

# Fiscal Federalisms and Electoral Accountability\*

Toke S. Aidt<sup>†</sup>      Jayasri Dutta<sup>‡</sup>

August 2, 2008

## Abstract

We study the efficient allocation of spending and taxation authority in a federation in which federal politicians are exposed to electoral uncertainty. We show that centralization may, but need not, result in a loss of electoral accountability. We identify an important asymmetry we regard to positive and negative externalities and show that centralization may not be efficient in economies with positive externalities even when regions are identical and centralization does not entail a loss of accountability. We also show that decentralization can only Pareto dominate centralization in economies with negative externalities.

*Keywords:* Fiscal federalism, local public goods, externalities, performance voting, turnout uncertainty, electoral accountability.

*JEL Classifications:* D72; D78; H41.

## 1 Introduction

Should a society opt for a centralized fiscal system under which spending decisions are made by a central authority and financed from general tax rev-

---

\*We thank Robert Evans, Paola Profeta, Dalibor Eterovic and the participants in the CEPR workshop “Dynamic Aspects of Policy Reforms” for useful comments and suggestions.

<sup>†</sup>Faculty of Economics, University of Cambridge, Austin Robinson Building, Sidgwick Avenue, Cambridge CB3 9DD, Tel.: +44 1223 335231. E-mail: Toke.Aidt@econ.cam.ac.uk.

<sup>‡</sup>Department of Economics, University of Birmingham, Tel.: +44 0121 4146640. E-mail: J.Dutta@bham.ac.uk.

enues or should it apt for a decentralized system in which choices are made by local authorities and financed by local taxes? In his seminal work on economic federalism, Oates (1972) answered this question by highlighting a trade off between internalization of externalities and the capacity of the state to cater for regional differences in taste. His famous Decentralization Theorem states that decentralization is desirable if externalities are weak and regional differences in taste are large.<sup>1</sup> Clearly such economic trade offs are important, yet the design of the fiscal state has equally important *political economy* implications. This is because political inefficiencies are affected by the degree of centralization of the fiscal state. This has been explored in a growing literature on the political economy of fiscal federalism.<sup>2</sup> This literature, which we discuss in more detail below, has identified various political trade offs as well as reasons why the economic trade offs are affected by politics. This paper makes a contribution to this literature by pointing to a new and potentially important political cost of centralization: governance uncertainty. It explores how governance uncertainty affects the trade off between internalization of externalities under centralization and the perceived benefits of electoral accountability under decentralization.

The organization of the fiscal state is not just a question of theoretical interest. It is an issue of great practical importance as well. The ongoing debate about the appropriate role of the European Union is just one example this. Another is view that a reorganisation of the fiscal state towards more a decentralized structure is one very promising way to increase efficiency and fairness in provision in less developed countries (Santos (1998); Bardhan (2000)).

The general framework of our analysis is the common agency model with governance uncertainty studied by Aidt and Dutta (2004). This model portrays a society populated by heterogenous groups of voters (e.g., living in different regions) who have conflicting interests over public policy. The groups of voters (the principals) use elections to hold an opportunistic or rent seeking politician (the agent) accountable for his policy choices while in office.

---

<sup>1</sup>This result is, as pointed out by Besley and Coate (2004), driven by the somewhat artificial assumption that central government cannot tailor spending to regional differences in taste. See Harstad (2007) for a rationale for why it might be politically optimal to select uniform federal policies.

<sup>2</sup>See, e.g., Seabright, 1996; Crémer and Palfrey, 1996, 2000; Edwards and Keen, 1996; Dixit and Londregan, 1998; Lockwood, 2002, 2008; Besley and Coate, 2003; Dur and Roelfsema, 2005, Tommasi and Weinschelbaum, 2007; and Bordignon et al. 2008.

They do so by voting retrospectively in an infinite sequence of elections, as in Ferejohn (1986), Persson et al. (1997) or Coate and Morris (1999). The critical new feature of the analysis is that *ex ante* – before each election – the politician is uncertain about which group will be pivotal in deciding the outcome of the election. We call this governance uncertainty. Governance uncertainty can arise from many different sources. To be concrete, here we relate it to random events that affect the turnout rate of the groups in each election.<sup>3</sup> These random turnout shocks, which we assume to be correlated within groups but not between groups, introduce uncertainty from the point of view of the politician as to which of group hold the majority among those who actually turn out to vote in any given election. Within the context of fiscal federalism, a leading example of what we have in mind is weather conditions in different locations that induce random turnouts, as in Roemer (1998).

We adopt this general setting to revisit one of the classical questions of fiscal federalism: when should provision of local public goods be centralized? We explore the characterization results of Aidt and Dutta (2004) to derive new insights into this question. Firstly, we highlight a new political cost of centralization. This cost arises because governance uncertainty is more pronounced at the federal level than at the regional level and is associated with a loss of electoral accountability. Secondly, we identify an important asymmetry between situations with positive and negative externalities from provision of local public goods. With negative externalities, voters are forced to accept more rent seeking in the federation than under regional government. Consequently, centralization entails a loss of accountability that must be traded off against the benefits of internalizing externalities, and centralization is only Pareto efficient if the externalities are sufficiently strong. With positive externalities, on the other hand, centralization does not entail a loss of accountability per se. Yet, even when the regions of the federation are identical in all respects, centralization is not necessarily Pareto efficient despite the presence of externalities.

The rest of the paper is organized as follows. In section 2 we discuss the related literature. In section 3, we present the general model and it discuss the main assumptions. In section 4, we present the characterization results from Aidt and Dutta (2004). In section 5, we present the analysis of local public goods and fiscal federalism and present the main results of the paper.

---

<sup>3</sup>See Dhillon and Peralta (2002) for a good survey of the literature on voter turnout.

In section 6, we summarize and discuss a number of extensions.

## 2 Related literature

The literature on the political economy of fiscal federalism has been surveyed by, for example, Lockwood (2006) and Inman and Rubinfeld (1997), and we shall only attempt to cover the most direct links here.

Our paper is most directly related to the work by Seabright (1996), Tommasi and Weinschelbaum (2007) and Bordignon et al. (2008). Seabright (1996) argues that political accountability is reduced when public spending decisions are centralized. He measures this effect as the reduced probability that the welfare of a given region can determine the re-election of the government. In our model, this notion is made precise. The political clout of a region is determined by the probability that voters of that region holds the majority among those who turn out to vote in the federation. Importantly, whether the reduction, implied by centralization, in the probability that a given region can determine the re-election of the government leads to a loss of political accountability depends on the nature of the externalities associated with provision of local public goods, as discussed above. Tommasi and Weinschelbaum (2007) study the question of centralization versus decentralization within the framework of a common agency model. They allow the principals (citizens of the regions within the country) to offer monetary rewards to either the federal politician (under centralization) or to the regional politicians (under decentralization). They identify a trade off between internalization of externalities and the coordination failure that arises among the principals when fiscal decisions are centralized. One can interpret the trade off that we highlight in a similar way, but with two important differences. One difference is that we focus on the implicit incentives that the threat of termination of office can provide rather than the explicit incentives provided by monetary payments. Another difference is that we allow for positive as well as negative externalities and show that this distinction matters in important ways for the nature of the coordination failure. Bordignon et al. (2008) also find that the distinction between positive and negative externalities matter within a lobbying model similar to that of Tommasi and Weinschelbaum (2007). The reason is, however, very different from the one highlighted by our analysis. It has to do with the fact that lobbying under decentralization may partly compensate for the fact that local public goods are under-provided, but only

if the externality is positive.

Our paper is also related to the work of Besley and Coate (2003), Dur and Roelfsema (2005) and that of Lockwood (2002; 2008). Besley and Coate (2003) identify two important political effects of centralization. These are related to different legislative procedures at the federal level. First, centralization induces uncertainty as to whether or not the representative from a particular region will be included in the minimum winning coalition that determines policy. Second, when policy making at the federal level is determined by bargaining between representatives from different regions, regional voters may have an incentive to delegate strategically and elect a politician that cares a lot about public spending. In both cases, a trade off between the political distortion (uncertainty or strategic delegation) and the benefits of internalizing (positive) externalities determines whether or not centralization is beneficial, and Besley and Coate find that centralization is, typically, beneficial if the externality is strong enough. Dur and Roelfsema (2005), however, extend this analysis to show that centralization may fail to internalize externalities if the cost of public policy cannot be shared among the regions. In our model, we also focus on the uncertainty that arises when decisions are centralized, but we stress governance uncertainty rather than uncertainty about being included in the minimum winning coalition. It is interesting to notice that decentralization, in our model, can only Pareto dominate centralization in the presence of a negative externality – a case that Besley and Coate (2003) do not consider.<sup>4</sup> Lockwood (2002) shows that centralization leads to inefficient outcomes when regional representatives vote over agendas that contain sets of region-specific projects. The problem is that the political choice is not tailored sufficiently to within-region benefits. Thus, centralization entails a classical trade off between catering for regional differences and internalizing externalities. Importantly, however, the political distortions imply that weaker externalities and heterogeneity between regions need not increase the efficiency gain from decentralizations. In our model, there is no regional differences with regard to the benefits of public goods. Nonetheless, we find an interesting asymmetry between positive and negative externalities which provides a complementary example of how politics can change the classical trade offs in surprising ways. Lockwood (2008) further explores

---

<sup>4</sup>Besley and Coate (2003) make welfare comparisons based on aggregate public goods surplus. In our model, it is possible to identify cases where aggregate public goods surplus is maximized under decentralization even with positive externalities.

ways in which the Decentralization Theorem may break down under majority voting or lobbying even when federal policy is, by assumption, prevented from reflecting regional preferences.

### 3 A General Model

The general setting is an infinite horizon model of repeated elections and performance voting, familiar from Ferejohn (1986), Persson et al. (1997) and Coate and Morris (1999) among others. We extend the standard formulation of the model by introducing voter heterogeneity and governance uncertainty.

Society consists of two groups of voters,  $i = 1, 2$ ; politicians are indicated by index 0. A group is defined as a subset of voters who are affected in the same way by public policy. Group affiliation may be determined by observable characteristics such as geographical location, age, or gender. Per-period utility,  $u_{it}$ , is discounted with the common discount factor  $\beta \in (0, 1)$  and lifetime welfare is given by

$$V_{0i} = \sum_{t=0}^{\infty} \beta^t u_{it}; \quad i \in \{0, 1, 2\}. \quad (1)$$

There are  $n_1$  voters in group 1 and  $n_2$  voters in group 2 and may be of different sizes. The size of the total (voter) population is  $n = n_1 + n_2$ .

Each period, the politician collects taxes up to a maximum of  $T$ , spends some of this on providing amenities to his electorate, and keeps the rest for himself.<sup>5</sup> Denoting the cost of providing utilities to the two groups of voters  $c_t$ , we can write the politician's per-period payoff as

$$u_{0t} = T - c_t \quad (2)$$

if in office, and  $u_{0t} = 0$  otherwise. Politicians apply the same discount factor as voters.

The cost of providing utility to voters is determined by the *political cost function*. We define  $C(x_{1t}, x_{2t})$  as the minimum cost to the politician of providing utility levels  $u_{1t} \geq x_{1t}$  and  $u_{2t} \geq x_{2t}$  simultaneously to voters in

---

<sup>5</sup>This formulation of the conflict of interest between voters and politicians is due to Persson et al. (1997) and used extensively in Persson and Tabellini (2000). It should be understood as a metaphor for the more general phenomenon that politicians can divert their efforts towards activities that are not in the interests of their electorate.

the two groups at time  $t$ . Likewise, we define  $C_i(x_{it})$  as the minimum cost of providing utility levels  $u_{it} \geq x_{it}$  to group  $i$ ,  $i = 1, 2$ , separately. We begin by specifying the political cost function directly, but shall derive it from more fundamental considerations in the application to fiscal federalism that follows. We shall explore the following general properties of the political cost function.

**Assumption 1** *The political cost function is differentiable and weakly increasing in each argument. Moreover,  $\lim_{x_i \rightarrow \infty} C(x_1, x_2) = \infty$  and  $C(0, 0)$ .*<sup>6</sup>

This assumption says that it is costly for the politician to generate utility for each group of voters. This is clearly the case whenever more tax resources have to be devoted to the task. However, when the politician can generate utilities by providing public goods, the cost function may not be strictly increasing in both arguments.

The property of the political cost function that really matters for outcomes is whether it is sub- or super-additive. The political cost function is sub-additive if

$$(\mathbf{C}^+) \quad C(x_{1t}, x_{2t}) \leq C_1(x_{1t}) + C_2(x_{2t}) \quad (3)$$

and super-additive if

$$(\mathbf{C}^-) \quad C(x_{1t}, x_{2t}) > C_1(x_{1t}) + C_2(x_{2t}). \quad (4)$$

A sub-additive political cost function makes it cheaper to provide utility to all voters jointly than to provide the same utility levels to the two groups separately. In public finance sub-additivity typically arises from the fundamental role of public goods. A super-additive cost function makes it more expensive to please all groups of voters jointly than to please them separately. Super-additivity arises in the presence of negative externalities associated with, for example, provision of local public goods or with envy effects.

The politician, elected at  $t$ , cannot make binding promises on the level and pattern of public spending before he enters office. Since his own payoff decreases with  $c_t$ , he would, in the absence of further incentives, choose  $c_t = 0$  and provide no amenities to the electorate. Voters know this, and threaten to vote retrospectively against a politician who does not provide them with

---

<sup>6</sup>In addition, we need the technical assumption that for all  $x_1$  there exists a  $x'_2$  such that  $C(x_1, x'_2) = C_1(x_1)$  and likewise that for all  $x_2$ , there exists a  $x'_1$  such that  $C(x'_1, x_2) = C_2(x_2)$ .

a minimum level of utility. At the beginning of each period, voters in each group announce simultaneously a performance standard, denoted  $x_{1t}$  and  $x_{2t}$ , and vote in favor of reelection of the incumbent politician if, and only if the policy implementation observed at the end of the period generates at least that level of utility, i.e., if, and only if  $u_{it} \geq x_{it}$ .

The key feature of the model is that politicians are exposed to governance uncertainty. At the most general level this means that the incumbent cannot be sure *ex ante* which of the two groups is decisive in determining his reappointment. Governance uncertainty can arise for many different reasons. It may, for example, reflect fluctuations in inter-group power relations with one group becoming more powerful and therefore more pivotal than another due to unpredictable events. Another example is electoral turnout uncertainty, and this is the interpretation we shall follow here for simplicity. In particular, we generate governance uncertainty by assuming that neither group can guarantee to turn out in full force at elections. Consequently, if a politician delivers on the performance standard set by group 1, who, say, holds the majority *ex ante*, by incurring the cost  $C_1(x_{1t})$ , but fails to deliver on the standard set by group 2 ( $u_{2t} < x_{2t}$ ). On the day of the election,  $\tilde{n}_{it}$  voters from group  $i$  actually show up to vote, and the politician can lose his bid for reelection if  $\tilde{n}_{2t} > \tilde{n}_{1t}$ . The central assumption of our analysis is that electoral turnout is uncertain, and that voters can commit to vote according to the announced performance standards *if they show up to vote*, but cannot commit to a particular turnout rate. This is captured by the next assumption.

**Assumption 2** *Electoral turnout,  $\tilde{n}_t = (\tilde{n}_{1t}, \tilde{n}_{2t})$ , is random. The ex-ante probability that the turnout of group 1 is greater than that of group 2,  $P(\tilde{n}_{1t} \geq \tilde{n}_{2t})$ , is equal to  $p_1$  and constant over time. The complementary probability is  $p_2$ . We assume that  $p_1 = 1 - p_2 \in (0, 1)$ .*

Here, we specify the parameters  $p_1$  and  $p_2$  directly. It can be derived from more basic considerations, however, and different distributions of turnout shocks map into alternative specifications of  $p_1$  and  $p_2$ . It is important that  $0 < p_1 < 1$ , so that neither group can guarantee reelection. This is more likely to be the case when turnout shocks are correlated within groups, as in the case where differences in weather conditions affect the turnout of voters in different geographical locations or foul weather keeps certain types of voters,



such as the poor, at home (Roemer, 1998), and when differences in group sizes are not too large.

The game between the incumbent politician and the two groups of voters unfolds over time as follows. At the beginning of each period, voters in each group announce the (utility) standard that the politician needs to satisfy to get their votes in the next election. The standards are chosen by the two groups non-cooperatively and at the same time. The politician observes the standards and determines whether to comply, and if so, how many standards to meet. We denote the set of actions available to the politician by  $A = \{(00), (10), (01), (11)\}$  with elements  $a_t = (00)$  (meet neither standard);  $a_t = (10)$  (meet group 1's standard only);  $a_t = (01)$  (meet group 2's standard only); and  $a_t = (11)$  (meet both standards). At the end of the period, a new election is held and voters randomly turn up to vote. Those who turn up vote according to the announced performance standard. The politician either wins or loses. In the latter case, he is replaced by an identical challenger; in the former case, he gets (at least) another term in office. After the election, the game continues to the next period where a similar sequence of events takes place. We restrict attention to history-independent subgame perfect Nash equilibria of this game.<sup>7</sup> In addition, we assume that the politician if indifferent between two or more actions (which are then preferred to the remaining ones) chooses the action that maximizes reelection chances. Below, when we refer to equilibrium this is what we have in mind.

## 4 Equilibrium Paths

We can apply Theorem 1 from Aidt and Dutta (2004) to characterize the set of equilibria. The Theorem says that all equilibrium paths of the political game described above have a property called *strategic consensus*: the politician prefers to meet all performance standards at all times, all those voters who turnout in the election vote for the incumbent, and the incumbent is reelected with certainty, irrespective of turnout shocks. While this outcome,

---

<sup>7</sup>Formally, the model describes a dynamic common agency game with absorbing states and perfect information. The two groups of voters are principals, and the elected politician their common agent. Uncertainty in rewards arises from uncertainty about which of the two principals will have the “casting vote”, or final say, in the only reward available: reelection. There is no aggregate uncertainty, as one of the principals will have the casting vote for sure.

perhaps, is to be expected when the political cost function is sub-additive and it is cheaper for the politician to satisfy the standards jointly than separately, it is surprising that the same result obtains with super-additive costs. In this case, the fact that it is *more* expensive to satisfy the standards jointly than separately suggests that “partisan” outcomes would be more likely. This intuition is, however, wrong. Whenever the politician is willing to implement a “partisan” outcome, the disfavored group has an incentive to lower its standard to induce the politician to make a “partisan” choice in its favor. This logic continues until the standards are such that the politician is just willing to implement a policy that satisfies both groups. The result is strategic consensus.

Although all equilibrium paths display strategic consensus, the distribution of payoffs depends critically on the properties of the political cost function. Let  $X = \{x_{1t}, x_{2t}\}_{t=0}^{\infty}$  be a sequence of *equilibrium* performance standards. In an economy with sub-additive political costs, the following characterization result holds.<sup>8</sup>

**Proposition 1 (Sub-additive Costs)** *If the political cost function satisfies assumption 1 and is sub-additive, then  $X$  must satisfy*

$$(\mathbf{SC}_1^+) \quad C(x_{1t}, x_{2t}) = \beta T;$$

$$(\mathbf{SC}_2^+) \quad C_1(x_{1t}) \geq \beta p_1 T;$$

$$(\mathbf{SC}_3^+) \quad C_2(x_{2t}) \geq \beta p_2 T.$$

Moreover,  $(\mathbf{SC}_2^+)$  and  $(\mathbf{SC}_3^+)$  hold with equality for an additive political cost function. Along all equilibrium paths, the politician receives payoffs  $(1 - \beta)T$  per period.

The proposition explores the fact that the politician must, at equilibrium, be indifferent between satisfying both and satisfying none of the standards. As a consequence, the politician *always* gets per period payoff  $(1 - \beta)T$ , while the remaining share of tax revenues,  $\beta T$ , is devoted to the task of generating utilities to the voters. Importantly, this distribution of resources is unaffected by turnout uncertainty. Thus, strategic consensus provides the politician with “full insurance” against random voter turnout and voters

---

<sup>8</sup>We state proposition 1 and 2 without proof. For proofs see Aidt and Dutta (2004; theorem 1 and propositions 1 and 2).

with insurance against “partisan” choices by the politician. When the political cost function is additive, the allocation of utility between the two groups of voters is uniquely determined by  $p_1$  and  $p_2$ . In contrast, economies with *strictly* sub-additive costs exhibit multiple equilibria in performance standards at each  $t$ , and any equilibrium allocation what arises with sub-additive costs (weakly) Pareto dominates the utility allocation with additive costs.

In an economy with super-additive political costs, the utility allocation is very different, as shown by the second characterization result.

**Proposition 2 (Super-additive Costs)** *If the political cost function satisfies assumption 1 and is super-additive, then  $X$  must satisfy*

$$(\mathbf{SC}_1^-) \quad C(x_1, x_2)(1 + \eta_1) - C_1(x_1) = \theta T$$

$$(\mathbf{SC}_2^-) \quad C(x_1, x_2)(1 + \eta_2) - C_2(x_2) = \eta T$$

where  $\eta_i = \frac{(1-p_i)\beta}{1-\beta}$  for  $i = 1, 2$ . The politician receives payoffs  $T - C(x_1, x_2) > (1 - \beta)T$  every period. Moreover, if  $\frac{\partial C}{\partial x_1 \partial x_2} \geq 0$ , the solution to  $(\mathbf{SC}_1^-)$  and  $(\mathbf{SC}_2^-)$  is unique.

In this case, the politician must, at equilibrium, be indifferent between satisfying both standards and satisfying just one of them. The politician receives  $T - C(x_1, x_2)$  each period. This is more that he receives along *any* equilibrium path with sub-additive costs, but the payoff is no longer independent of turnout shocks. Intuitively, super-additive costs make it costly for the politician to implement consensus outcomes. This enables him to extract more rents: the two groups of voters have, *ceteris paribus*, to lower their standards to prevent “partisan” outcomes.

In the next section, we use the general model to revisit the classical question in public finance: should fiscal decisions be centralized or decentralized? We argue that governance uncertainty is more pronounced at the federal than at the local level. This gives rise to a new trade off and yields interesting new insights into the costs and benefits of centralization of provision of local public goods in a federation.

## 5 Fiscal Federalism

We consider a country with two regions,  $i = 1, 2$ . This corresponds to the two groups in the general model. The two regions are of equal size with respect to

population (normalize to 1 in each region), but may differ with regard to tax potential and electoral turnout patterns.<sup>9</sup> Individuals in each region derive utility from local public goods  $g_{it}$  and private goods  $y_{it}$ . Consumption of local public goods in one region generates externalities for individuals in the other region. To capture this, we write the utility function of an individual in region  $i$  as

$$u_{it} = y_{it} + g_{it} - \gamma g_{-it} \quad (5)$$

where  $\gamma \in (-1, 1)$  captures the strength of the externality.  $\gamma > 0$  corresponds to a negative and  $\gamma < 0$  to a positive externality. Public goods are produced by the following technology

$$g_{it} = \frac{1}{\alpha} k_{it}^\alpha \quad (6)$$

where  $k_{it}$  is an input required to produce the public good, bought at a constant price of one. For simplicity, we assume that  $\alpha = \frac{1}{2}$ .<sup>10</sup> The maximum revenue that can be raised each period in region  $i$  is  $T_i$ , and so the maximum revenue that can be raised in the country is  $T = T_1 + T_2$ . We use the convention that politicians raise the maximum revenue each period, spent some of it on providing local public goods, some on transfers  $s_{it} > 0$  to individuals, and keep the rest as rents.

We compare two institutional arrangements: Regionalism [ $R$ ] and Federalism [ $F$ ]. Regionalism means that each region elects its own politician who can finance local public goods (and transfers) out of local tax revenues. Federalism means that a single elected politician is in charge of the whole country and can use general tax revenues to provide public goods and transfers to the two regions.

The key assumption of the model is that governance uncertainty is more pronounced at the federal than at the local level. This assumption can be justified in many ways. Most importantly, the federal politician must by definition cater to more principals than the regional politician. The federal politician needs the support of the majority of the whole country while a regional politician only needs the majority support of his own region. Turnout shocks at the regional level renders regional turnout unpredictable. Consequently, the federal politician faces an additional layer of uncertainty that is

---

<sup>9</sup>We make the assumption  $n_1 = n_2$  to isolate the novel features of the application, but note that differences in group sizes plays a role in the choice between (local) public goods and transfers.

<sup>10</sup>This assumption can be relaxed, but doing so yields not additional insights and complicates the equations.

not present in regional elections. To make the contrast as sharp as possible, we assume that regional politicians can guarantee reelection if they satisfy the performance standard set by voters in their region: there is no turnout uncertainty within a region. In contrast to the two regional politicians, the politician in charge of the federation is exposed to turnout uncertainty and needs the support of voters in both regions to get reelected for sure. We denote the ex ante probability that voters in region  $i$  holds the majority among those who turn out to vote by  $p_i$  with  $p_1 = 1 - p_2$ .

As a benchmark, suppose that all public finance decisions were made by benevolent planners. When fiscal decisions are decentralized to the regional level, two regional planners decide independently and simultaneously how much local public good to provide to their region. They do so by maximizing regional aggregate public goods surplus taken the spending decision in the other region as given:

$$s_{it}^D(k_{it}; k_{-it}) = 2(k_{it}^{\frac{1}{2}} - \gamma k_{-it}^{\frac{1}{2}}) - k_{it}, \quad i = 1, 2. \quad (7)$$

In a federation, on the other hand, decisions are made by one benevolent planner who maximizes aggregate public goods surplus for the whole country, i.e.,  $s_t^F(k_{1t}, k_{2t}) = \sum s_{it}^D(\cdot)$ . It is easy to verify that federalism under these ideal circumstances Pareto denominates regionalism for all  $\gamma \neq 0$ .<sup>11</sup> This provides a clear-cut benchmark against which we can measure political distortions.

To characterize equilibrium allocations, we need to derive the political cost functions. While politicians always want to provide local public goods<sup>12</sup>, transfers are only used if the demands of voters are sufficiently high. In the following, we restrict attention to the situation in which both federal and regional politicians provide local public goods *and* transfers in equilibrium.<sup>13</sup>

<sup>11</sup>For  $\gamma = 0$ , the institutional arrangement makes no difference.

<sup>12</sup>This is implied by the production technology.

<sup>13</sup>A sufficient condition that guarantees that politicians, at equilibrium, provide local public goods and transfers in all regimes is  $\min\{T_1, T_2\} > \frac{1}{\beta}$ ; for  $\gamma < 0$

$$T > \max_i \left[ \frac{1}{\beta p_i} \right] (1 + \gamma^2 + 4\gamma);$$

and for  $\gamma \geq 0$

$$T > \max_i \left[ \frac{(1 + 2\gamma(1 - \beta p_i)(1 - \gamma))}{\beta p_i} \right].$$

Under regionalism, the two regional politicians face a separate performance standard and make decisions about public spending without (direct) regard for the welfare of voters in the other region: each politician takes the spending decisions by the other politician as given. Consider the politician in region  $i$  who in period  $t$  faces the performance standard  $x_{it}$ . The minimum cost of satisfying this standard for a given input to the production of local public goods in the other region is

$$C(x_{it}; k_{-i}) = \min_{k_{it} \geq 0, s_{it} \geq 0} k_{it} + s_{it} \quad (8)$$

subject to  $x_{it} \leq s_{it} + 2k_{it}^{\frac{1}{2}} - 2\gamma k_{-it}^{\frac{1}{2}}$  and the regional budget constraint. For  $\min\{x_{1t}, x_{2t}\} > 2(1 - \gamma)$ , it follows that  $k_{it} = 1$  and  $s_{it} = x_{it} - 2(1 - \gamma)$ , and the political cost functions are

$$C_i^R(x_{it}) = x_{it} - 1 + 2\gamma \quad \text{for } i = 1, 2. \quad (9)$$

We notice that the externality is not internalized: both regions spend on local public goods up to the point where private marginal benefits are equal to the marginal cost. The transfer must therefore compensate local voters for the impact of spending on local public goods in the other region – if the politician wants to secure reelection. In each region, voters set the performance standard in period  $t$  taking the standard of the other region as given. At equilibrium, the standards are set to make each regional politician indifferent between satisfying the standard and getting reelected (for sure) and not satisfying it, in case of which he is replaced but keeps all local tax revenues  $T_i$  for himself. This yields the following stationary equilibrium allocation

$$x_{it}^R = \beta T_i + 1 - 2\gamma \quad \text{for } i = 1, 2. \quad (10)$$

Thus, the politician keeps a share  $(1 - \beta)T_i$  of regional tax revenues each period, and uses the rest to provide local public goods and transfers to voters. A negative externality reduces voter welfare, while a positive externality enhances their well-being, as one would expect.

Under federalism, decision making power rests with a single elected politician who faces performance standards  $\{x_{1t}, x_{2t}\}$  set by voters in the two regions each period. For  $\min\{x_{1t}, x_{2t}\} > 2(1 - \gamma)^2$ , the politician minimizes the cost of satisfying the two standards jointly by spending  $k_{1t} = k_{2t} = (1 - \gamma)^2$  on local public goods and by providing transfers  $s_{it} = x_{it} - 2(1 - \gamma)^2$  to voters

in each of the two regions. The political cost function is therefore given by

$$C^F(x_{1t}, x_{2t}) = x_{1t} + x_{2t} - 2(1 - \gamma)^2. \quad (11)$$

If the politician decides to satisfy the standard of one of the regions, say, region 1, only, then it is clear that  $s_{2t} = 0$ . However, if local public goods generate a positive externality, it is cost effective to provide some local public goods to region 2: not because the politician cares about the welfare of voters in that region, but because it is, up to a point, cheaper to provide utility to voters in region 1 this way than to give them transfers. If, on the other hand, local public goods generate negative externalities, then  $k_{2t} = 0$  minimizes political costs. With this in mind, we can, for  $\min\{x_{1t}, x_{2t}\} > 2$ , write the political cost functions as follows

$$C_i^F(x_{it}) = x_{it} - 1 \quad \text{for } \gamma \geq 0 \quad \text{for } i = 1, 2; \quad (12)$$

$$C_i^F(x_{it}) = x_{it} - (1 + \gamma^2) \quad \text{for } \gamma < 0 \quad \text{for } i = 1, 2. \quad (13)$$

We notice that the political cost function is sub-additive for  $\gamma < 0$ , super-additive for  $\gamma > 0$  and additive for  $\gamma = 0$ . Below we apply propositions 1 and 2 to characterize stationary equilibrium allocations.

Our main goal is to compare regime [F] and [R] under different assumptions about the magnitude of the externality. To set the stage, we begin by considering the case in which there is no externality. In this case, political costs are additive and the total rent  $((1 - \beta)T)$  captured by the federal politician corresponds precisely to the sum of those captured by the two regional politicians  $((1 - \beta)T_1 + (1 - \beta)T_2)$ . An implication, then, is that the only effect of centralization is to allow redistribution between the two regions: with additive costs centralization is a zero-sum game and if one region gains it must be at the expense of the other.

**Proposition 3 (No externality  $\gamma = 0$ )** *Regime [F] and [R] cannot be Pareto ranked. Region  $i$  prefers regime [F] to [R] if, and only if*

$$p_i > \frac{T_i}{T} \quad \text{for } i = 1, 2.$$

**Proof.** Using proposition 1, we can derive the equilibrium utility allocation in regime [F] as follows

$$x_{it}^F = \beta p_i T + 1 \quad \text{for } i = 1, 2.$$

The utility differences between regime [F] and [R] is

$$x_{it}^F - x_{it}^R = \beta(p_i T_{-i} - p_{-i} T_i) \equiv \widehat{\Delta}_i \text{ for } i = 1, 2. \quad (14)$$

where  $x_{it}^R$  is defined by equation (10). The proposition follows immediately from the fact that  $\widehat{\Delta}_1 = -\widehat{\Delta}_2$  ■

Region  $i$  receives  $1 + p_i \beta T$  from the federal government and  $1 + \beta T_i$  net of rents from the regional government. Intuitively, therefore, whether a region gains or loses from centralization depends on  $p_i$  – the probability that each region holds the majority among those who turn out to vote in the federal election – relative to the region’s contribution to the federal tax revenues. An implication, then, is that poor regions are, *ceteris paribus*, more likely to favor centralization than rich regions.

The situation is more complex and interesting when local public goods generate a negative externality ( $\gamma > 0$ ) and political costs become super-additive. In this case, centralization is associated with three effects. The first effect is the *redistribution effect* described above: centralization pools revenues from the two regions and thus allows redistribution to take place. The second effect is the *internalization effect*: centralization induces the politician to internalize the externality in order to minimize the cost of getting reelected. This benefits all voters. The third effect is the *rent effect*. The rent effect arises because political costs are super-additive. Recall from proposition 2 that the politician’s share of total revenues, at equilibrium, is *larger* than  $(1 - \beta)T$ . This implies that less is available in total to generate amenities to voters in the federation than in the two regions separately. This harms all voters. In the next proposition, we isolate the externality and rent effect from the redistribution effect by assuming that  $p_1 = \frac{1}{2}$  and that  $T_1 = T_2$ .<sup>14</sup>

**Proposition 4 (Negative Externalities  $\gamma > 0$ )** *Assume that  $p_1 = \frac{1}{2}$  and  $T_1 = T_2$ . Then*

---

<sup>14</sup>We use Pareto efficiency as our welfare criterion instead of aggregate public goods surplus (used e.g., by Besley and Coate, 2003). We do so because the Pareto criterion has a clear-cut positive implication: if one institutional arrangement Pareto dominates another, all voters would support a change in the institutional arrangement if the decision to change was put to a vote in e.g. a referendum (see Cr mer and Palfrey (1996) for a positive theory of centralization of political decisions). It also avoids mixing up positive and normative analysis. Notice, however, in making Pareto statements, we do not count the welfare of the politicians.



1.  $[R]$  is Pareto superior to  $[F]$  for  $\gamma \in (0, \frac{2(1-\beta)}{2-\beta})$ .
2.  $[F]$  is Pareto superior to  $[R]$  for  $\gamma \in (\frac{2(1-\beta)}{2-\beta}, 1)$ .

**Proof.** Using proposition 2 and equations (11) and (12), we can derive the (unique) stationary utility allocation as follows:

$$x_{it}^F = p_i \beta T + 1 + 2\gamma(1 - \beta p_i)(\gamma - 2) \quad \text{for } i = 1, 2.$$

The utility differences between regime  $[F]$  and  $[R]$  are

$$\Delta_{it} = x_{it}^F - x_{it}^D = \widehat{\Delta}_i + 2\gamma^2(1 - \beta p_i) - 2\gamma(1 - 2\beta p_i) \quad \text{for } i = 1, 2,$$

where  $\widehat{\Delta}_i$  is defined in equation (14). For  $p_1 = \frac{1}{2}$  and  $T_1 = T_2$ , we have that

$$\Delta_{1t} = \Delta_{2t} = \gamma(\gamma(2 - \beta) - 2(1 - \beta)),$$

which is negative for  $\gamma \in (0, \frac{2(1-\beta)}{2-\beta})$  and positive for  $\gamma \in (\frac{2(1-\beta)}{2-\beta}, 1)$  ■

The proposition shows that centralization is efficient only with strong negative externalities. This is in contrast to the social planner's solution which showed that centralization is a Pareto improvement for all  $\gamma > 0$ . The result, however, echoes the classical finding by Oates (1972), although the logic is entirely different. While Oates focused on the trade off between internalizing externalities and catering for differences in preferences for public goods in different regions, the trade off behind proposition 4 has nothing to do with heterogenous taste: it is driven by the rent effect. Centralization implies a transfer of resources from voters in the two regions to the federal politician and for weak externalities, both regions are worse off in a federation. However, for  $\gamma > \frac{2(1-\beta)}{2-\beta}$ , the externality effect is sufficiently strong to dominate the rent effect, and federalism Pareto dominates regionalism.

Proposition 4 ignores the redistribution effect which, as we noted above, is driven by turnout uncertainty as captured by  $p_i$  and differences in tax resources in the two regions. We can define the values of  $p_1$  at which the two regions are indifferent between the two regimes as:

$$p_1^1(\gamma, \lambda) = \frac{\beta \lambda T_2 + 2\gamma(1 - \gamma)}{\beta(T_2(1 + \lambda) + 2\gamma(2 - \gamma))}; \quad (15)$$

$$p_1^2(\gamma, \lambda) = \frac{\beta \lambda T_2 + 2\gamma^2(1 - \beta) - 2\gamma(1 - 2\beta)}{\beta(T_2(1 + \lambda) + 2\gamma(2 - \gamma))}; \quad (16)$$

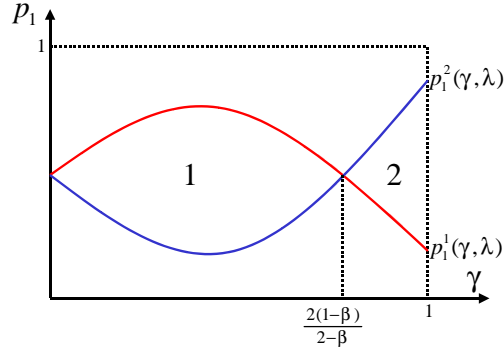


Figure 1: Welfare analysis with super-additive political costs.

where  $\lambda = \frac{T_1}{T_2}$  and  $\gamma$  captures the strength of the externality. Region 1 prefers regime [F] to [R] if, and only if  $p_1 > p_1^1(\gamma, \lambda)$  and region 2 prefers regime [F] to [R] if, and only if  $p_1 < p_1^2(\gamma, \lambda)$ . The two functions,  $p_1^1(\gamma, \lambda)$  and  $p_1^2(\gamma, \lambda)$ , are drawn in Figure 1 in  $(\gamma, p)$  space for a given value of  $\lambda$ . We can identify two main areas: in area 1 regime [R] is Pareto superior to [F], while in area 2, regime [F] Pareto dominates [R]. Outside these areas, the distribution effect is sufficiently strong to make one of the regions better off at the expense of the other. An increase in  $\lambda$  (which makes region 1 relatively richer) shifts  $p_1^1(\gamma, \lambda)$  and  $p_1^2(\gamma, \lambda)$  up making it less likely that region 1 and more likely that region 2 benefits from federalism.

The situation in which local public goods generate positive externalities is very different. In this case, political costs are sub-additive and proposition 1 shows that the political agency has multiple equilibria. Along all equilibrium paths, the aggregate utility of the two regions is, however, uniquely determined by

$$x_{1t} + x_{2t} = \beta T + 2(1 - \gamma)^2. \quad (17)$$

Moreover, the lower bounds on the utility provided to each region is given by  $x_i \geq \beta p_i T + (1 + \gamma^2)$  for  $i = 1, 2$ . The federal politician collects the rent  $(1 - \beta)T$  each period. This is the same as the total rent collected by the two regional politicians: there is not rent effect with sub-additive costs. In the absence, then, of significant redistribution effects, one might expect that centralization is always a Pareto improvement. The next proposition shows that this is not the case. To state the result, we define the share, denoted

$\theta$ , of total utility that goes to region 1 as  $\theta = \frac{x_{1t}}{\beta T + 2(1-\gamma)^2}$ . This allows us to index equilibrium allocations by  $\theta$ .

**Proposition 5 (Positive externalities  $\gamma < 0$ )** *Assume that  $p_1 = \frac{1}{2}$  and  $T_1 = T_2$ . Then there exists a  $\bar{\theta} \in (0, \frac{1}{2})$  such that for  $\theta \in [\bar{\theta}, 1 - \bar{\theta}]$  regime [F] Pareto dominates regime [R].*

**Proof.** Using proposition 1, we can calculate the “best” and the “worst” equilibrium allocation for each region under regime [F]:

$$\begin{aligned} x_{it}^{\max} &= 1 - 4\gamma + \gamma^2 + p_i\beta T \\ x_{it}^{\min} &= \beta p_i T + (1 + \gamma^2) \end{aligned}$$

for  $i = 1, 2$ . Region  $i$  is better off under [R] than under [F] in the “worst” equilibrium if

$$x_{it}^{\min} - x_{it}^D = \widehat{\Delta}_i + \gamma^2 + 2\gamma < 0,$$

and is better off under [F] than under [R] in the “best” equilibrium if

$$x_{it}^{\max} - x_{it}^D = \widehat{\Delta}_i + \gamma^2 - 2\gamma > 0,$$

where  $\widehat{\Delta}_i$  is defined in equation (14). For  $p_1 = \frac{1}{2}$  and  $T_1 = T_2$ , we see that  $x_{it}^{\min} - x_{it}^D < 0$  and  $x_{it}^{\max} - x_{it}^D > 0$  for  $i = 1, 2$ . Thus, at least one region prefers [F] to [R]. Along any equilibrium path

$$x_{1t} + x_{2t} = \beta T + 2(1 - \gamma)^2.$$

Define the share of total utility obtained by region  $i$  by  $\theta_i$ . Region  $i$  is then indifferent between the two regimes for

$$\theta_i = \frac{\beta T_i + 1 - 2\gamma}{\beta T + 2(1 - \gamma)^2} \equiv \bar{\theta}_i.$$

Note that for  $T_1 = T_2$ ,  $0 < \bar{\theta}_1 < 1 - \bar{\theta}_2 < 1$  and that  $\bar{\theta}_1 = \bar{\theta}_2 < \frac{1}{2}$ . Since  $\sum_i \theta_i = 1$ , we conclude that for  $\theta_1 \in (\bar{\theta}_1, 1 - \bar{\theta}_2)$  both regions prefer [F] to [R]. Substitution of  $\theta_1 = \theta$  and  $\bar{\theta}_1 = \bar{\theta}$  yields the proposition ■

**Corollary 1** *For  $p_1 = \frac{1}{2}$ ,  $T_1 = T_2$  and  $\gamma < 0$ , there exist equilibrium allocations for which centralization is not a Pareto improvement.*

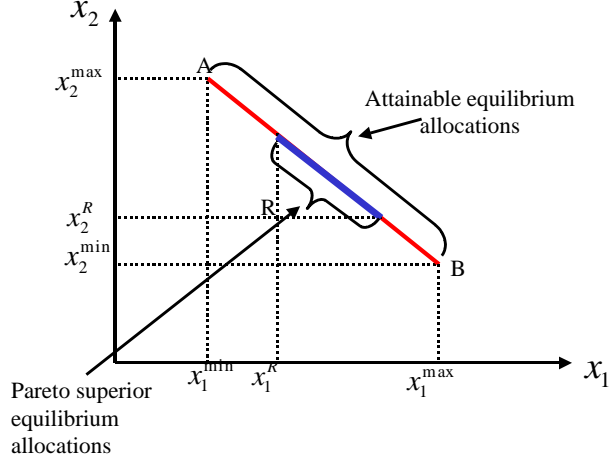


Figure 2: Utility allocations with sub-additive political costs.

The proposition shows that federalism Pareto dominates regionalism in some, but not all, equilibria. In the absence of the rent and redistribution effect, this it is surprising that centralization is not always efficient. Why is it not better for all voters to allow internalization of the external benefits? The reason is that the selection of equilibria, in fact, re-opens the door to redistribution, but now redistribution is driven by the selection of equilibria, rather than by differences in  $p_i$  and  $T_i$  as such. For example, in the “worst” equilibrium under regime [F], the external benefit captured by region 1 is  $\gamma^2$  which is less that what it “receives” under [R], namely  $-2\gamma$ . The point is that in this equilibrium most of the benefits from having the positive externality internalized are captured by region 2 and region 1 is better off with the “external” benefits unintentionally bestowed on it by region 2 under regionalism. This – and the proposition more generally – is illustrated in Figure 2. The Figure shows the utility allocations attainable in political equilibrium under the assumptions of the proposition. The segment  $A - B$  indicated with bold on the utility frontier contains the equilibrium allocations that Pareto dominate regionalism (represented by point  $R$ ). The remaining allocation on the frontier cannot be Pareto ranked. In these cases, contrary to the Decentralization Theorem, it is not efficient to centralize despite the fact that there are no regional differences in neither taste nor income, but there are (positive) externalities to be internalized.

## 6 Conclusion

This paper revisits the classical question about whether fiscal decisions should be centralized or decentralized. We show how governance uncertainty affects the trade off between internalization of externalities and political accountability. We highlight an important asymmetry between positive and negative externalities and show that centralization only weakens political accountability in the presence of negative externalities. We also show that in the presence of positive externalities centralization may not be Pareto efficient despite the fact that policy can be tailored to regional tastes and centralization internalize regional spillovers. These results, however, ignore a potentially important benefit of decentralization, namely yardstick competition. As shown by Besley and Case (1995) voters can make comparisons between jurisdictions and use information about what is happening in other jurisdictions to overcome political agency problems. This forces incumbents into (yardstick) competition in which they care about what other incumbents are doing. This benefit is, of course, lost if fiscal decisions are centralized. It would be interesting in future research to extend the analysis to include the possibility of yardstick competition.

More generally, the paper explores the consequences of turnout uncertainty in a political agency model with repeated elections, retrospective voting, and heterogeneous voters. The general framework and the characterization results in Aidt and Dutta (2004) can be adopted to many other applications than the one studied here. This includes other public finance problems, e.g., the choice between targeted transfers and universal public goods (see Aidt and Dutta, 2008), but applications in many other fields, including corporate governance and labor economics, also come to mind.

## References

- [1] Aidt, T.S. and J. Dutta, 2004, Strategic consensus. *Journal of Mathematical Economics* 40, 227-245.
- [2] Aidt, T.S. and J. Dutta, 2008, Electoral Uncertainty and Public Goods. Working Paper, Faculty of Economics, University of Cambridge.
- [3] Bardhan, Pranab, 2002, Decentralization of governance and development, *Journal of Economic Perspectives* 16, 185-205.

- [4] Besley, Timothy and Case, Anne, 1995, Incumbent Behavior: Vote-Seeking, tax-setting, and yardstick competition. *American Economic Review* 85(1), 25-45.
- [5] Besley, T. and Coate, S., 2003, Centralized versus decentralized provision of local public goods: a political economy approach. *Journal of Public Economics* 87, 2611-2637.
- [6] Bordignon, M., Colombo, L., and U. Galmarini, 2008, Fiscal federalism and lobbying, *Journal of Public Economics*, In Press.
- [7] Coate, S., and S. Morris, 1999, Policy persistence, *American Economic Review* 89, 1327-1336.
- [8] Crémer, Jacques and Palfrey, Thomas R., 1996, In or out?: Centralization by majority vote. *European Economic Review* 40(1), 43-60.
- [9] Crémer, Jacques and Palfrey, Thomas R., 2000. Federal Mandates by Popular Demand, *Journal of Political Economy* 100, 905-927.
- [10] Dhillon, A. and S. Peralta, 2002, Economic theories of voter turnout. *Economic Journal* 112, F332-F352.
- [11] Dixit, A., and J. Londregan, 1998, Fiscal federalism and redistributive politics. *Journal of Public Economics* 68, 153-180.
- [12] Dur, R., and H. Roelfsema, 2005, Why does centralisation fail to internalise policy externalities? *Public Choice* 122, 395-416.
- [13] Edwards, Jeremy and Keen, Michael, 1996, Tax competition and Leviathan, *European Economic Review* 40(1), 113-134.
- [14] Ferejohn, J., 1986, Incumbent performance and electoral control, *Public Choice* 50(1-3), 5-25.
- [15] Harstad, Bård, 2007, Harmonization and Side Payments in Political Cooperation. *American Economic Review* 97(3), 871-889.
- [16] Inman, R. P and Rubinfeld, D. L., 1997, *The political economy of federalism*, in D. Mueller (ed.): *Perspectives on Public Choice: a Handbook*. Cambridge: Cambridge University Press.
- [17] Lockwood, B., 2002, Distributive politics and the costs of centralization. *The Review of Economic Studies* 69(2), 313-337.

- [18] Lockwood, B., 2006, *Fiscal Decentralization: A Political Economy Perspective*, in E. Ahmad and G. Brosio (eds.): *The Handbook of Fiscal Federalism*, Edward Elgar.
- [19] Lockwood, B., 2008, Voting, lobbying, and the decentralization theorem. *Economics and Politics*, In press.
- [20] Oates, W.E., 1972, *Fiscal Federalism*. Harcourt Brace, New York.
- [21] Persson, T., G. Roland and G. Tabellini, 1997, Separation of powers and political accountability, *Quarterly Journal of Economics* 112, 1163-1202.
- [22] Persson, T., and G. Tabellini, 2000, *Political Economics: Explaining Economic Policy*. The MIT Press: Cambridge, Mass.
- [23] Roemer, John E., 1998, Why the poor do not expropriate the rich: an old argument in new garb, *Journal of Public Economics* 70, 399-424.
- [24] Santos, Boaventura de Sausa, 1998, Participatory budgeting in Porto Alegre: Toward a redistributive democracy, *Politics and Society* 26(4), 461-510.
- [25] Seabright, P. 1996, Accountability and decentralization: an incomplete contacts model. *European Economic Review* 40(1), 61-90.
- [26] Tommasi, M. and F. Weinschelbaum, 2007. Centralization vs. decentralization: A principal-agent analysis. *Journal of Public Economic Theory* 9(2), 369-389.