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ASPECTS

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Fiscal Federalism

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ABSTRACT: This paper empirically investigates the underlying causes of expenditure decentralization, based on the predictions of a new political economy model of partial fiscal decentralization. Under shared expenditure responsibility, the degree of decentralization is endogenous and depends on the relative political conditions prevailing at each level of government. Our empirical results from a panel of democracies support the relevance of political factors as determinants of fiscal decentralization. The relationship between central government electoral strength and both expenditure and revenue centralization emerges as nontrivial and non-linear. Political forces at the central government level driving centralization up and down appear to coexist.

JEL Codes: H77, D72, H11

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1 Introduction

Sub-central governments enjoy larger degrees of competence in revenue and expenditure decisions, a trend that has been documented empirically (Arzaghi and Henderson, 2005). What are the determinants of this trend? And what are the channels through which decentralization is achieved? These questions, while on top of the policy agenda, have been relatively little explored.

In this paper we point to two directions we consider relevant in understanding the mechanisms of delegation of competencies to lower level governments: first, in many instances there is joint contribution and shared responsibility in the provision of specific public goods by two or more levels of government. This implies that we need to adapt our theoretical framework by moving away from considering decentralization as a binary choice – i.e. provision *either* by the central or lower level government, as generally assumed in the fiscal federalism literature – and toward explicitly taking into account the interplay arising from joint provision. Hence, decentralization is often of partial nature. Second, politics matters: we argue that the degree of decentralization within a country depends in important ways on the relative political forces between levels of government.

Most of the theoretical literature in economics treats the decision to decentralize as a binary one. Based on the “Decentralization Theorem” (Oates, 1972) allocation of public goods and services is guided by a trade-off between internalizing inter-jurisdictional spillovers and catering to local preferences.¹ Notably, even what is known as the Second Generation Theory of Fiscal Federalism (Weingast, 2009), while moving away from assuming benevolent governments² to include political dimensions, still essentially remains within a binary choice framework.

¹See Epple and Nechyba (2004) for a recent survey.

²The standard in the First Generation Theory (Oates, 2003).

Conversely, actual decentralization policies generally imply overlap in spending duties by two or more levels of government. Breton (1996) argues that few countries do indeed have a fully centralized government structure. Even unitary states, such as France and Spain, have lower level authorities, often with elected officials.

We define *partial decentralization* as a situation where a public good is provided by more than one level of government. Jametti and Joanis (2009a) using raw data from the IMF's Government Financial Statistics show that even within fairly disaggregate spending items, such as education, health and culture, there is contribution from three levels of government (central, state and local) in Canada, Switzerland and the U.S. Similarly, within their database, considering between 40 and 50 countries with at least some (overall) expenditure decentralization and the aforementioned spending items, only cultural spending in India is fully decentralized.

Partial decentralization gives rise to vertical interactions among governments on two dimensions. First, complementarities in spending among levels of government make joint contribution socially optimal. Second, vertical externalities arise among politicians as they might benefit and react strategically to the contribution to the public good of another level of government.

The latter dimension is the main focus of this paper, the political economy of partial decentralization having received relatively little attention in the literature.³ Our analysis is based on an earlier paper by Joanis (2009), which is cast in the context of a pure moral hazard political agency model, an approach initiated by Barro (1973) and Ferejohn (1986). In the model, two levels of government are involved in the provision of a public good and voters are imperfectly informed about each government's contribution to the good, creating a shared accountability problem. An important feature of the model is that the degree of decentralization

³We are aware of two recent exceptions: Brueckner (2009) studies partial fiscal decentralization in a Tiebout-style framework, while Hatfield and Padro i Miquel's (2008) analysis is cast in a tax competition framework. Neither of these papers provide an empirical application.

is endogenous in the model and depends on three elements: (i) the relative competence of each level of government, (ii) the relative rents that politicians at each level of government can earn from holding office, captured in the model by each level of government's access to the tax base, and (iii) the relative political conditions prevailing at each level of government, i.e. the extent to which each level of government can affect its electoral fortunes by contributing to the public good.

This paper's focus is on the third of these predictions, with the theory's main insight being that the central government's electoral strength should, all else being equal, increase that government's share of spending. Using data from a panel of democracies, we explore the role of electoral conditions prevailing at the central level on the degree of both expenditure and revenue centralization. Fixed effects regressions generally support the theory, together with highlighting the non-linear nature of the empirical relationship between centralization and government strength. Overall, these results show that electoral variables rightly belong in the set of determinants of fiscal decentralization.

The paper proceeds as follows. After a brief discussion of the related empirical literature in Section 2, Section 3 lays down the theoretical model and derives empirically-testable predictions. Section 4 introduces the empirical strategy and describes the data, with empirical results being presented in Section 5. The last section concludes briefly.

2 Contribution to the Literature

This paper is related to the large body of empirical research investigating decentralization as a determinant of various economic variables, where decentralization is measured in terms of a revenue or expenditure ratio between different levels of government, e.g. sub-federal divided

by total government expenditures. For example, Oates (1985) relates the size of government to the degree of decentralization, a question that has been taken up by a number of studies (for a survey, see Feld *et al.*, 2003). Thus, decentralization often features as an explanatory variable in empirical research on fiscal federalism.

Much smaller – but closer to our purpose – is the empirical literature on the actual determinants of fiscal decentralization. An early, cross-sectional attempt is Panizza (1999), who finds that country size, income, ethnic fractionalization and the degree of democracy all reduce the degree of fiscal decentralization. Similar results are presented by Arzaghi and Henderson (2005), using panel data. A more recent study, also in a panel context, on the determinants of decentralization in Switzerland (Feld *et al.*, 2008) shows that centralization is negatively related to the availability of direct democratic decision-making (referenda). Stegarescu (2009) documents the role of political integration as a determinant of fiscal decentralization in OECD countries.

We expand the existing literature on the determinants of fiscal decentralization along three dimensions: First, as mentioned above, in most of the theoretical literature, the devolution of public good provision and financing is assumed to be a binary decision, e.g. expenditures are either provided by the central or the local government. Second, political economy aspects of decentralization are generally introduced in an *ad hoc* way in the empirical analysis.⁴ Our analysis is based on a theoretical political economy framework, thus introducing explicitly the effects of political choices on the degree of decentralization. Third, we see a better modeling of the determinants of decentralization as a stepping stone towards addressing the issues that arise in models where decentralization is used as an explanatory variable – such as the “Oates” regressions from above – which suffer quite obviously from endogeneity problems. In particular,

⁴Panizza (1999) does present a theoretical model in which the degree of centralization is endogenously determined. However, that model does not focus on political aspects.

the potential for endogeneity problems is evident in the theoretical model presented in the next section, in which the degree of decentralization is an equilibrium outcome. Our work can be seen as an exploration of potential instruments for decentralization variables in other applications.

3 A Model of Shared Responsibility in a Federation

This section lays down a model in which a public good valued by the voters in a given jurisdiction is jointly provided by two levels of government (labelled ‘federal’ and ‘provincial’). It describes the environment (composed of two governments and N identical voters), characterizes the social optimum, and derives key results on the political determinants of decentralization.⁵

In each of two periods, two levels of government choose fiscal policy (taxes collected and spending) to maximize their expected level of rent extraction, subject to the constraint that they need to seek reelection at the end of the first period. Voters, who value public goods, can observe total taxes and can infer total rents. However, they do not observe the intergovernmental composition of expenditures. Public good provision is positively related to the reelection probability of both governments such that the spending decisions of one level of government affects not only its own reelection probability but that of the other level of government as well (a positive externality arises). Each level of government’s equilibrium contribution to the public good equates its own marginal benefit from reelection – with an incentive to free-ride on the other level of government’s contribution – to the marginal cost of foregone rents in the first period, taking as given the strategy of the other level of government.

⁵This section is adapted from Joanis (2009).

3.1 The Environment

Every period, the federal government (indexed by superscript f) and the provincial government (indexed by superscript p) each contribute to the provision of a public good g in a province. Government j produces $g^j \geq 0$ units of a publicly-provided input. Together, the federal and provincial inputs are converted into a public good g by a constant elasticity of substitution (CES) technology:⁶

$$g = \left(\theta^f (g^f)^\rho + \theta^p (g^p)^\rho \right)^{1/\rho}, \quad (1)$$

where $\rho \leq 1$. θ^p and θ^f are parameters that denote each level of government's competence.

Each government levies a lump-sum tax (T^j) and faces a common unit cost of production ($\tilde{\tau}$). Politicians in office can divert tax revenues away from public good provision and towards their own benefit. Assuming balanced budgets at each level of government, any of the jurisdiction's N individuals faces a total tax bill of

$$T = T^f + T^p = \tau(g^f + g^p) + s^f + s^p, \quad (2)$$

where $\tau = \tilde{\tau}/N$ and s^j are the per capita rents extracted by government j .

All individuals have the following quasi-linear utility function:

$$u(g, z) = h(g) + z, \quad (3)$$

where z denotes the consumption of a private good and h is a well-behaved concave function.

⁶Nishimura (2006) also uses such an aggregation technology in a similar context.

For tractability, let us assume a simple functional form for h :

$$h(g) = g^\alpha, \tag{4}$$

where $0 < \alpha < 1$. Furthermore, every period each individual is endowed with y units of the private good such that

$$z + T = y. \tag{5}$$

Without loss of generality, we normalize the population of the jurisdiction to unity ($N = 1$) since all individuals are identical.

For simplicity, let us make a few additional assumptions about taxes. Since taxes are lump-sum in this model, we can assume that individuals and governments take total taxes collected (T^p and T^f) as given. Let us further assume that T^p and T^f are fixed at some pre-determined levels that are sufficient for each level of government to provide some arbitrary maximum level of the public good (\bar{g}). In sum, we assume the following series of inequalities for each government j :

$$\tau \bar{g} \leq T^j \leq y. \tag{6}$$

3.2 Benevolent Governments and the Optimal Degree of Decentralization

Given our focus on the extent of decentralization on the expenditure side, for expositional purposes, it will be useful to define the ‘degree of decentralization’ (d) as the share of provincial spending in total spending:

$$d \equiv \frac{g^p}{g^f + g^p} \in [0, 1]. \tag{7}$$

The case in which $d = 1$ will be referred to as *complete decentralization*, $d = 0$ as *complete centralization*, and $0 < d < 1$ will correspond to instances of *partial decentralization*.

Optimality requires that politicians extract no rents while in office ($s^{fS} = s^{pS} = 0$) and that the Samuelson condition be satisfied (a superscript S denotes the social optimum). In this model, the latter implies that government j contributes to the public good according to the following expression:

$$g^{jS} = \left(\frac{\tau}{\alpha}\right)^{\frac{1}{\alpha-1}} (\theta^j)^{\frac{1}{1-\rho}} \left((\theta^j)^{\frac{1}{1-\rho}} + (\theta^{-j})^{\frac{1}{1-\rho}}\right)^{\frac{\rho-\alpha}{\rho(\alpha-1)}} \text{ if } \rho < 1, \quad (8)$$

where $-j$ denotes the other level of government. It follows from (8) that the optimal spending ratio (which determines the optimal degree of decentralization) is a function of the relative competence of the two levels of government:

$$\left(\frac{g^p}{g^f}\right)^S = \left(\frac{\theta^p}{\theta^f}\right)^{\frac{1}{1-\rho}}. \quad (9)$$

If the inputs produced by both levels of government do not exhibit any complementarity ($\rho = 1$) – a case in which these inputs are ‘perfect substitutes’ – the socially optimal levels of g^f and g^p are given by the following conditions:

$$\begin{aligned} g^{jS} &= \left(\frac{\tau}{\alpha} \left(\frac{1}{\theta^j}\right)^\alpha\right)^{\frac{1}{\alpha-1}} && \text{if } \theta^j > \theta^{-j}, \\ g^p + g^f &= \left(\frac{\tau}{\alpha} \left(\frac{1}{\theta}\right)^\alpha\right)^{\frac{1}{\alpha-1}} && \text{if } \theta^p = \theta^f = \theta, \text{ for some } \theta, \\ g^{jS} &= 0 && \text{if } \theta^j < \theta^{-j}. \end{aligned} \quad (10)$$

The above results are summarized by the following proposition.

Proposition 1 (Optimal Decentralization) *The involvement of both levels of government in the provision of a public good – i.e. ‘partial decentralization’ – is optimal provided that there is some degree of complementarity between g^f and g^p . Complete centralization can be optimal only if there is no complementarity in g^f and g^p ($\rho = 1$) and if the federal government is more competent than the provincial government ($\theta^f \geq \theta^p$). Similarly, complete decentralization is optimal only if $\rho = 1$ and $\theta^f \leq \theta^p$.*

In what follows, we assume that $\rho < 1$.

3.3 Introducing Politics: Opportunistic Politicians and Strategic Voters

Unless governments are assumed to be benevolent social planners, their behaviour depends on the incentives provided by the political process. This paper considers a two-period model, with separate elections taking place at the provincial and federal levels between the two periods. As in Besley and Smart’s (2006, 2007) political agency model, elections in our model can act as an imperfect disciplinary device.

Politicians Each government maximizes expected discounted rents (per capita) over the two periods, given by

$$S^j = s_1^j + P^j \beta s_2^j, \quad (11)$$

where subscripts indicate periods, $\beta \in [0, 1]$ is a discount factor and P^j is incumbent j ’s perception of his reelection probability.

Voters and elections Voters face a simple binary reelection decision in the elections held at the two levels of government at the end of period 1. The two elections are assumed to take

place simultaneously.⁷ Furthermore, following Besley and Smart (2006), voters are taken to be able to announce and commit to a reelection rule before the elections take place.

Information The information available to voters at election time is crucial to the ability of elections to act as disciplinary devices. Two sources of imperfect information will be crucial to the analysis that follows:

1. Voters do not observe the contribution of each level of government to the shared public good. However, voters observe the aggregate level of the public good. In other words, voters observe g but not g^f and g^p .
2. Uncertainty about the election outcome is introduced and resolved only after incumbents have taken all relevant decisions and just before the voters cast their ballots. From the point of view of incumbents, elections are ‘probabilistic.’

In the spirit of probabilistic voting models, such as those developed by Persson and Tabellini (2000) or more recently by Alesina and Tabellini (2007, 2008), election results are typically uncertain from the point of view of politicians (at least to some extent) since a series of shocks may affect the electorate’s decision beyond fiscal policy (e.g. other issues arising during the campaign, characteristics of challengers, partisan loyalty). Here, these shocks are specific to a given level of government, introducing heterogeneity in the electoral conditions between the elections taking place at the two levels of government.

Timing The timing of the game is as follows:

1. Incumbents set period-1 fiscal policy (determining the contribution to the shared public good and the level of rents);

⁷A case in which this assumption is relaxed is presented in Joanis (2009).

2. Voters observe the realization of two random variables which summarize the electoral conditions specific to each election;
3. The federal and provincial elections take place; and
4. If reelected, the incumbents set period-2 fiscal policy. Otherwise, voters achieve the utility level associated with challengers (similar in all respects to incumbents).

3.4 Equilibrium and predictions

Voters announce that they will reelect each incumbent if their period-1 utility level exceeds some random threshold value,⁸ the distribution of which is assumed to be common knowledge. The cut-off utility level relevant to the provincial election is denoted \bar{u} and is a random variable distributed according to F , a c.d.f. Hence, voters reelect the provincial government if

$$u(g, T) \geq \bar{u}. \tag{12}$$

Symmetrically, they reelect the federal government if their utility exceeds the realization of a random variable \bar{v} , distributed according to G , a c.d.f.

From the point of view of incumbents, reelection is probabilistic. Electoral results depend on aggregate public good provision and on the realization of the stochastic reservation utility levels. The probability that the provincial incumbent is reelected is

$$P^P = \Pr [u(g, T) \geq \bar{u}] = F [u(g, T)]. \tag{13}$$

For simplicity, let us assume that \bar{u} is uniformly distributed on the interval $[0, u^*]$, implying

⁸One interpretation for this is that information about the quality of the challengers becomes available just before the election.

that

$$P^p = \frac{1}{u^*} u(g, T). \quad (14)$$

Note that the reelection probability is decreasing in u^* , the upper bound on the random cut-off utility level. Hence, the election is riskier from the incumbent's point of view the higher is this upper bound.

We can now consider the provincial incumbent's problem in period 1:

$$\max_{g^p} T^p - \tau g^p + \beta T^p \frac{1}{u^*} \left((\theta^f (g^f)^\rho + \theta^p (g^p)^\rho)^{\alpha/\rho} - T^p - T^f \right), \quad (15)$$

which is obtained by substituting the government's budget constraint ($\tau g^p + s^p = T^p$) and equation (14) in equation (11).⁹ The federal government solves a symmetric problem, with $\bar{v} \sim U[0, v^*]$. The two levels of government are assumed to behave non-cooperatively in setting their contribution to the public good, taking the contribution level of the other government as given. Since elections are simultaneous, the equilibrium contribution levels in period 1 will be those observed in a Nash equilibrium.

Under shared responsibility, the degree of decentralization is endogenous and is the outcome of vertical interactions between the two levels of government that are shaped by the degree of substitutability between the public inputs.¹⁰ The reaction functions are given by:

$$\frac{\beta T^p}{u^*} (\theta^f (g^f)^\rho + \theta^p (g^p)^\rho)^{\frac{\alpha}{\rho}-1} (g^p)^{\rho-1} \theta^p = \frac{\tau}{\alpha}, \quad (16)$$

$$\frac{\beta T^f}{v^*} (\theta^f (g^f)^\rho + \theta^p (g^p)^\rho)^{\frac{\alpha}{\rho}-1} (g^f)^{\rho-1} \theta^f = \frac{\tau}{\alpha}. \quad (17)$$

⁹Time subscripts are dropped from now on since the period-2 problem is trivial, with maximum rents being taken by each government. All decision variables relate to period 1.

¹⁰Whereas high complementarity mitigates the ability of each government to merely free-ride on the other's contribution, complementarity is also associated with a more indirect effect of aggregate spending on reelection probabilities.

Solving (16) for an interior solution yields the Nash equilibrium spending ratio:

$$\frac{g^p}{g^f} = \left(\frac{\theta^p T^p v^*}{\theta^f T^f u^*} \right)^{\frac{1}{1-\rho}}, \quad (18)$$

which in general is different from the optimal spending ratio given by equation (9), unless $T^p v^* = T^f u^*$.

Proposition 2 (Endogenous decentralization) *The equilibrium degree of decentralization corresponds to the optimal degree of decentralization only if $\frac{T^p}{T^f} = \frac{u^*}{v^*}$, i.e. if the provincial-federal revenue ratio is equal to the provincial-federal ratio of the voters' reservation utility levels. Otherwise, the equilibrium spending ratio differs from the optimal ratio and is determined by the product of three ratios: the relative competencies $\left(\frac{\theta^p}{\theta^f}\right)$, the revenue ratio $\left(\frac{T^p}{T^f}\right)$, and the relative reelection uncertainties $\left(\frac{v^*}{u^*}\right)$.*

Hence, a decentralization reform that leads to *de facto* shared expenditure responsibilities may not be socially optimal despite the existence of complementarities amongst levels of government. The key reasons for why this is the case in this model are (i) voters' inability to hold each level of government individually liable for its actions, and (ii) vertical interactions among levels of government, which take into account factors other than relative competencies.

The theoretical model thus leads to the following empirically-relevant equation:

$$\frac{g^p}{g^f} = f \left(\frac{\theta^p}{\theta^f}, \frac{T^p}{T^f}, \frac{v^*}{u^*} \right) + \varepsilon, \quad (19)$$

where ε is an error term. In the remainder of this paper, we develop an empirical implementation of this equation. Our main endeavour is to identify the effect of electoral conditions on the observed degree of decentralization.

4 Empirical Framework and Data

Equation (18) implies a relationship between the degree of expenditure decentralization and three ratios:

1. **Relative competencies:** This ratio captures a technological advantage of one level of government over the other. For example, in the spirit of Oates' decentralization theorem, if $\theta^f < \theta^p$, that is the level of government closest to citizens has an advantage in production, equilibrium (and optimal) expenditure decentralization will favour the provincial government. While this ratio is interesting in its own right, we will assume in the following empirical application that it does not vary within country over time. As a consequence, its effect will be captured by the country fixed effects.
2. **Revenue ratio:** Not surprisingly, the model predicts that expenditure decentralization is closely related to how the tax base is split between the two levels of government. To avoid obvious endogeneity issues in including the revenue ratio among our right-hand side variables, our preferred empirical specifications will exclude the revenue ratio. However, revenue decentralization is interesting in its own right, and we investigate its determinants in the next section.
3. **Relative reelection uncertainties:** This is our main ratio of interest. Recall that u^* and v^* capture the uncertainty of the election at each level of government. When v^* increases, the reelection prospects of the federal incumbent become more uncertain. *Ceteris paribus*, this reduces the incumbent's incentive to spend on the public good. The same is true at the subcentral level. However, in what follows, because of a lack of electoral data at the subcentral level we will assume that while v^* varies within country over time, u^* does not.

For the purpose of our empirical analysis we assembled a new database combining information from four sources: the IMF’s Government Financial Statistics (GFS); the World Bank’s Dataset of Political Indicators (DPI) and World Development Indicators (WDI); and the Polity 2 dataset from the University of Maryland. Country data is at the annual level. We dispose of an unbalanced panel of a total of 107 countries for the period 1990 to 2006.¹¹

From GFS we included data on expenditures and revenues of different levels of government (central, state and local). We have used this information to construct our measures of centralization (or decentralization). DPI contains information on the political system of each country as well as a vast array of electoral variables, such as party composition and strength of national governments and oppositions. We used this information for our measures of political strength. The WDI dataset gives variables concerning overall economic indicators and constitutes our basis for additional control variables. Finally, the primary use of Polity 2 is to restrict our sample to democracies.

Our dependent variables correspond to *centralization ratios*:

$$CENTRAL = \frac{g^c}{g^c + g^s + g^l}, \quad (20)$$

where g is government expenditure (or revenues); c is central government; s is state or sub-federal government; and l is local government. Thus, we contrast central government decisions with decisions taken at any sub-central unit. Data is taken from the GFS-Series 2 “Cash expenditure” for central, state and local governments.¹² We exclude observations with centralization

¹¹Not all countries present data for all years. A total of 104 countries present at least one year of central government expenditure. The countries formed out of Yugoslavia are considered individually in our dataset. Note that our dataset includes all the countries of Panizza (1999) except: Central African Republic, Guatemala, Honduras, Iraq, Jordan, Kenya, Malawi, New Zealand, Senegal, Sri Lanka, Yemen and Zaire.

¹²We computed overall public expenditure as indicated in (20). GFS contains the government unit “General Government”, which, in principle should correspond to the denominator of (20). However, information on this variable is lacking in many instances, and hence we did not use it. Additionally, we have run our regressions

ratios equal to one, since we are unable to distinguish between absence of sub-central spending and missing data.¹³

The political variables that we include in our analysis intend to capture the absolute strength of the government, the relative strength *vis-à-vis* the opposition and the dispersion of opposition political forces. To capture government strength (**GOVSTREN**), we use five political variables:

- **Central Government Seat Share (*MAJ*):** Share of seats held by the government.¹⁴
- **Central Government Vote Share (*NUMVOTE*):** Share of votes held by the government. Depending on the electoral system (e.g. the first-past-the-post system in Canada) *NUMVOTE* can be different from the seat distribution (*MAJ*).
- **Central Government Seat Advantage (*SEATADV*):** The difference between legislature seats held by government (*NUMGOV*) and by opposition (*NUMOPP*) as a ratio of total seats. Total seats is defined as the sum of government, opposition and unaligned (*NUMUL*) seats. Note that seat advantage can be negative.
- **Central Government Herfindahl Index (*HERFGOV*):** Sum of squared seat shares of government parties.
- **Central Opposition Herfindahl Index (*HERFOPP*):** Sum of squared seat shares of opposition parties.

Seat share and vote share of the government represent the absolute political strength of the government; seat advantage captures the relative strength of the government compared to

using the Series 7 “Outlays”. Results do not vary significantly and are available upon request.

¹³Inspection of the data showed that the expenditure centralization ratio in Romania for 1990 was less than 1%. We dropped this observation as well.

¹⁴Government parties are defined within the DPI.

its opposition; government Herfindahl Index (HHI) is an indication of the political spectrum that is combined within the government parties, a government is likely to be weaker if it has to rely on coalitions with a large number of parties holding different views. Finally, opposition HHI is an indicator of the political dispersion of opposition parties. A high HHI is an indicator of a fragmented opposition, hence potentially more leeway for the government. All political variables are taken directly from DPI, except central government seat advantage which we constructed.¹⁵ Additionally, we include in all our regressions the logs of GDP per capita, population and population density, all taken from WDI. They form the \mathbf{X} vector in the regression equation (below).

Figure 1 presents a scatterplot of the centralization ratio and the central government vote share for the year 1992. We observe a slightly positive raw correlation, indicating that higher political strength seems to favour higher centralization ratios, consistent with the theoretical model’s prediction. Table 1 presents summary statistics of our dataset.

In order to move beyond such unconditional correlations, regression results follow in the next section.

5 Estimation and Results

We implement the following linear version of equation (19):

$$CENTRAL_{jt} = \alpha + \beta \mathbf{GOVSTREN}_{jt} + \delta \mathbf{X}_{jt} + \mathbf{COUNTRY}_j + \mathbf{YEAR}_t + \varepsilon_{jt}, \quad (21)$$

¹⁵We excluded observations where government vote share was equal to zero ($NUMVOTE = 0$). Note that the number of observations with missing values varies across the different political variables, which implies that the sample varies across specifications.

where $\mathbf{COUNTRY}_j$ is a vector of country fixed effects, and \mathbf{YEAR}_t is a vector of year effects. We ran panel data least squares regressions including country fixed effects and year effects in all our specifications. A constant is always included, though unreported.

5.1 Base Regressions

Table 2 presents our baseline expenditure specifications. We present results using the seat share, vote share and seat advantage variables in turn, while we include, besides the additional controls, the opposition HHI in all specifications. Further, some specifications allow for possibly non-linear effects including squares and cubes of the government strength variables.¹⁶ Standard errors are robust.

Our sample contains between 453 and 530 observations, from 59 to 64 countries. The different specifications explain between 18% and 46% of total variation, and the economic control variables are all highly significant and in line with expectations. Higher income and higher population density increase expenditure centralization, while a larger population decreases it.

A first important result is that in all our specifications the political variables included are jointly highly significant, as illustrated by the Wald-test statistic in the last two rows of the table.¹⁷ Columns (1) to (3) of Table 2 present the results using seat share (MAJ) to represent the political strength of the government. In a linear specification, column (1) suggests that a higher seat share leads to *less* centralization (more decentralization). The negative coefficient on the MAJ variable thus appears to contradict the raw correlation of Figure 1. However, columns (2) and (3) suggest that this relationship is likely to be non-linear. Including the square of MAJ reveals the expected positive linear term, with a negative square term (both

¹⁶In support for the latter functional forms, note the nonlinear form of equation (18). We come back to the nonlinearity issue in our discussion of the results below.

¹⁷In this subsection, inference is based on robust standard errors. See the next subsection for a discussion of clustering issues.

are statistically significant). Finally, we obtain the best results statistically when we also include a cubic term of MAJ , where all coefficients are significant at the 1% level. Again, signs of the coefficients switch, this time with a negative linear, positive square and negative cubic term. We find similar results using the government vote share (columns (4) to (6)).

Using seat advantage to measure relative political strength (columns (7) to (9)) seems to stand on slightly weaker statistical grounds. Only the squared term is significant (at the 5% level) if allowing for linear and square terms, while only the square and cubic ones are significant if allowing for all three terms. Finally, in column (10) we include the government HHI as a political variable but do not find any significant effect. The opposition HHI is included in all ten specifications, and is negative and significant in three of them. Hence, a stronger opposition (as measured by a larger concentration index) tends to imply lower levels of centralization. This is in line with the theory's prediction that a weak central government should be associated with more decentralization.

Table 3 presents the same specifications using revenue centralization as the dependent variable. As for the expenditure regressions, the political variables are jointly significant in all specifications. Furthermore, the coefficient on the opposition HHI is now highly significantly negative in all specifications. The estimated patterns for the government strength variables are similar to those estimated in expenditure specifications, again highlighting the nonlinear nature of the relationship.

5.2 Robustness Checks

As a robustness check we present, in Table 4, the results of our most flexible specifications (using cubic terms) with clustered standard errors at the country level. Indeed, as shown by Stock and Watson (2008), the heteroskedasticity robust standard errors following White

(1980), commonly used, may be significantly biased in a panel context. They suggest, among other, the use of clustered standard errors, where the clusters are applied at the dimension of the fixed effect.¹⁸ The results of Stock and Watson (2008) depend on fixed T and it has been reported that the clustering method might be unstable in situations of unbalanced panels (see Nichols and Schaffer, 2007).

As expected, our results with clustered standard errors are slightly more conservative. Nevertheless, the included political variables are jointly significant at the 5% level in all regressions. Individual coefficients for seat shares (MAJ), both for expenditures and revenues and government vote share ($NUMVOTE$), only for expenditures are still significant at conventional levels.

5.3 Discussion of Results

What do our results imply? Our main result is that political variables are important determinants of the degree of centralization. However, all of our empirical results do not necessarily confirm our priors. On the one hand, results based on the opposition Herfindhal index suggest that a strong central government tends to be associated with more centralization. But on the other hand, looking at Table 1 we observe that in the linear specification (column (1)) political strength of the federal government, measured by the government seat share, has a negative impact on the degree of centralization. Hence, our proxy of lower (federal) reelection uncertainty fails to predict an increase in the contribution to the federal public good. This result is robust when we allow for the most flexible parameterization. Figure 2 presents the effect of government seat share in the cubic specification on the degree of centralization, showing a

¹⁸Indeed, as of Version 10, Stata automatically presents the clustered standard errors when using the option “robust”.

consistently significant negative impact, at least over the range of centralization we observe.¹⁹

Figure 2 also nicely illustrates the nonlinearity of the relationship between government strength and centralization. In particular, there appears to be a differential effect towards the bounds of the domain (0 and 1). Although corner solutions were intentionally left out of the theoretical discussion to simplify exposition, nonlinear outcomes are likely to arise in the model because reelection probabilities are bounded – see equation (14) above. For a given government, the incentive to spend more to improve reelection prospects disappears when the reelection probability hits one. A similar issue may arise at the zero bound.

But besides highlighting the nonlinear nature of the relationship, our mixed empirical results suggest that our simple theoretical model does not fully capture the complexity of government behaviour. Should a strong government ‘invest’ more in public good provision when its reelection prospects are higher? The implicit assumption in our model is yes: when reelection uncertainty decreases, public spending is a safer investment for the incumbent. This view of government behaviour is consistent with a theoretical perspective, due to Cox and McCubbins (1986) and revisited in Joanis (forthcoming), for which the latter find strong empirical support in a distributive politics application. However, a competing view of government behaviour, in the Downsian tradition, predicts that an incumbent should be expected to spend more when the election is highly uncertain – see, for example, Lindbeck and Weibull (1987). In our context, this “swing voter” view of government incentives would predict an activist central government when its reelection prospects are *uncertain*. In line with the discussion in Joanis (forthcoming), a more complete theoretical model would nest both views of government behaviour, which have both been shown to be empirically relevant.

¹⁹Confidence intervals are calculated based on clustered standard errors, consistent with the previous subsection.

6 Conclusion

All levels of government in a federation (or a decentralized ‘unitary’ state) are more or less involved in similar sectors of activity. In such a context – typical in real-world federations – making coherent collective choices is a complex undertaking for voters, who need to garner information about the contribution of each level of government to the aggregate policy outcomes that they observe. To capture such informational complexity, this paper has considered a political agency model in which the presence of a hierarchy of governments involved in the provision of a public good creates an externality on the spending side (with respect to the intergovernmental composition of government spending). In the model, the provision of public goods by both levels of government in a federation is the margin along which political competition occurs. In a given subnational jurisdiction, the central and the subnational governments compete for the support of the same voters (though in separate elections) by each providing public goods. Under some realistic conditions – chiefly, imperfectly informed voters and substitutable central and subnational public goods – the model predicts that the equilibrium degree of decentralization will diverge from the social optimum.

Our empirical results lend support to that theoretical perspective. They support the relevance of political factors as determinants of fiscal decentralization. The empirical application of this paper has focused on one aspect of the political economy of fiscal decentralization, that is the influence of central government electoral strength. The relationship between the latter and both expenditure and revenue centralization emerges as nontrivial and nonlinear. Political forces driving centralization down – the linear effect of seat and vote shares – and up – the effect of opposition composition – appear to coexist (see our discussion in the previous subsection).

The exploratory cross-country analysis presented in this paper can most certainly be im-

proved along many dimensions. Our dataset presents a number of important issues that preclude us from estimating our model the way we wish. First, since we do not observe sub-central political outcomes, we cannot use information on the relative strength of government. Second, our data cover general spending only. More precise results might be obtained using specific spending categories, more in line with our theoretical model. Despite these drawbacks, we think that our analysis is a useful first step into assessing the effect of political instances on the issue of fiscal decentralization.

But further work is obviously needed to refine those early results. This paper is part of a broader, ongoing research agenda. In future work, we intend to test the predictions of the Joanis (2009) theoretical model in a broad set of institutional environments. We are currently conducting similar empirical studies with a panel of Canadian provinces (Jametti and Joanis, 2009b) and a panel of Swiss cantons, in which it is possible to include subnational elections data in the analysis. An interesting avenue would be to explicitly include the ‘relative competencies’ in the empirical analysis, perhaps using Public Sector Efficiency (PSE) measures – see, for example, Afonso *et al.* (2005).

Despite these necessary refinements, the analysis already has interesting implications for policy design, highlighting the need for decentralization reforms to take into account the reality of the political process. For example, shared responsibility in policy areas that are politically sensitive (e.g. infrastructure investment) may be especially conducive to inefficient public spending. With partial decentralization of expenditure responsibilities being an increasingly pervasive institution in both developed and developing countries, this paper indicates a need to shift the policy focus from whether decentralization is desirable to *how* decentralization is actually implemented.

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Figure 1

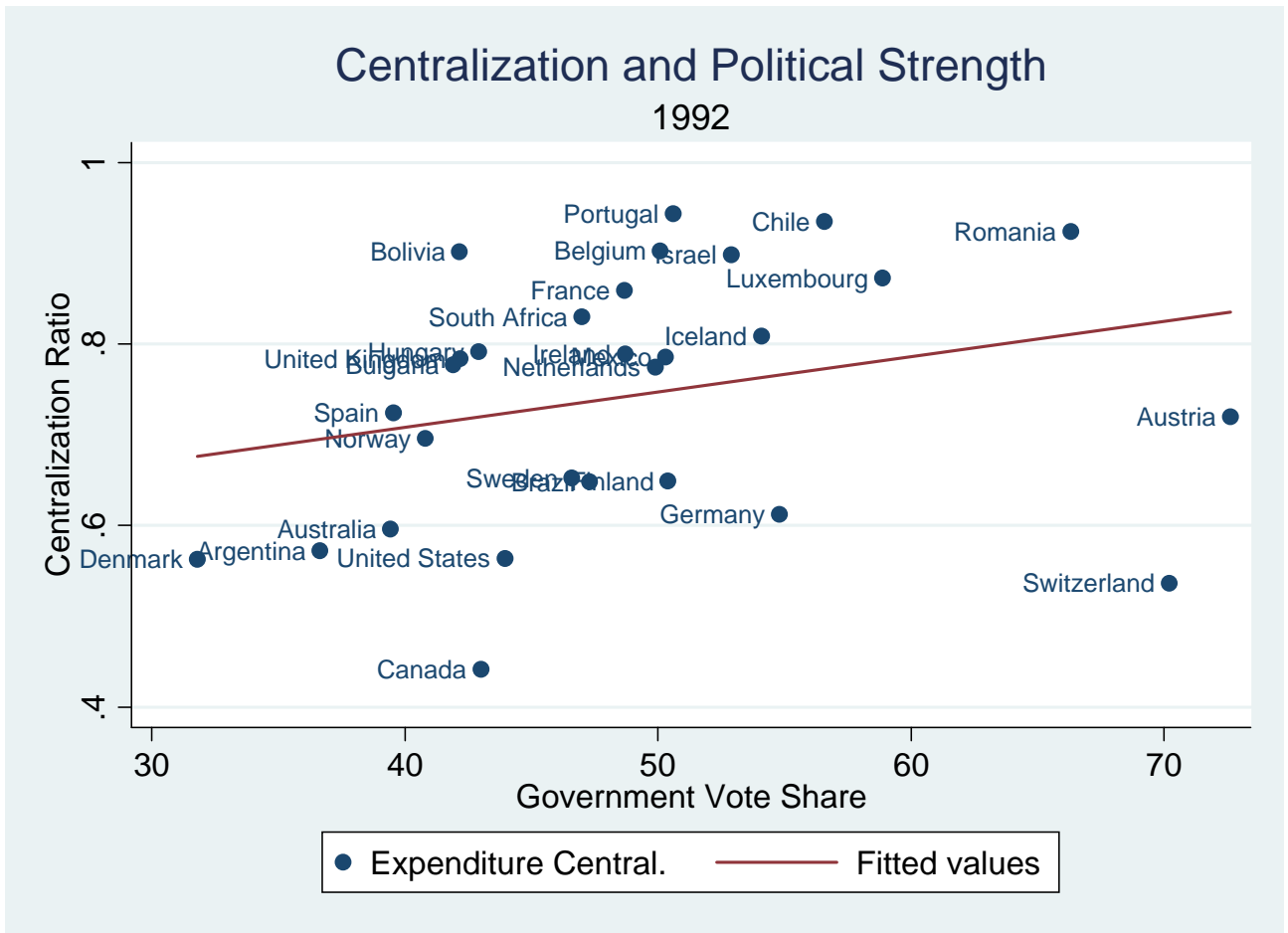


Figure 2

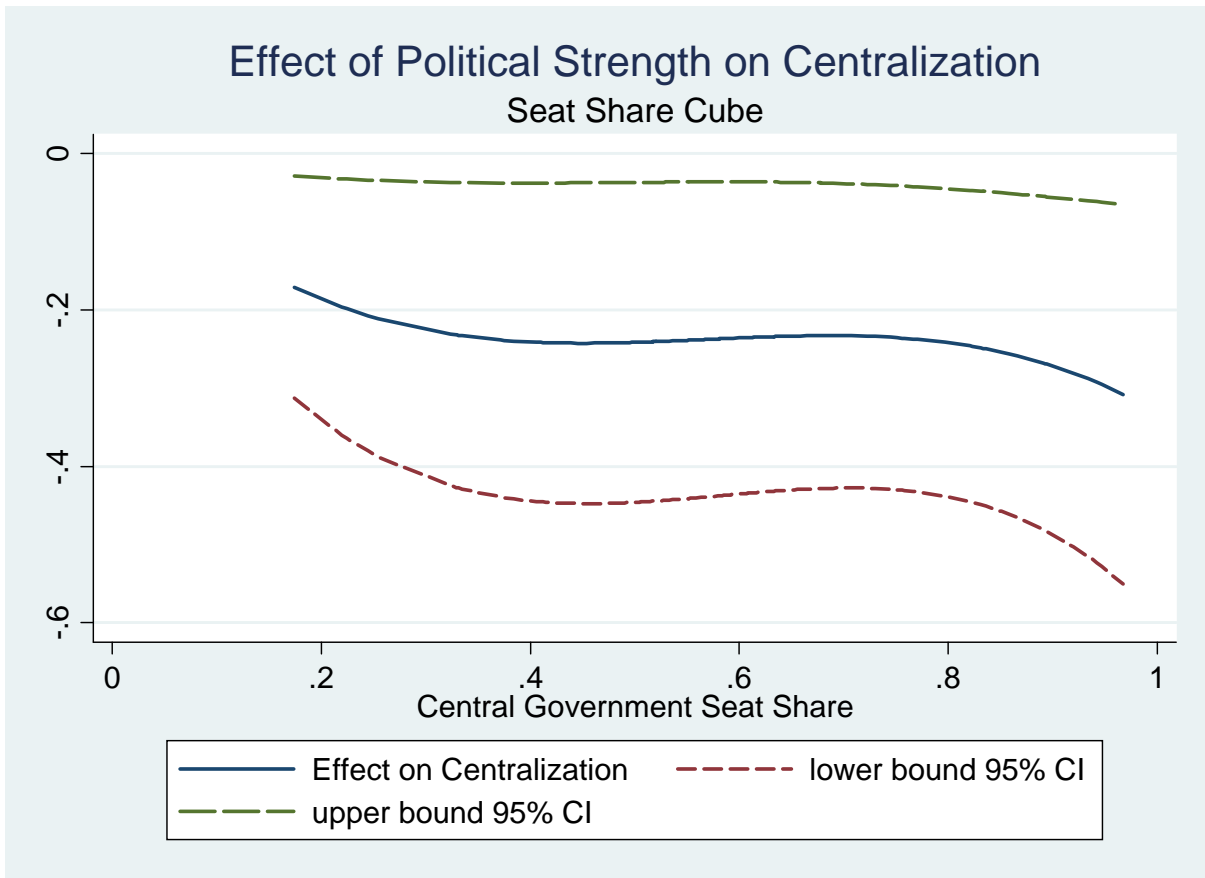


Table 1
Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Expenditure Centralization	558	0.77	0.14	0.40	0.99
Revenue Centralization	563	0.74	0.15	0.39	0.99
Central government seat share (MAJ)	802	0.60	0.18	0.11	1.00
Central government vote share (NUMVOTE) (in %)	665	50.70	15.77	5.50	100.00
Central government seat advantage (SEATADV)	802	0.21	0.35	-0.78	1.00
Central government Herfindahl index (HERFGOV)	798	0.69	0.29	0.01	1.00
Central opposition Herfindahl index (HERFOPP)	742	0.52	0.25	0.07	1.00
GDP per capita (constant 2000 US\$)	557	10321.26	10549.92	129.20	38407.11
Population (in millions)	557	52.68	159.29	0.25	1079.72
Population Density	557	115.52	146.77	1.39	1254.06

Sources: GFS, DPI, WDI

Table 2
Base Regressions - Expenditure Centralization

Dependent Variable = Ratio of Expenditure Centralization	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Central government seat share (MAJ)	-0.04746** <i>0.01993</i>	0.22167* <i>0.11577</i>	-1.37754*** <i>0.37079</i>							
MAJ ²		-0.22106** <i>0.09884</i>	2.53209*** <i>0.66304</i>							
MAJ ³			-1.48522*** <i>0.37983</i>							
Central government vote share (NUMVOTE)				-0.00072** <i>0.00029</i>	0.00246** <i>0.00099</i>	-0.01107*** <i>0.0023</i>				
NUMVOTE ²					-0.00003*** <i>0.00001</i>	0.00023*** <i>0.00005</i>				
NUMVOTE ³						-0.00000*** <i>0</i>				
Central government seat advantage (SEATADV)							-0.02412** <i>0.01013</i>	-0.00156 <i>0.0118</i>	0.01748 <i>0.01267</i>	
SEATADV ²								-0.05198** <i>0.0241</i>	0.07102** <i>0.02894</i>	
SEATADV ³									-0.17382*** <i>0.04688</i>	
Central government Herfindahl index (HERFGOV)										0.01193 <i>0.00949</i>
Central opposition Herfindahl index (HERFOPP)	-0.02011* <i>0.0118</i>	-0.01943 <i>0.01203</i>	-0.02261* <i>0.01217</i>	-0.00126 <i>0.0129</i>	-0.00719 <i>0.01274</i>	-0.01063 <i>0.01218</i>	-0.01939 <i>0.01183</i>	-0.0198 <i>0.01204</i>	-0.02234* <i>0.01229</i>	-0.01119 <i>0.01261</i>
Log(GDP per capita)	0.08126*** <i>0.02304</i>	0.06926*** <i>0.02252</i>	0.05926*** <i>0.02218</i>	0.03003 <i>0.02607</i>	0.02748 <i>0.02613</i>	0.01367 <i>0.02459</i>	0.08038*** <i>0.02287</i>	0.07041*** <i>0.02248</i>	0.05937*** <i>0.0222</i>	0.07950*** <i>0.02351</i>
Log(Population)	-2.06490*** <i>0.56895</i>	-2.02158*** <i>0.54829</i>	-1.58090** <i>0.64241</i>	-1.96732*** <i>0.56337</i>	-1.76227*** <i>0.54712</i>	-1.56251** <i>0.66951</i>	-2.08411*** <i>0.57056</i>	-2.00165*** <i>0.55072</i>	-1.65759*** <i>0.63926</i>	-2.11261*** <i>0.60064</i>
Log(Population Density)	1.92334*** <i>0.57492</i>	1.88509*** <i>0.55551</i>	1.43940** <i>0.64868</i>	1.57536*** <i>0.57456</i>	1.41742** <i>0.56043</i>	1.23732* <i>0.68107</i>	1.94346*** <i>0.57658</i>	1.86372*** <i>0.55819</i>	1.51807** <i>0.64581</i>	1.97726*** <i>0.60349</i>
Log likelihood	1220.97259	1227.62659	1242.7616	1083.24288	1095.45998	1117.46761	1221.08118	1227.16828	1240.25974	1217.79318
R-squared	0.1957	0.21564	0.25918	0.37731	0.41	0.46463	0.19602	0.21428	0.25215	0.17739
Number of Observations	530	530	530	453	453	453	530	530	530	531
Number of Countries	64	64	64	59	59	59	64	64	64	64
Joint Significance of Political Variables	5.68	4.53	5.27	3.42	4.04	8.51	5.72	4.47	5.07	2.51
P-value	0.0037	0.0039	0.0004	0.0339	0.0075	0.0000	0.0035	0.0042	0.0005	0.0827

* p<0.1, ** p<0.05, *** p<0.01

Notes: A constant, time effects and country fixed effects included in all regressions. Robust standard errors in italics.

Table 3
Base Regressions - Revenue Centralization

Dependent Variable = Ratio of Revenue Centralization	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Central government seat share (MAJ)	-0.02863 <i>0.02017</i>	0.20789* <i>0.12239</i>	-1.00224*** <i>0.37099</i>							
MAJ ²		-0.19421* <i>0.10217</i>	1.88978*** <i>0.66904</i>							
MAJ ³			-1.12441*** <i>0.38362</i>							
Central government vote share (NUMVOTE)				-0.0005 <i>0.00031</i>	0.00354*** <i>0.00101</i>	-0.00777*** <i>0.00289</i>				
NUMVOTE ²					-0.00004*** <i>0.00001</i>	0.00018*** <i>0.00006</i>				
NUMVOTE ³						-0.00000*** <i>0</i>				
Central government seat advantage (SEATADV)							-0.01359 <i>0.01028</i>	0.00722 <i>0.01364</i>	0.02187 <i>0.01473</i>	
SEATADV ²								-0.04787* <i>0.02532</i>	0.0459 <i>0.03125</i>	
SEATADV ³									-0.13263*** <i>0.04885</i>	
Central government Herfindahl index (HERFGOV)										0.01245 <i>0.00974</i>
Central opposition Herfindahl index (HERFOPP)	-0.04049*** <i>0.01429</i>	-0.03989*** <i>0.0145</i>	-0.04234*** <i>0.01481</i>	-0.04682*** <i>0.01448</i>	-0.05452*** <i>0.01412</i>	-0.05746*** <i>0.01381</i>	-0.03999*** <i>0.01433</i>	-0.04038*** <i>0.01461</i>	-0.04236*** <i>0.01492</i>	-0.03151** <i>0.01483</i>
Log(GDP per capita)	0.09487*** <i>0.02939</i>	0.08429*** <i>0.02905</i>	0.07664*** <i>0.02862</i>	0.07215** <i>0.02822</i>	0.06895** <i>0.0271</i>	0.05733** <i>0.02554</i>	0.09429*** <i>0.02928</i>	0.08507*** <i>0.02895</i>	0.07659*** <i>0.0286</i>	0.09368*** <i>0.02898</i>
Log(Population)	-2.37052*** <i>0.68071</i>	-2.33108*** <i>0.64173</i>	-1.99474*** <i>0.73664</i>	-2.20797*** <i>0.68564</i>	-1.94450*** <i>0.64263</i>	-1.77461** <i>0.79306</i>	-2.37175*** <i>0.68353</i>	-2.29443*** <i>0.64823</i>	-2.02940*** <i>0.7347</i>	-2.53083*** <i>0.6759</i>
Log(Population Density)	2.12339*** <i>0.69142</i>	2.08855*** <i>0.65368</i>	1.74880** <i>0.74631</i>	1.79809** <i>0.69513</i>	1.59531** <i>0.65428</i>	1.44229* <i>0.80118</i>	2.12519*** <i>0.69419</i>	2.05052*** <i>0.66012</i>	1.78466** <i>0.74445</i>	2.29009*** <i>0.68376</i>
Log likelihood	1178.64569	1183.23179	1190.82406	1036.14818	1053.34367	1066.70412	1178.39436	1183.00436	1189.69424	1179.67722
R-squared	0.22971	0.24308	0.2647	0.3416	0.39036	0.42573	0.22897	0.24242	0.26152	0.22481
Number of Observations	524	524	524	447	447	447	524	524	524	525
Number of Countries	64	64	64	59	59	59	64	64	64	64
Joint Significance of Political Variables	6.14	4.46	4.06	8.05	9.35	9.77	6.03	4.36	3.87	6.43
P-value	0.0023	0.0042	0.0031	0.0004	0.0000	0.0000	0.0026	0.0048	0.0042	0.0018

* p<0.1, ** p<0.05, *** p<0.01

Notes: A constant, time effects and country fixed effects included in all regressions. Robust standard errors in italics.

Table 4
Robustness Checks

Dependent Variable =	Expenditure Centralization			Revenue Centralization		
	(1)	(2)	(3)	(4)	(5)	(6)
Central government seat share (MAJ)	-1.37754**			-1.00224*		
	<i>0.57166</i>			<i>0.58724</i>		
MAJ ²	2.53209**			1.88978*		
	<i>1.05293</i>			<i>1.10442</i>		
MAJ ³	-1.48522**			-1.12441*		
	<i>0.6239</i>			<i>0.66003</i>		
Central government vote share (NUMVOTE)		-0.01107***			-0.00777**	
		<i>0.00254</i>			<i>0.00374</i>	
NUMVOTE ²		0.00023***			0.00018**	
		<i>0.00005</i>			<i>0.00007</i>	
NUMVOTE ³		-0.00000***			-0.00000***	
		<i>0.00000</i>			<i>0.00000</i>	
Central government seat advantage (SEATADV)			0.01748			0.02187
			<i>0.02058</i>			<i>0.02182</i>
SEATADV ²			0.07102			0.0459
			<i>0.0431</i>			<i>0.04496</i>
SEATADV ³			-0.17382**			-0.13263
			<i>0.07668</i>			<i>0.08381</i>
Central opposition Herfindahl index (HERFOPP)	-0.02261	-0.01063	-0.02234	-0.04234**	-0.05746***	-0.04236**
	<i>0.01453</i>	<i>0.0141</i>	<i>0.01477</i>	<i>0.01884</i>	<i>0.01716</i>	<i>0.01862</i>
Log(GDP per capita)	0.05926*	0.01367	0.05937*	0.07664**	0.05733	0.07659**
	<i>0.03228</i>	<i>0.03589</i>	<i>0.03218</i>	<i>0.03656</i>	<i>0.0379</i>	<i>0.03619</i>
Log(Population)	-1.58090***	-1.56251***	-1.65759***	-1.99474***	-1.77461***	-2.02940***
	<i>0.51506</i>	<i>0.53258</i>	<i>0.52382</i>	<i>0.63777</i>	<i>0.51291</i>	<i>0.62448</i>
Log(Population Density)	1.43940**	1.23732**	1.51807**	1.74880**	1.44229**	1.78466***
	<i>0.57144</i>	<i>0.57372</i>	<i>0.57875</i>	<i>0.68444</i>	<i>0.56615</i>	<i>0.67056</i>
Log likelihood	1242.76	1117.47	1240.26	1190.82	1066.70	1189.69
R-squared	0.26	0.46	0.25	0.26	0.43	0.26
Number of Observations	530	453	530	524	447	524
Number of Countries	64	59	64	64	59	64
Joint Significance of Political Variables	2.60	19.45	2.68	1.87	10.46	1.84
P-value	0.0447	0.0000	0.0397	0.1268	0.0000	0.1318

* p<0.1, ** p<0.05, *** p<0.01

Notes: A constant, time effects and country fixed effects included in all regressions. Clustered (by country) standard errors in italics.

2007

- 2007/1. Durán Cabré, J.M^a.; Esteller Moré, A.: "An empirical analysis of wealth taxation: Equity vs. tax compliance"
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