the degree of interregional spill-overs. The difference in utility received from centrally versus decentrally decided provision gives rise to a surplus from centralization that depends positively on the extent of the spill-over for a particular public good and on the individual’s preference for public spending. Comparing the average surplus to a given fixed cost of centralization, we can identify a critical degree of spill-over. Below this threshold, the decision on a particular local public good should — from the perspective of a benevolent social planner — be taken decentrally, whereas public goods with higher spill-overs are ideally decided on at the center.

The main contribution of our paper lies in going beyond this normative analysis. To determine which policies are decided at the center and which

decentrally, we consider a political equilibrium that results from the following political process: By majority vote, each region elects a citizen candidate as its representative. These regional representatives then form a house of representatives and decide on the degree of centralization. At the same time, they have to negotiate the regional cost shares of centrally decided policies. We model these negotiations as Nash-bargaining over the degree of centralization with side-payments that determine the regional cost shares.

We show that the degree of centralization thus determined falls short of the social optimum, even though the latter is preferred by each region's median voter. This discrepancy is due to strategic delegation: Representatives with a low preference for public spending are in a better bargaining position because they themselves enjoy only a relatively small surplus from centralization. Such representatives are therefore able to obtain a favorable cost share for their region. Knowing this, the median voter in each region strategically delegates the representation of the region to someone who is less keen on public goods in order to pay lower contributions. However, these representatives also prefer less centralization. As a result, they agree to centralize less policies than would be optimal for the median voter.

One important extension of our model is the generalization to asymmetric regions. In particular, we consider asymmetric interregional spill-overs because this type of asymmetry has an interesting core-periphery interpretation. As in the symmetric case, voters in both regions elect representatives who are less keen on public spending than the median voter. Focusing on the limit case where only one of the two regions receives spill-overs whereas there is no externality in the other direction, we show that the strategic delegation effect is stronger at the periphery and less pronounced at the core. This bears interesting implications for EU enlargement as it predicts that

the representatives of the accession countries are less integration-minded.

Our paper builds on a large literature on the normative and positive aspects of fiscal federalism.<sup>1</sup> The seminal contribution of Oates (1972) compares costs and benefits from centralization and derives the well-known “Decentralization Theorem” as a guideline for the division of decision powers between central and local governments. Besley and Coate (2003) provide a political economy model that offers deeper insights into the trade-off between the centralized and decentralized provision of local public goods.<sup>2</sup> Their political process is similar to ours, including strategic delegation. However, they apply it to the determination of public good provision. We instead focus on the decision on the degree of centralization. Another difference regards the cost shares of centrally decided public goods. Besley and Coate (2003) assume that both regions share the costs equally, whereas in our model the cost allocation is determined endogenously.

Segendorff (1998) considers strategic delegation in a Nash-bargaining model which allows for side payments. In his approach, elected representatives bargain over the levels of local public goods with full interregional spill-overs. As in our paper, voters delegate decisions to a representative with a lower preference for public goods to improve the region’s position in the bargaining game with the other region. In contrast to our paper, however, strategic delegation can not influence the degree of centralization because in Segendorff (1998) it is taken as given.

Redoano and Scharf (2004) deal explicitly with the question of policy centralization. Their model features two regions that differ with respect to the preference for one public good. They compare the policy outcome under

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<sup>1</sup>Rubinfeld (1987) and Oates (1999) provide an overview of this literature and the issues involved.

<sup>2</sup>For related models see also Ferretti and Perotti (2002), Chari, Jones, and Marimon (1997), Cheikbossian (2000), Lockwood (2002) or Dur and Roelfsema (2003).

a direct referendum on policy centralization with that of a representative democracy. The elected representatives in their model decide on the supply of the public good and – in the representative system – also on the question of centralization. Strategic delegation may then favor policy centralization: Voters in the jurisdiction with a high preference for the public good elect a representative with a low preference to facilitate a consensus with the representative of the low-preference jurisdiction. In contrast to Redoano and Scharf (2004), we focus on the constitutional stage, where representatives decide the allocation of decision powers between central and regional governments. Subsequently, the central or decentral executives in our model choose the optimal public good levels.

Last but not least, there exists an important strand of literature that analyzes the formation (as well as the break-up) of political unions.<sup>3</sup> A recent contribution is Alesina, Angeloni, and Etro (2001). As we, they analyze the degree of centralization, i.e. the scope of a political union, by considering a range of public goods with different spill-overs. However, their direct democracy approach does not allow for strategic delegation with respect to the centralization decision, which is the driving force behind our results. In a related setting, Panizza (1999) derives the degree of centralization as the outcome of a sequential game between a Leviathan-type government and the voters.

The remainder of this paper is organized as follows: Section 2 presents the economic model. In Section 3, we introduce the political process and derive the political equilibrium. Section 4 analyzes the case of asymmetric regions. Section 5, finally, offers concluding remarks.

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<sup>3</sup>See e.g. Alesina and Spolaore (1997), Alesina and Spolaore (2003), Bolton and Roland (1997) or the earlier survey by Bolton, Roland, and Spolaore (1996).



## 2 Economic Model

The economic framework underlying our model is a familiar setup in the context of regional public good provision. There are two regions, indexed by  $i \in \{1, 2\}$ , which, for the time being, are assumed to be symmetric. Each region is populated by a continuum of citizens, and we normalize the mass of each region's population to one. Citizens differ within regions with respect to their personal preference for public spending. This preference is captured by the parameter  $\alpha$ , which is distributed uniformly over  $[\alpha_{min}, \alpha_{max}]$ . The utility of individual  $\alpha$  in region  $i$  then takes the form:

$$U_\alpha(c_i, g_i, g_{-i}) = c_i + \alpha \int_0^1 [\ln g_i(\beta) + \beta \ln g_{-i}(\beta)] d\beta, \quad (1)$$

where  $c_i$  is the consumption of a private good and the  $g_i(\beta)$  are *continua* of local public goods in each region. These public goods are indexed by  $\beta$ , the extent of the interregional spill-over, that is assumed to be distributed uniformly over the unit interval  $[0, 1]$ .

On the production side, each citizen earns an exogenous income of  $y$ , and the cost of providing public goods in terms of the private good is equal to one for all public goods. To finance their provision, the government collects lump sum taxes that are uniform within each region.

We now derive, for future reference, the provision levels of regional public goods that result under decentralized and centralized decision making by a welfare maximizing government. Notice that centralized decision making means that the interregional spill-overs will be internalized. It does not imply that the actual provision levels of a particular regional public good are the same across regions, as would be the case under centralized provision. Furthermore, note that utilitarian welfare maximization in our framework

corresponds to maximizing the utility of the average citizen  $\bar{\alpha}$  who, due to our distributional assumption, coincides with the median.

Under decentralized decision making then, the welfare maximizing local governments ignore the citizens in the other region and focus exclusively on the welfare of their own average voter. Let  $b_i(g(\beta); \alpha) \equiv \alpha[\ln g_i(\beta) + \beta \ln g_{-i}(\beta)] - g_i(\beta)$  denote the net benefit from the regional public good  $\beta$  to citizen  $\alpha$  in region  $i$ . In other words, this is the utility arising from a particular regional public good minus the per capita cost of providing it. Each local government maximizes  $b_i(g(\beta); \bar{\alpha})$  over  $g_i(\beta)$  and provides the following level regional public good  $\beta$ :

$$g_i^d(\beta) = \bar{\alpha} \quad \forall \beta \in (0, 1) \text{ and } i \in \{1, 2\}. \quad (2)$$

We see that the public good levels under decentralized decision making do not depend on the extent of the spill-over  $\beta$  to the foreign region because these spill-overs are ignored and not internalized.

Under centralized decision making, on the other hand, the interregional spill-overs are internalized. At the same time, centralized decision making most likely entails additional over-heads<sup>4</sup> and has to overcome informational asymmetries. To capture these effects, we assume that centralization entails a fixed cost of  $f$  per capita. In line with our symmetry assumption, the central authority then weighs equally the net benefit accruing to the average citizen in both regions and maximizes  $b_1(g(\beta); \bar{\alpha}) + b_2(g(\beta); \bar{\alpha}) - 2f$ . The resulting provision levels under are:

$$g_i^c(\beta) = \bar{\alpha} [1 + \beta] \quad \forall \beta \in [0, 1] \text{ and } i \in \{1, 2\}. \quad (3)$$

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<sup>4</sup>This is certainly the case in Europe where the national authorities that lose their previous role are hardly ever downsized, leave alone shut down.

We see that under centralized decision making the provision levels increase not only in the average preference for public spending  $\bar{\alpha}$  but also in the extent of interregional spill-overs  $\beta$ . This is because these spill-overs are now internalized. Comparing centralized versus decentralized decision making, equations (2) and (3) reveal that decentralized decision making leads to lower provision levels. Again, this is because the interregional spill-overs are internalized by the central authority whereas they are ignored by local decision makers.

From a normative standpoint, it is clear which policies should be decided centrally and which decentrally. Let  $s(\beta; \alpha) \equiv b(g^c(\beta); \alpha) - b(g^d(\beta); \alpha) - f$  denote the surplus from centralization. Inserting the provision levels just derived, we have  $s(\beta; \alpha) = \alpha[1 + \beta] \ln[1 + \beta] - \bar{\alpha}\beta - f$ . At one extreme, this surplus is negative for public goods with low interregional spill-overs because the fixed cost dominates the benefit. At the other extreme, the surplus is positive for public goods with high spill-overs as long as the fixed cost is not too large.<sup>5</sup> The critical spill-over threshold  $\beta^*$  that follows from utilitarian welfare maximization is (implicitly) given by:

$$s(\beta^*; \bar{\alpha}) = 0 . \tag{4}$$

Below this threshold, the provision of a public good is best decided decentrally, whereas above the threshold centralized decision making dominates. This is the reference point to which we will compare the politically determined outcome. We now turn to its derivation.

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<sup>5</sup>Specifically, it is positive for all individuals even for high spill-overs as long as  $\alpha_{min} > [f + \bar{\alpha}] / [2 \ln 2]$ , which we assume henceforth to keep the problem interesting.

### 3 Political Equilibrium

The highly politicized nature of the decision on the allocation of decision power casts doubt on whether the normative outcome of section 2 will prevail. It is more realistic, in our view, to regard the allocation of decision power as being determined politically. This meta-decision is an important part of the constitutional design, which is certainly subject to political pressures. In the European Union, for instance, the constitution is being drafted as we write and the political maneuvers involved are all too obvious. It is this process that we model here and that will lead to a politically chosen spill-over threshold.

The process of political decision-making we envisage has three stages: In the first stage, citizens of each region choose a representative by majority vote. In the second stage, the elected representatives of both regions decide jointly on the set of public goods — or, more generally, the policies — that are to be decided centrally, and on how to share the cost of centrally decided policies. In the third stage, the respective executives — at the center or in each region — determine the quantities of the local public goods to provide.

Solving the game backwards, we start by considering the decision on how much of each local public good to provide. Subsequently, we analyze the joint decision by given local representatives on which policies to centralize and on how to share the cost. Finally, we determine the identities of the representatives chosen in regional elections.

#### 3.1 Provision of Public Goods

As already mentioned, the political economy aspects of the provision of local public goods have been researched extensively. Since our focus is the

allocation of decision powers, we find it advantageous — in the interest of tractability — to keep the provision decision as simple as possible. We therefore abstract from explicit political considerations in this context and assume that the provision of local public goods is decided optimally, whether this decision is taken at the center or decentrally.

The motivating example is the European Union. While the centralization decision appears highly contested, the actual policy making — in our framework the provision of the local public goods — seems to be much more routine. We therefore think of these decisions as being taken by bureaucrats at the center (the commission in Brussels) or at the regional level who maximize social welfare and choose the optimal levels of public goods as determined above. That is, the provision of the local public goods, decided on by the central or local authorities, is given by equations (2) and (3) respectively. This assumption enables us to concentrate on the centralization decision that is the focus of this paper.

### 3.2 Centralization Decision

In this subsection, we analyze the allocation of decision powers, taking as given the identities of the regional representatives,  $\alpha_i^{rep}$  for  $i \in \{1, 2\}$ . That is, the regional elections have supposedly taken place and the elected representatives now have to decide on the spill-over threshold. Put differently, they choose what local public goods are to be decided at the center and which local public goods remain under the control of the regional governments. In making this decision, they are aware of the resulting provision levels, namely the ones we have determined previously.

The elected representatives bargain not only over the centralization of decision powers. They also negotiate the respective contributions towards

the funding of the centrally decided regional public goods. Equivalently, they have to agree on a side payment that is paid by one region to the other. Note that a side payment of zero corresponds to the case in which each region pays exactly for the provision of its own regional public goods. Given that most negotiations in the European context involve the distribution of costs, allowing for side payments seems more realistic.<sup>6</sup>

More formally, the representatives choose the spill-over threshold  $\beta^*$  and the side-payment  $Z$  of region 2 to region 1 in order to maximize the Nash-product:

$$\left( \int_{\beta^*}^1 s(\beta; \alpha_1^{rep}) d\beta + Z \right) \times \left( \int_{\beta^*}^1 s(\beta; \alpha_2^{rep}) d\beta - Z \right), \quad (5)$$

where  $s(\beta; \alpha_i^{rep})$  is the surplus of the representative  $\alpha_i^{rep}$  from centrally deciding on public good  $\beta$ .

The maximization of (5) yields the following results: First, the representatives decide to centralize the decision over the local public good with spill-over  $\beta$  as long as the aggregate surplus for this particular good,  $\Delta(\beta; \alpha^{rep}) \equiv s(\beta; \alpha_1^{rep}) + s(\beta; \alpha_2^{rep})$ , is non-negative. The politically optimal threshold  $\beta^*$  is (implicitly) given by:

$$\Delta(\beta^*; \alpha^{rep}) \equiv (\alpha_1^{rep} + \alpha_2^{rep})[1 + \beta^*] \ln[1 + \beta^*] - 2\bar{\alpha}\beta^* - 2f = 0. \quad (6)$$

It is straightforward to show how the preferences for public spending of the two regional representatives influence the equilibrium threshold  $\beta^*$ : Using the implicit function theorem, we have  $d\beta^*/d\alpha_i^{rep} = -\Delta_{\alpha_i^{rep}}/\Delta_{\beta^*}$ . Since both the denominator and the numerator are positive, it follows that  $d\beta^*/d\alpha_i^{rep} <$

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<sup>6</sup>In the theoretical bargaining literature — see, for example, Hart and Mas-Colell (1996) — our assumption corresponds to the transferable utility case.

0. The higher the preference for public spending of each representative, the lower is the politically chosen  $\beta^*$ , or, put differently, the more decisions are taken at the center. Note that this dependence on  $\alpha^{rep}$  reflects the interim nature of our result — we do not yet know who will ultimately represent the region.

Second, the first-order condition for the politically optimal equilibrium side payment  $Z^*$  can be written as:

$$Z^*(\beta^*; \alpha^{rep}) = 0.5 \int_{\beta^*}^1 (s_2(\beta; \alpha_2^{rep}) - s_1(\beta^*; \alpha_1^{rep})) d\beta ,$$

or alternatively, substituting for the surplus functions, as:

$$Z^*(\beta^*; \alpha^{rep}) = 0.5 \int_{\beta^*}^1 (\alpha_2^{rep} - \alpha_1^{rep}) [1 + \beta] \ln[1 + \beta] d\beta , \quad (7)$$

where the politically chosen allocation of power,  $\beta^*$ , is defined by equation (6) above.

The total contributions of both regions towards financing the centrally decided local public goods then amount to:<sup>7</sup>

$$\begin{aligned} T_1^*(\beta^*; \alpha^{rep}) &= \int_{\beta^*}^1 g_1^c(\beta) d\beta - Z^* , \\ T_2^*(\beta^*; \alpha^{rep}) &= \int_{\beta^*}^1 g_2^c(\beta) d\beta + Z^* . \end{aligned}$$

Substituting equation (3) for the centrally decided level of public goods  $g_i^c$

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<sup>7</sup>The fixed costs  $f$  were modeled as non-monetary utility costs and therefore do not appear in these equations.

and equation (7) above for the equilibrium side-payment  $Z^*$  we have:

$$T_i^*(\beta^*; \alpha^{rep}) = \int_{\beta^*}^1 \bar{\alpha}[1 + \beta]d\beta + 0.5(\alpha_i^{rep} - \alpha_j^{rep})\varepsilon(\beta^*) ,$$

$$\text{with } \varepsilon(\beta^*) \equiv \int_{\beta^*}^1 [1 + \beta] \ln [1 + \beta] d\beta > 0 . \quad (8)$$

We see that the contribution a region has to pay increases in the preference of its representative for public goods,  $\alpha_i^{rep}$ . On the other hand, it decreases in the preference of the other region's representative,  $\alpha_{-i}^{rep}$ . The reason is that the greater a representative's gusto for public goods, the weaker is her position in the negotiations and, consequently, the higher the contribution this region has to pay. Conversely, the weaker the position of her opponent in the negotiations, the less the own region pays.

Comparing both regions' contributions, we see that region 1 pays more if its representative has the greater desire for public goods, and vice versa. Only if both representatives have exactly the same preference for public spending will the contributions be equal. This turns out to be the outcome in the symmetric case. However, the off- equilibrium effects are crucial for the voters' decision whom to elect. It is to these elections that we now turn.

### 3.3 Selection of Representatives

We are now in a position to analyze the first stage of the political process: In regional elections, voters in each region choose a regional representative. These representatives are citizens candidates in the sense of Osborne and Slivinski (1996) and Besley and Coate (1997), which means that they have the same (type-dependent) preferences as ordinary citizens. When choosing their representative, voters are aware that the equilibrium allocation of



decision power  $\beta^*$  and the side-payment  $Z^*$  depend on the identities of the representatives. Voters in region  $i$  thus choose their representative  $\alpha_i^{rep}$  to maximize the following utility imputation:

$$V_i(\beta^*(\alpha^{rep}), Z^*(\beta^*(\alpha^{rep}), \alpha^{rep}); \alpha) = y \pm Z^* + \int_0^1 b_i(g_i^d(\beta); \alpha) d\beta + \int_{\beta^*}^1 s(\beta; \alpha) d\beta. \quad (9)$$

Substituting for the net benefit function  $b_i$ , the surplus from centralization  $s_i$ , the public good levels  $g_i^d$ , and the definition of  $\varepsilon(\beta^*)$  from (8), the first order condition of this one-dimensional voting problem takes the form:

$$\frac{dV_i(\cdot)}{d\alpha_i^{rep}} = -\frac{\varepsilon(\beta^*)}{2} + (\alpha_i^{rep} - \alpha)[1 + \beta^*] \ln[1 + \beta^*] \frac{d\beta^*}{d\alpha_i^{rep}} = 0. \quad (10)$$

Since  $\varepsilon(\beta^*) > 0$  and  $d\beta^*/d\alpha_i^{rep} < 0$ , equation (10) can only be satisfied if  $\alpha_i^{rep} < \alpha$ . That is, each voter would like to elect a representative whose preference for public spending is lower than the voter's own preference.

Ultimately, it will be the median voter in each region who selects the regional representative.<sup>8</sup> This is because the candidate the median voter prefers is also preferred by a majority of voters over any alternative candidate in a pairwise election. The above first order condition then implies that the preference for public spending of both elected representatives in equilibrium is lower than the median voters' preference for public spending, or  $\alpha_i^{rep} < \bar{\alpha}$ . Instead of representing the region herself, the median voter prefers to select a representative with a lower preference for public spending. In other words, she strategically delegates the representation of the region to someone who is less keen on public goods. The driving force behind this result is the median voter's desire to obtain a favorable cost share for her region.

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<sup>8</sup>As in Besley and Coate (2003), we assume that the utility imputation satisfies sufficient conditions to invoke the median voter result. See Gans and Smart (1996) for a proof that single crossing is a sufficient condition.

This has important implications for the equilibrium allocation of decision powers. Given that the elected representative is less keen on public spending than the median voter and recalling that the equilibrium threshold decreases in the preference parameter of the representative, it follows that the politically chosen spill-over threshold  $\beta^*(\alpha^{rep})$  falls short of the threshold  $\beta^*(\bar{\alpha})$  that would be chosen by the median voter, were she to represent the region herself. Note that the latter threshold is socially optimal as the median and the average voter coincide due to our distributional assumption. Compared to the socially optimal spill-over threshold then, we conclude that the politically chosen threshold is sub-optimally low. In other words, strategic delegation leads to less centralization than is socially optimal. The driving force behind this result is again the objective of obtaining a lower cost share.

Notwithstanding this objective, the equilibrium side payment  $Z^*$  equals zero in the symmetric case. Each region pays for its own local public goods and the contributions of the regions to fund centrally decided policies are exactly equal. However, this particular aspect of our result is an artifact of the symmetry assumption which we now relax.

## 4 The Asymmetric Case

Let us now generalize the model to account for asymmetries between regions. In particular, we want to study the case of asymmetric spill-overs which turns out to be of special importance in the context at hand.<sup>9</sup> Suppose that regions differ with respect to the extent of spill-overs they receive from the local

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<sup>9</sup>Other potential asymmetries that can be incorporated into our model are fixed costs of centralization that differ across regions and also asymmetric tastes for the public good. As for the former, it is straightforward to show that, while affecting the side-payment, they do not change the extent of strategic delegation and hence the degree of centralization. The latter type of asymmetry, which has been considered in Besley and Coate (2003) and Redoano and Scharf (2004), leads to ambiguous results in our setup.

public goods in the other region. This type of asymmetry has two interesting interpretations: First, a region could be located downstream (or leeward) of the other region and thus benefit from pollution reductions upstream (or upwind) whereas the opposite is generally not true. Perhaps even more interesting is the second interpretation: Think of one region as the core and the other as the periphery. Usually, the region located at the periphery receives higher benefits from the public goods provided in the central region than vice versa. Take as an example a German *autobahn* or French *autoroute* and compare them to the same type of public good in peripheral countries such as Ireland or Portugal. Clearly, the freeways in core countries benefit residents of the peripheral countries more than the other way round.

We integrate this type of asymmetry into our model as follows: Generalize the net benefit of region  $i$  from a public good with spill-over  $\beta$  to take the form  $b_i = \alpha \ln g_i + \alpha \lambda_i \beta \ln g_{-i} - g_i$ , where  $\lambda_i \in [0, 1]$  differs across regions. The term  $\lambda$  determines to what extent a region benefits from the local public good  $\beta$  provided in the other region. As before, we start by determining the provision levels if decisions are taken decentrally versus when they are taken at the center. The public good levels under decentralization are  $g_1^d = g_2^d = \bar{\alpha}$  just as in the symmetric case. Since spill-overs are not taken into account, their asymmetry does not change the decentrally decided levels. Under centralization, on the other hand, provision levels do differ by region. In particular, the resulting provision levels are  $g_i^c = \bar{\alpha} [1 + \lambda_{-i} \beta]$ . Substituting these levels back into the benefits and subtracting the fixed cost gives a surplus from centralization of  $s_i(\beta; \alpha) = \alpha \ln [1 + \lambda_{-i} \beta] + \alpha \beta \lambda_i \ln [1 + \lambda_i \beta] - \bar{\alpha} \lambda_{-i} \beta - f$ .

We now turn to the second stage of the political process where the degree of centralization is determined conditional on the identity of the representatives. As in section 3.2, the degree of centralization and the side payment

are chosen by the elected representatives,  $\alpha_i^{rep}$  for  $i \in \{1, 2\}$ . These representatives maximize the Nash-product (5) as before. The equilibrium spill-over threshold  $\beta^*$  is again given by the condition  $\Delta(\beta^*; \alpha^{rep}) = 0$ , which now takes the form:

$$\begin{aligned} \Delta(\beta^*; \alpha^{rep}) \equiv & (\alpha_1^{rep} + \alpha_2^{rep} \beta^* \lambda_2) \ln [1 + \lambda_2 \beta^*] + (\alpha_2^{rep} + \alpha_1^{rep} \beta^* \lambda_1) \ln [1 + \lambda_1 \beta^*] \\ & - \bar{\alpha} \beta^* (\lambda_2 + \lambda_1) - 2f = 0 . \end{aligned} \quad (11)$$

The equilibrium side payment  $Z^*(\beta^*; \alpha^{rep})$  now amounts to

$$\begin{aligned} Z^*(\beta^*; \alpha^{rep}) = & 0.5 \int_{\beta^*}^1 (\alpha_2^{rep} \beta \lambda_2 - \alpha_1^{rep}) \ln [1 + \lambda_2 \beta] d\beta \\ & - 0.5 \int_{\beta^*}^1 (\alpha_1^{rep} \beta \lambda_1 - \alpha_2^{rep}) \ln [1 + \lambda_1 \beta] d\beta \\ & - 0.5 \int_{\beta^*}^1 \bar{\alpha} \beta (\lambda_1 - \lambda_2) d\beta , \end{aligned} \quad (12)$$

where  $\beta^* = \beta^*(\alpha^{rep})$  is implicitly given by (11). We see that, as before, the side payment increases with the taste for public goods of the representative  $\alpha_2^{rep}$  and decreases with the preference of the representative  $\alpha_1^{rep}$ .

Given this policy outcome, we now turn to the first stage of the model where each voter and, in particular, the median voter maximizes her own utility by selecting the region's representative. The first order conditions pertaining to the respective optimization of the utility imputation (cf. (9) in section 3.3) take the following form:

$$\frac{dV_1(\cdot)}{d\alpha_1^{rep}} = \left[ \frac{dZ^*}{d\beta^*} - s_1(\beta^*; \alpha) \right] \frac{d\beta^*}{d\alpha_1^{rep}} + \frac{dZ^*}{d\alpha_1^{rep}} = 0 , \quad (13a)$$

$$\frac{dV_2(\cdot)}{d\alpha_2^{rep}} = \left[ -\frac{dZ^*}{d\beta^*} - s_2(\beta^*; \alpha) \right] \frac{d\beta^*}{d\alpha_2^{rep}} - \frac{dZ^*}{d\alpha_2^{rep}} = 0 . \quad (13b)$$

We see that the representative's preference for public goods influences the voters' utility indirectly and directly: First, the identity of the representative changes the equilibrium threshold spill-over  $\beta^*$  and thereby the side-payment the region receives (pays) as well as the surplus on goods that are now centralized. Second, the representative's type changes the side-payment directly, as we have seen above. Substituting the explicit expressions for all these terms into the first-order conditions, we have:

$$-(\alpha_1^{rep} - \alpha) \frac{(\ln [1 + \lambda_2 \beta^*] + \lambda_1 \beta^* \ln [1 + \lambda_1 \beta^*])^2}{\Delta_{\beta^*}} - \frac{\varepsilon_1(\beta^*)}{2} = 0, \quad (14a)$$

$$-(\alpha_2^{rep} - \alpha) \frac{(\ln [1 + \lambda_1 \beta^*] + \lambda_2 \beta^* \ln [1 + \lambda_2 \beta^*])^2}{\Delta_{\beta^*}} - \frac{\varepsilon_2(\beta^*)}{2} = 0, \quad (14b)$$

with  $\varepsilon_i(\beta^*) \equiv \int_{\beta^*}^1 (\ln [1 + \lambda_{-i} \beta] + \beta \lambda_i \ln [1 + \lambda_i \beta]) d\beta$ . As in the symmetric case,  $\varepsilon_i(\beta^*) > 0$  for  $\beta^* < 1$  implying that  $\alpha_1^{rep} < \bar{\alpha}$  and  $\alpha_2^{rep} < \bar{\alpha}$ . In other words, the median voter in each country still elects a representative whose preference for public spending falls short of her own.

However, in contrast to the symmetric case, the degrees of strategic delegation need no longer be equal across countries. In general,  $\alpha_1^{rep} \neq \alpha_2^{rep}$  unless  $\lambda_1 = \lambda_2$  as can be seen from (14a) and (14b). To gain further insight, consider the extreme case where  $\lambda_1 = 0$  and  $\lambda_2 = 1$ . The local public goods of region 1 then benefit region 2 whereas region 1 does not receive such externalities. In terms of the core-periphery interpretation, region 1 is the core and region 2 the periphery. In this (special) case, equations (14a) and (14b) become

$$-(\alpha_1^{rep} - \alpha) \frac{(\ln [1 + \beta^*])^2}{\Delta_{\beta^*}} - \frac{\varepsilon_1(\beta^*)}{2} = 0, \quad (15a)$$

$$-(\alpha_2^{rep} - \alpha) \frac{(\beta^* \ln [1 + \beta^*])^2}{\Delta_{\beta^*}} - \frac{\varepsilon_2(\beta^*)}{2} = 0, \quad (15b)$$

with  $\varepsilon_1(\beta^*) = \int_{\beta^*}^1 \ln[1 + \beta] d\beta$  and  $\varepsilon_2(\beta^*) = \int_{\beta^*}^1 \beta \ln[1 + \beta] d\beta$ . The first term in (15a) and (15b) measures the indirect influence of  $\alpha_i^{rep}$  on the utility of voters in region  $i$ . Since  $\beta^* < 1$ , this indirect influence is stronger in the spill-over sending region 1 than in region 2. The direct effect of  $\alpha_i^{rep}$  on  $Z^*$ , given by  $\varepsilon_i(\beta^*)$ , is also more pronounced in region 1 than in region 2. Dividing (15b) by  $(\beta^*)^2$  and subtracting (15a) gives:

$$\frac{(\alpha_1^{rep} - \alpha_2^{rep}) (\ln[1 + \beta^*])^2}{\Delta_{\beta^*}} = -\frac{\beta^* \varepsilon_1(\beta^*) - \varepsilon_2(\beta^*)/\beta^*}{2\beta^*}. \quad (16)$$

The numerator on the RHS is strictly increasing in  $\beta^*$  as long as  $\beta^* < 1$  and becomes zero for  $\beta^* = 1$ . Hence, the RHS of (16) will be positive as long as  $\beta^* < 1$ . This implies that  $\alpha_2^{rep} < \alpha_1^{rep}$ . In other words, the region that benefits from inter-regional spill-overs elects a representative who has a lower preference for public spending than her counterpart in the region that does not receive spill-overs. Strategic delegation is found to be stronger in the periphery than at the center.

Our result that peripheral countries elect representatives who have less gusto for centralization than their counterparts in core regions seems to be born out by the European experience. Anecdotal evidence includes Margaret Thatcher and the rebate she obtained for Britain as well as the more recent examples of Spain and Poland. It is of particular interest that our result does not bode well for the impending EU enlargement. New member countries are necessarily peripheral. We are thus led to expect that their representatives will have too low a preference for integration because their constituents hope to achieve a favorable cost sharing arrangement.

## 5 Conclusion

In this paper we have presented a positive model of policy centralization. As a first step, we have compared how each individual policy is set when the decision is taken decentrally versus when it is taken centrally. As is well known, the centralized solution internalizes spill-overs but incurs various costs of centralization. The trade-off between these costs and the benefits determines the optimal degree of centralization. Our contribution in this paper is to move beyond such a normative analysis and endogenize the degree of centralization.

In our model, local representatives decide which policies are to be centralized and how to share the ensuing costs. We show that strategic delegation leads to the election of less centralist or federal-minded representatives, who are elected to obtain a more favorable cost share for their constituency. As a consequence, the resulting degree of centralization falls short of what is optimal for the average citizen. When we extend the setup to account for asymmetric spill-overs, these effects persist. However, strategic delegation turns out to be more pronounced in the periphery than at the center.

Our analysis can be applied to the European Union and bears interesting implications for other regional agreements as well. In the European context, our findings may reassure all those who are concerned about the ever expanding powers of the Brussels bureaucracy. Quite to the contrary, our model predicts that not enough decision power is devolved to the EU Commission. In fact, it might be the centralization-skeptical politicians predicted by our model who have popularized the term subsidiarity. Equally interesting is the prediction, implied by the asymmetric extension of the model, that representatives from the periphery will be less centralist than their counterparts in core countries. Anecdotal evidence seems to support this prediction:

One famous example is the rebate obtained by Margareth Thatcher.

We are well aware that such conclusions are courageous. In fact, we have intended them that way. The endogenous determination of centralization has so far attracted so little attention that we feel obliged to provoke more. There is a wide open field lying in front of us and we can only point out a few directions where further research is needed.

One direction is to take a closer look at the actors who set policies, both at the center as well as decentrally. We have modelled them as well-meaning executives but clearly they have their own stakes in the centralization decision, and will take action to influence it. Most notable in this respect is the interest of the central bureaucracy in further centralization. To account for such effects, we need to develop a dynamic version of our model

Another interesting dimension that merits attention is the institutional design aspect of our analysis. We have considered an institutional setting where representatives are elected to bargain on policy centralization. Our goal in doing so has been to model the European status-quo. However, the rules are still malleable, especially in Europe. Our framework should be compared to alternative rules of decision-making that might give rise to a different degree of centralization.

Finally, our treatment of policies has necessarily been stylized, especially on the cost side. The cost of centralization was meant to proxy for a wide range of possible issues, be it informational asymmetries or locational differences. A more explicit treatment of different costs might provide further insights. This also applies to the benefits or spill-overs produced by different types of public goods. Greater detail on this dimension would yield more concrete predictions which policies are most likely to be centralized.



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