

Fiscal decentralization and the size of government: a European country empirical analysis

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Abstract This article is an original contribution to the understanding of the relationship between fiscal decentralization and government size. Using a panel data set of the EU-15 countries, we analyse the effect of decentralization on aggregate, national and subnational government sizes by separating the long run effects of decentralization from its short run dynamics. In the long run, tax autonomy reduces central expenditure but increases—and to a greater extent—subnational public expenditure, leading to higher aggregate public expenditure. We find also that vertical imbalances tend to increase the sizes of subnational, national and aggregate governments.

Keywords Fiscal decentralization · Government size · Dynamic panel · Cointegration · Error-correction model · European countries

JEL Classification H5 · H7 · C23

1 Introduction

Since the end of the 1980s, decentralization—that is the transfer of political, fiscal and administrative powers to subnational governments—has emerged as one of the most important trends in development policy. Thus, the design of fiscal relations across levels of governments in the European Union member countries has attracted increased interest as competencies and tax-raising powers are transferred to local government level. Supranational institutions, such as the World Bank (2000) or the OECD (2002a, 2002b), support fiscal

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decentralization in the East European countries, arguing that a move towards more decentralization would promote economic development as well as the efficiency of the public sector. The World Bank Report on *Entering the 21st Century* notes that the desire for self-determination and the devolution of power is the main force “shaping the world in which development will be defined and implemented”¹ in the first decade of the present century.

Several alternative theories of government behavior proposed in the public finance literature advance the hypothesis that fiscal decentralization might restrict the size of the public sector. Oates (1972) argues that local governments are better informed about citizens’ preferences than federal or central governments, meaning that decentralized provision of public goods should be more efficient than centralized provision. However, he also notes that while public goods better match the needs of citizens (in line with Tiebout 1956), increased local demand for public services might increase the size of the public sector (Oates 1985). In introducing their famous Leviathan hypothesis, Brennan and Buchanan (1980, p. 185) posited that “total government intrusion in the economy should be smaller, *ceteris paribus*, the greater the extent to which taxes and expenditures are decentralized”. Depicting governments as revenue-maximizers, these authors, and the subsequent literature on public choice, argue that, as long as tax bases are mobile, fiscal decentralization forces governments to engage in tax competition, thus restricting the Leviathan’s monopoly on taxation. However, models show that when several levels of government independently set their tax rates, on a common tax base (i.e., tax base sharing), the combined (aggregate) equilibrium tax rate of two overlapping revenue-maximizing governments is higher than a single revenue-maximizing government tax rate (Flowers 1988; Shughart and Tollison 1991; Keen 1995; Wrede 1996; Keen and Kotsogiannis 2004). Indeed, there is no theoretical consensus on the relationship between fiscal decentralization and the size of public sector since those who question the Leviathan model also outline arguments showing that decentralization may not lead to a leaner public sector, that is the well-known fly-paper effect and the problem of the commons (for more detail, see Jin and Zou 2002, pp. 273–274).

Following Oates’s (1972, 1985) seminal empirical studies, many papers have attempted to test the impact of decentralization on the size of government. However, the results are inconclusive (see Feld et al. 2003, for an exhaustive literature review). This strand of the literature sees government size typically measured in terms of tax revenues or government spending, while most indicators of fiscal decentralization—derived from the Government Finance Statistics (GFS) issued by the International Monetary Fund (IMF)—are defined on the basis of a single aspect of decentralization, that is, the subnational share of aggregate government revenue or expenditure. However, these common fiscal indicators considerably overestimate the degree of fiscal decentralization or fiscal autonomy in most countries as they take no account of the control wielded by subnational governments over tax bases and rates (Stegarescu 2004). Decentralizing expenditure without corresponding local taxation powers may not produce the tax competition that constrains Leviathan behavior. Decentralization funded by common sources, such as grants or shared revenues that are controlled by the center (i.e., vertical imbalance), may have the opposite effect, by breaking the link between taxes and benefits. Decentralization could restrain or intensify government growth, depending on the nature of the decentralization (Rodden 2003). A few papers based on information from the OECD (2001), take account of subnational government control over tax bases or rates in European transition countries (Ebel and Yilmaz 2002) and in some OECD countries (Rodden 2003;

¹World Development Report on *Entering the 21st Century* quoted by Ebel and Yilmaz (2002, p. 3).

Meloche et al. 2004). Many of these studies conclude that fiscal autonomy leads to smaller states while grants have a positive impact on public sector size. However, Jin and Zou (2002), in a study that uses panel data on 32 countries, show that fiscal decentralization affects the sizes of national, subnational and aggregate governments differently.

Following this literature, the present paper focuses on the effects of fiscal decentralization on government size using a panel data set of European countries. This article constitutes an original contribution to the understanding of the relationship between fiscal decentralization and government size in relation to some particular aspects. To our knowledge, this is the first paper that combines an OECD indicator of revenue decentralization² with a measure of vertical imbalance, for a sample of the EU-15 group of countries. We use a spatial dynamic panel data model to take into account that government spending is likely to change only slowly over time and that there might be some correlation between countries' public expenditures. We estimate both the long run relationship between decentralization and public expenditure and an error correction model to distinguish the short run and long run effects of decentralization. To our knowledge, this is also the first paper that analyses the effect of decentralization on aggregate, national and subnational government sizes, by separating the long run effects of decentralization from the short run dynamics. The arguments relating decentralization to government size can be best understood as referring to long-term equilibria.

First, we confirm the high level of persistency in public spending in European countries. There are interactions in aggregate and national level public expenditure in the EU15. We find also that decentralization affects aggregate, subnational and national government sizes and that the effect of decentralization on the size of each level of government depends on the nature of the devolution. In the long run, we show that tax autonomy increases subnational governments more than it reduces national governments, leading to bigger aggregate governments. We also find that vertical imbalance tends to increase the sizes of subnational, national and aggregate governments.

The paper is organized as follows. The next section summarizes the empirical literature. In Sect. 3, we present the empirical specification and the data set. The results are presented in Sects. 4 and 5. The last section concludes.

2 The related empirical literature

Most of the empirical work on decentralization and government size attempts to test Brennan and Buchanan's Leviathan hypothesis (see Feld et al. 2003, for an exhaustive literature review). In this paper, we discuss only the tests for national level. First, Oates (1972, pp. 209–213) assesses the empirical relevance of the decentralization hypothesis on a cross-section of 57 countries. He used the share of tax revenue in national income as a proxy for government size while the ratio of central government tax revenues to total tax revenues is used as a centralization measure. He obtains a negative relationship between this indicator of centralization, and government size, but his results are insignificant when he controls for income. Edhaie (1994) criticizes Oates's study, arguing that tax and spending choices should be considered simultaneously in relation to the decentralization process. He finds that, in a sample of 30 countries for 1987 and 1977, the simultaneous decentralization of national

²We use the data compiled by Stegarescu (2004) which employs the OECD (1999) approach to revenue autonomy of subnational governments. Stegarescu extends the number of countries and extends the data to achieve a full panel data set.

government tax and spending powers tends to reduce the size of the public sector. Nevertheless, some studies do find a statistically significant positive impact of decentralization on the size of government: Stein (1999) for 19 Latin American countries between 1990 and 1995, and Heil (1991) for a cross-section of 22 OECD and 39 IMF countries.

Some studies argue that fiscal decentralization might restrain or intensify the growth of government, depending on the type of decentralization. Expenditure decentralization that is not accompanied by corresponding local taxing power will not produce the tax competition that constrains Leviathan behavior. And decentralization funded by common sources, such as grants or shared revenues that are controlled by the center, may have the opposite effect by breaking the link between taxes and benefits. Moreover, according to Brennan and Buchanan's Leviathan model, systems of grants can be interpreted as a form of collusive agreement among subnational governments to circumvent the constraining effects of fiscal decentralization (Feld et al. 2003). Jin and Zou (2002), based on IMF GFS (Government Finance Statistics) data for 17 industrial and 15 developing countries, find that expenditure decentralization and vertical imbalance increase the size of the aggregate public sector, while revenue decentralization produces the opposite result. They show also that fiscal decentralization has different effects on national, subnational and aggregate government sizes. Revenue decentralization is shown to increase subnational governments by less than it reduces national governments, leading to smaller aggregate governments. Ebel and Yilmaz (2002) and Fiva (2006) used new indicators of fiscal decentralization based on the OECD (1999) classification, which provides additional information on tax revenues and on the share over which subnational governments have significant control. Ebel and Yilmaz (2002) find that subnational tax autonomy has a negative and significant impact on public sector size in 10 transition countries for the period 1997–1999, while using data on 18 OECD countries, Fiva (2006) shows that subnational tax autonomy matters for both the aggregate size and composition of government spending. Estimating an error-correction model (ECM) for a panel data set of 59 countries between 1978 and 1997, Rodden (2003) finds that decentralization measured by own source subnational revenues, has a negative impact on the growth of governments, while fiscal decentralization measured by intergovernmental transfers, is positively correlated with public sector growth. Finally, Ashworth et al. (2008) use a panel cointegration approach to separate the long run effects of decentralization from the short run dynamics. The results show that increases in the amount of revenue raised by local governments leads to a long term fall in the aggregate size of government (i.e., aggregate public expenditure), while grants have the opposite effect.

3 Empirical specification and data

In this paper we test whether fiscal decentralization has an impact on government size in European countries. The general specification of our empirical model is:

$$GOVSIZE_{it} = \beta GOVSIZE_{it-1} + \alpha \sum w_{ij} GOVSIZE_{jt} + \gamma DEC_{it} + \delta X_{it} + \eta_i + \eta_t + \varepsilon_{it} \quad (1)$$

for $i \in [1, 15]$ and $t \in [1, 33]$, and where *GOVSIZE* is the dependent variable, government size, *DEC* are indicators of decentralization, *X* is a vector of the control variables, η_i is a country fixed effect, η_t is a period fixed effect and ε is the error term.

3.1 Econometric procedure

Since we want to test the existence of spending interactions among European countries at the aggregate and national levels, we need to consider spatial dependence in a panel data context. We choose two weighting schemes: a scheme that assigns weights based on geographical distance³ W^{Dist} and a scheme that gives similar weights to all countries (W^{NW}). Both weight matrices are standardized so that the elements of each row sum to 1. If each country does react to the others' spending choices, then neighbours' spending decisions are endogenous and correlated with the error term (ε). We choose to use the instrumental variables (IV) approach,⁴ which suggests the use of the weighted averages of neighbours' exogenous or control variables, (WX), as instruments (Kelejian and Robinson 1993; Kelejian and Prucha 1998). Moreover, since there is some persistence of expenditures, it may be appropriate to estimate system-GMM (Veiga and Veiga 2007).

With or without spatial dependence, we use the system-GMM estimator developed by Blundell and Bond (1998).⁵ The validity of the instruments used in the regressions is evaluated using two different statistics. The Sargan test (or overidentifying restriction test) examines the hypothesis that the instruments are not correlated with the residuals. The second test is the one proposed by Arellano and Bond (1991). This test examines the hypothesis that the residuals from the first-differenced estimating equation are not second-order correlated. A small N (as in our case) limits the number of instruments that can be used for the estimations, which may also have a consequence for the properties of the estimators. However, Soto (2007), analyses the performance of the system GMM when the number of cross-sectional units is small using Monte Carlo simulations. He shows that a small number of cross-units does not seem to have important effects on the properties previously outlined for the system GMM estimator.

Finally, for datasets with a small number of observations in the cross section and without spatial dependence, the Least Square Dummy Variable Corrected (LSDVC) estimator developed by Kiviet (1995) can be used since it corrects for any bias and is relatively efficient.

In a second step, if time series dominate the cross section, we need to perform panel unit roots, panel cointegration tests and estimate an error correction model (see Sect. 5).

3.2 Data

We estimate model in (1) using annual data for the European Union member countries. We have cross-sectional data for the 15 EU member countries for 33 years (1972–2004). Table 1 reports summary statistics and the sources of the data in this paper.

3.2.1 Government size

We analyse three different dependent variables. Whereas Fiva (2006) studies size and composition of government spending at an aggregate level (social security transfers and government consumption), we prefer to investigate the size of the public sector at different layers of

³This scheme imposes a smooth distance decay, with weights w_{ij} given by $1/d_{ij}$ where d_{ij} is the Euclidian distance between countries i and j for $j \neq i$.

⁴Empirical studies that use the IV approach to estimate spatial coefficients include Ladd (1992), Kelejian and Robinson (1993), World Bank (2000), Heyndels and Vuchelen (1998), Figlio et al. (1999), Buettner (2001), and Revelli (2001).

⁵Blundell and Bond (1998) show that their extended GMM estimator is preferred to that of Arellano and Bond (1991) if the dependent variable and/or the independent variables are persistent.

Table 1 Summary statistics-EU15

Variables	Data source	EU15 (1972–2004)			
		Mean	Std. Dev.	Min	Max
Aggregate gov. size	Eurostat	46.7	8.2	22.0	72.4
Subnational gov. size	Eurostat	14.6	8.1	0.5	34.5
National gov. size	Eurostat	29.0	6.9	11.7	48.2
GDP per capita	AMECO	14.4	9.7	1.1	59.9
Unemployment	AMECO	6.7	3.8	0.1	19.5
Pop. density	AMECO	153.2	117.6	15.2	480.6
Pop + 65 y.o.	AMECO	14.1	2.0	9.5	19.2
TDEC	Stegarescu (2004)	11.7	11.7	0.0	47.6
VI	IMF	43.7	18.6	3.3	86.8
OPEN	AMECO	78.1	45.3	26.9	280.5
SELF	AMECO	7.4	3.3	2.7	19.6

All variables are in % except GDP per capita and population density (in inhab/km²). Nb of observations: 495; TDEC: sub-central gov. autonomous own tax over total gov revenue; VI: intergovernmental transfers as a share of sub-national expenditures; AMECO: Annual Macro economic Database of the European Commission

government. Our first dependent variable is a measure of aggregate government size which is total public-sector expenditures (as a percentage of GDP). Since we also want to analyse how decentralization affects subnational and national governments, we use subnational public sector expenditures (as a percentage of GDP) and national public sector expenditures (as a percentage of GDP).

3.2.2 Fiscal decentralization

It is difficult to define and measure the degree of decentralization as the concept itself is broad, and also complex in terms of both quantitative and qualitative indicators (World Bank 2004). Indeed, decentralization covers fields such as politics, administration, and budget. Nevertheless, conventional measures of the degree of fiscal decentralization used in the literature relate subnational government revenue (or expenditure) to consolidated general government revenue (expenditure), as derived from IMF GFS. However, these common fiscal indicators tend to overestimate the degree of fiscal decentralization, especially in federal countries compared to unitary countries, as they do not provide any information on the shares over which subnational governments have significant control. Consequently, they misrepresent the actual level of fiscal decentralization in several countries (such as Austria and Germany) and introduce bias in the results of empirical studies (Stegarescu 2004). Following recent work on this topic, we use two indicators to represent the different aspects of decentralization. To test the hypothesis that fiscal autonomy leads to a smaller state, we first use a measure of revenue decentralization that is based on an analytical framework provided by the OECD (1999), which classifies taxes according to the degree of local discretion. We also include a measure of vertical imbalance, that is, the degree to which subnational governments rely on central government revenues to support their expenditure. Vertical imbalance is likely to increase the size of the public sector when the expenditure responsibilities of subnational governments do not match their revenue raising power.

We use the following two measures:

1. A measure of revenue decentralization (*TDec*) which accounts for autonomous own taxes of subnational governments in the case that subnational governments have total or significant control over their taxes. Following the classification in OECD (1999), this is the case if subnational government determines the tax rate and tax base or if subnational government determines the tax rate only or if subnational government determines the tax base only (see e.g., Ebel and Yilmaz 2002; Stegarescu 2004). Note that this indicator does not extend the analysis to all sources of public revenue, omitting, e.g., non-tax revenue, such as user charges or operational surplus of enterprises, and capital revenue which can also be classified as own autonomous revenue.

$$TDec = \frac{\text{subnational gov. own tax revenue}}{\text{consolidated general gov. total tax revenue}}$$

2. Vertical Imbalance (VI) is measured by intergovernmental transfers as a share of subnational expenditures.⁶

Note also that the simple correlation coefficient of these two decentralization indicators is not significant so that we can include them together in the estimating equation. In line with Jin and Zou (2002), we choose not to introduce the indicators for tax decentralization and expenditure decentralization simultaneously, because the standard expenditure decentralization indicator (the share of subnational public expenditures in consolidated public expenditures) is highly correlated with these other decentralization indicators.

3.2.3 Control variables

We include in our model some control variables which reflect the impact of differences in economic and demographic factors grouped in the vector X in (1). Following the empirical literature, we include some explanatory variables that might affect the demand for public expenditure. The first is GDP per capita (GDPCAP). This economic resource variable can be used as a measure of country income. The second data set is composed of socio-demographic variables, such as unemployment rate (UNEMP), population density (DENS), and share of over 65 year-olds in the population (PP65). These variables can be considered indicators of expenditure needs and may exhibit a positive sign. The variable PP65 is designed to capture the political demand for social services by the older members of the public. This segment of the population constitutes an interest group with growing political power, and PP65 is expected to be positively related to real government size.

Following Persson et al. (2005), we tried including some political variables as controls (political orientation, plurality systems, party fragmentation). None of these political variables is significant. We decided not to include them in the base regression in order to limit the number of instruments.

The degree to which an economy is open to foreign trade (OPEN) is likely to have an impact on government size. The greater the percentage of GDP in foreign trade, the more unstable and uncertain is domestic income, and knowledge of that greater insecurity leads to a greater reliance by the community on government, which increases government size

⁶However, this measure does not distinguish between conditional and general purpose transfers. General-purpose grants can be used as if they were own revenues, but may be allocated based on objective criteria or at the discretion of central government. Specific grants, on the other hand, are used for certain expenditure purposes and can be conditional across subnational governments.

(Rodrik 1998). From a more traditional public choice perspective, openness triggers foreign competition and increases the constraints on the government's ability to tax relative to its neighbours (Ferris and West 1996). This then diminishes rather than increases the rate at which government can expand.

We include a variable for the fraction of the labor force that is self employed (SELF). As it is likely easier for the self employed labor force to hide income (Kau and Rubin 1981), a larger fraction of self-employed persons is expected to raise the relative cost of tax evasion and to have a negative effect on government size (Backhaus and Wagner 2004).

Finally, in order to account for factors that are common to all countries, we need to include time dummies. However, time dummies cannot be included in the dynamic regression together with non-weighted average public expenditures of competing countries (see, e.g., the demonstration by Devereux et al. (2008, p. 1224). We therefore use a quadratic time trend. When significant, the estimated coefficient on this variable indicates a non-linear trend in the data over time.

4 Decentralization effects on public expenditures

We investigate the link between fiscal decentralization and three types of government size—aggregate, subnational and national. We estimate (1) taking account of the lagged value of our dependent variable ($\beta \neq 0$) and the spatial lagged dependent variable in the consolidated and national public expenditure estimations ($\alpha \neq 0$). Columns 1 to 6 in Table 2 reports the estimation results of this dynamic model for each level of government expenditure (aggregate, national and subnational). We estimate the extended GMM estimator as suggested by Blundell and Bond (1998). High probability values respectively for the Sargan and Arellano-Bond tests do not call into question the validity of the results of any of the regressions. For subnational public expenditures (i.e., without spatially dependent variables), as we have a small sample, Kiviet recommends the LSDVC method.

First, as Table 2 shows, the lagged endogenous variable ($GOVSIZE_{it-1}$) is always significant and takes a positive sign in all specifications. This result confirms both the consistency of the autoregressive specification in (1) and the hypothesis that government spending is likely to change only slowly over time. We also find a positive and significant coefficient associated with the weighted average of competing countries' public expenditure, using our two weighting schemes. The existence of spending interdependences is in line with the results on aggregate public expenditures obtained by Redoano (2007) based on a dataset of the EU15 (plus Switzerland and Norway) for the period 1970–1999. One explanation for this spending interdependence might be the existence of a common intellectual trend that drives public expenditure in the same direction. Another could be based on yardstick competition among governments. Governments take account of the spending choices of their neighbours, which are best known to their voters, and more easily compared with their own spending choices. A third explanation is proposed by Feld et al. (2003): that countries do not compete directly on public expenditure, but that tax rate competition has effects on tax revenues and finally on public expenditure.

The most important results in Table 2 are the parameter estimates for our two decentralization indicators. As expected, revenue decentralization is likely to increase the size of subnational governments and to decrease the size of national governments. However, the size of the consolidated government does not shrink: this outcome suggests that revenue decentralization increases the size of subnational governments to a greater extent than it reduces national government size.

Table 2 Spatial and dynamic model

GOVSIZE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Aggregate		National		Subnational		Index	
	GMM	GMM	GMM	GMM	GMM	LSDVC	GMM	GMM
	W^{NW}	W^{Dist}	W^{NW}	W^{Dist}	–	–	W^{NW}	W^{Dist}
$WGOVSIZE_{i;t}$	0.53*** (3.01)	0.73*** (6.63)	0.32*** (2.62)	0.28*** (2.69)	–	–	0.15 (0.22)	0.24 (0.38)
$GOVSIZE_{i;t-1}$	0.71*** (4.58)	0.49*** (3.83)	0.83*** (10.74)	0.83*** (9.88)	0.42*** (2.74)	0.96*** (40.56)	0.93*** (9.84)	0.92*** (7.81)
$TDEC_{i;t}$	0.009** (1.97)	0.01*** (4.06)	–0.01** (–2.29)	–0.02** (–2.47)	0.14*** (3.11)	0.03*** (3.17)	0.02** (2.17)	0.02* (2.01)
$VI_{i;t}$	–0.001 (–0.18)	0.003 (0.81)	0.03* (1.96)	0.04* (1.68)	0.37*** (3.50)	0.16*** (3.40)	–0.004 (–0.33)	–0.005 (–0.34)
$GDPCAP_{i;t}$	0.02 (0.71)	0.0002 (0.03)	0.02 (0.30)	0.04 (0.78)	–0.004 (–0.04)	0.18* (1.67)	–0.14 (–1.39)	–0.15 (–1.31)
$UNEMP_{i;t}$	0.01 (1.02)	0.03** (2.38)	0.02 (1.52)	0.02 (1.50)	0.03 (0.90)	–0.03 (–1.41)	–0.02 (–1.06)	–0.03 (–1.01)
$PP65_{i;t}$	0.15** (2.27)	0.24*** (3.39)	0.21** (2.08)	0.20** (2.08)	0.75*** (4.76)	–0.50 (–0.96)	–0.15 (–1.41)	–0.18 (–1.29)
$DENS_{i;t}$	–0.009*** (–2.63)	–0.001 (–0.50)	–0.02*** (–3.17)	–0.02*** (–2.89)	0.004 (0.26)	0.18 (0.45)	0.01 (1.36)	0.02 (1.31)
$OPEN_{i;t}$	–0.02*** (–3.16)	–0.01** (–2.09)	0.03 (1.11)	0.01 (0.30)	–0.36* (–1.91)	–0.09 (–1.05)	–0.006 (–0.27)	–0.01 (–0.37)
$SELF_{i;t}$	0.003 (0.18)	–0.02* (–1.95)	0.002 (0.09)	0.009 (0.42)	–0.39*** (–3.09)	–0.41** (–1.99)	–0.07 (–0.72)	–0.09 (–0.75)
$TREND$	–0.02 (–0.94)	–0.006 (–0.90)	–0.01* (–1.96)	–0.01** (–2.09)	–0.03*** (–3.09)	0.0007 (0.47)	0.02 (0.96)	0.02 (1.08)
$TRENDSQ$	0.0005 (0.88)	0.0002 (0.71)	0.0003* (1.91)	0.0003* (1.90)	0.001*** (4.14)	–0.0005 (–0.70)	–0.0002 (–0.75)	–0.0002 (–0.84)
Instruments	14	15	15	15	14	–	14	14
AR(2)	0.783	0.774	0.286	0.300	0.271	–	0.572	0.758
Sargan	0.824	0.325	0.773	0.826	0.827	–	0.733	0.692

t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Each endogenous variables ($GOVSIZE_{i;t-1}$; $WGOVSIZE_{i;t}$; $UNEMP_{i;t}$; $GDPCAP_{i;t}$) are instrumented by their 2nd lags values, the exogenous variables, $WPP65$ and $WGDPCAP$

We find the expected positive and significant sign for the decentralization indicator based on intergovernmental transfers (VI), in the subnational and national government size regressions. This can probably be explained by the existence of a fly-paper effect at the subnational government level. Subnational governments would spend any transfers received more easily

than they would spend local tax revenues. As suggested by Jin and Zou (2002) and Stein (1999), decentralization funded from common sources, such as grants or shared revenues that are controlled by the center, may exacerbate the problem of the commons. The disconnect between the beneficiaries of public services and those who pay for them would increase the size of subnational governments. This outcome is fully consistent with the results in Oates (1985), Grossman (1989), Edhaie (1994), Stein (1999) and Jin and Zou (2002). Expansion of the public sector at the subnational level due to transfers from the center would force national government to grow proportionately (Jin and Zou 2002). Consequently, the greater the share of intergovernmental transfers in subnational public expenditures, the larger the size of national government: vertical imbalance is positively associated with national government size.

In terms of the control variables, with the exception of the coefficient of the subnational regression which has the expected positive sign, GDP per capita is never significant. As expected, a larger share of the population aged over 65 leads to higher public expenditure at each level of government suggesting that this category of population has the political power to demand some specific expenditure allocations. Higher rates of unemployment also lead to a larger aggregate government size. When the parameter associated with population density is significant and negative this implies the existence of economies of scale in the supply of public goods. Moreover, we observe that, when the coefficient of SELF is significant, it has a negative effect on government size. Countries with a higher proportion of self employed in the labor force are likely to suffer from tax evasion and therefore have lower levels of public expenditure. We also find a negative sign for OPEN suggesting that openness triggers foreign competition and increases the constraints on the ability of governments to impose taxes, relative to their neighbours (Ferris and West 1996). Finally, only in the national regression was a significant quadratic trend detected, indicating that national public expenditures declined during our period of study but then leveled off.

Following the advice of a referee, we use a broad government measure, e.g., the Fraser Institutes economic freedom index. Government size in the broadest sense includes taxes/spending and also regulations, and distorting trade and monetary policies, most of which are not reflected in fiscal budgets to any great extent. The world economic freedom index measures the degree to which the policies and institutions of countries are supportive of economic freedom. The cornerstones of economic freedom are personal choice, voluntary exchange, freedom to compete, and security of privately owned property. Forty-two variables are used to construct a summary index and to measure the degree of economic freedom in five broad areas: (1) size of government;⁷ (2) legal structure and security of property rights; (3) access to sound money; (4) freedom to trade internationally; and (5) regulation of credit, labor and business (Gwartney and Lawson 2008). More precisely, countries with low shares of government spending in total government spending, smaller government enterprise sectors, and lower marginal tax rates earn the highest ratings in this area. This index is available for the years 1970, 1975, 1980, 1985, 1990, 1995, and 2000 to 2006.⁸ We present the estimation results in columns 7 and 8.

⁷The four components in size of government indicate the extent to which countries rely on the political process to allocate resources, and goods and services. Government consumption as a share of total consumption, and transfers and subsidies as a share of GDP, are indicators of government size. The third component measures the extent to which countries use private rather than government enterprises to produce goods and services. The fourth component is based either on the top marginal income tax rate or the top marginal income and payroll tax rates and the income threshold over which these rates apply (Gwartney and Lawson 2008).

⁸The missing observations are subjected to spline transformations.

As in the previous estimations, we can see that the index of economic freedom changes only slowly over time. We find a positive but non-significant coefficient associated with the weighted average economic freedom index of neighbour countries (using both weighting schemes). It may be difficult for governments to imitate each other using this summary index based on 42 variables. This broader government measure yields similar results for the impact of tax decentralization. We find that tax decentralization has a positive and significant impact on economic freedom. However vertical imbalance has no significant effect on the index. Finally, the control variables are never significant.

5 Short run and long run dynamics

We examine the short run and long run dynamics of the relationship between decentralization and the size of the public sector using a generalized one-step ECM⁹ estimated using a LSDVC estimator. First we need to check the stationarity of our variables. Then, if the variables are integrated on the order of $I(1)$, we conduct Pedroni panel cointegration tests to check for long run equilibrium between our variables.

5.1 Preliminary results: panel unit root and cointegration

First we perform the panel unit-root tests of Im-Shin-Pesaran for each variable to check their stationarity. If the variables are integrated on the order of $I(1)$, we conduct Pedroni panel cointegration tests to see whether there is a long run equilibrium between our variables (see Pedroni 1996, 1999, 2000, 2004). From the Im-Shin-Pesaran test, all variables are difference stationary since the unit root hypothesis is rejected for all of the other variables. While the variables for public expenditure and decentralization are not stationary, the control variables and the Fraser index are stationary in level and in difference. As a consequence, decentralization and expenditure variables are integrated in the order of $I(1)$ while control variables and the Fraser index are integrated by $I(0)$.

We proceed to Pedroni's panel cointegration tests for each pair of $I(1)$ variables. After applying the cointegration test, we cannot accept the null hypothesis of no cointegration between decentralization and public expenditure. The next step is to estimate the long run relationship with FMOLS. Table 3 presents the panel group fully modified estimates of the long run equilibrium relationship between decentralization and the size of the public sector over the period 1972–2004. The panel fully modified group mean estimators are given with and without time dummies. The time dummies are included in the regression to pick up any common disturbances affecting panel members. We discuss only the results with time dummies, which means that common shocks encountered by countries are taken into account.

The elasticity of local public expenditure relative to tax autonomy (TDEC) shows the expected positive sign and is highly significant. Moreover, the results are clear-cut for central and aggregate public expenditures. In the long run, tax autonomy reduces central expenditures and it increases subnational public expenditures and to a larger extent. As a consequence, there is an increase in aggregate public expenditures.

When considering the group mean estimator, the elasticities of local, national and aggregate public expenditure relative to vertical imbalance (VI) are significant and positive. However, there are wide differences in individual country elasticities at every level.

⁹This approach to analysing short run and long run dynamics using panel data is in line with Bond et al. (1997, 1999), Mairesse et al. (1999), Yasar et al. (2006).

Table 3 Panel Estimates of the cointegration vector

Dependent variable	Aggregate		National		Subnational	
	TDEC	VI	TDEC	VI	TDEC	VI
Group-mean estimator						
without time	0.06	-0.02	-0.05	0.03	0.38	0.01
dummies	(17.66)***	(-2.80)***	(-11.42)***	(-0.59)	(30.98)***	(0.62)
with time	0.05	0.09	-0.05	0.01	0.37	0.19
dummies	(15.22)***	(6.32)***	(-13.12)***	(1.86)*	(29.68)***	(2.08)**

t-student between brackets. Variables in logarithm. * significant at 10%; ** significant at 5%; *** significant at 1%

5.2 Short run and long run effects of decentralization

The ECM is based on the assumption that the economy can adjust itself to disturbances over time. We begin with the following autoregressive-distributed lag model:

$$\begin{aligned}
 GOVSIZE_{i,t} &= \phi_1 GOVSIZE_{i,t-1} + \phi_2 GOVSIZE_{i,t-2} + \alpha_0 DEC_{i,t} \\
 &+ \alpha_1 DEC_{i,t-1} + \alpha_2 DEC_{i,t-2} + \beta_0 X_{i,t} + \beta_1 X_{i,t-1} + \psi_t + v_{i,t} \\
 &\text{with } v_{i,t} = \varepsilon_i + u_{i,t} \text{ and } i = 1, \dots, N, t = 1, \dots, T
 \end{aligned}
 \tag{2}$$

where *i* is the cross-sectional units; *t* is time periods; *GOVSIZE*, is our measure of public sector size (e.g. consolidated public expenditures, central expenditures or local expenditures), *DEC* is the variable of decentralization (TDEC or VI),¹⁰ *X* is a vector of the control variables. The time-specific effect, ψ_t , is included to capture aggregate shocks, which can appear in any year. Assuming fixed effects, the cross section error term, $v_{i,t}$, contains the following two effects: unobserved time-invariant, country effects, ε_i and a stochastic error term, $u_{i,t}$, which vary across time and cross section.

The autoregressive-distributed lag model specification is appropriate if the short run relationship between decentralization and government size is the only object of interest. However, it does not allow for a distinction between long and short run effects. We incorporate this distinction into our model by using an error correction specification of the dynamic panel model. This error correction specification is a linear transformation of the variables in (2), which provides an explicit link between the short run and the long run effects (Banerjee et al. 1993, 1998):

$$\begin{aligned}
 \Delta GOVSIZE_{i,t} &= (\phi_1 - 1)\Delta GOVSIZE_{i,t-1} + \alpha_0 \Delta DEC_{i,t} + (\alpha_0 + \alpha_1)\Delta DEC_{i,t-1} \\
 &+ \eta(GOVSIZE_{i,t-2} - DEC_{i,t-2}) + \theta DEC_{i,t-2} \\
 &+ \beta_0 \Delta X_{i,t} + (\beta_0 + \beta_1)X_{i,t-1} + \psi_t + v_{i,t} \\
 &\text{with } \theta = \alpha_0 + \alpha_1 + \alpha_2 + \phi_1 + \phi_2 - 1 \text{ and } \eta = \phi_1 + \phi_2 - 1
 \end{aligned}
 \tag{3}$$

The sum of the contemporaneous and the one-period lagged degree of decentralization captures the short run dynamics while the error correction term ($GOVSIZE_{i,t-2} - DEC_{i,t-2}$)

¹⁰Due to the cointegration of these two variables, they are not introduced in the same equation.

and the lagged level of decentralization variable provide a framework to test the long run relationship. We include both changes and lags of the independent variables X . Lagged variables represent the long run effect whereas changes in the variable explain the short run effect of these variables on public expenditures. The coefficient on the error correction term, η , gives the adjustment rate at which the gap between decentralization and the size of the public sector is closed. If η is negative and significant, the model is an ECM and the relationship between decentralization and the size of the public sector exists in the long run. This error correction specification allows to directly compute the long run relationship between decentralisation and the size of the public sector, $1 - (\hat{\theta}/\hat{\eta})$: this long run elasticity is calculated by subtracting the ratio of the coefficient of the scale effect (lagged value of the decentralization variable) to the coefficient of the error correction term, from 1. Estimations are performed with corrected LSDVC¹¹ (Kiviet 1995).

Table 4 shows that the error correction coefficients have statistically significant, negative signs in all regressions. Thus, the results show that there is a strong long run relationship between decentralization and size of the public sector. Furthermore, the statistical significance of the error correction terms implies that, if there are deviations from long run equilibrium, short run adjustments will be made to the dependent variable to re-establish this long run equilibrium.

We observe that the magnitude of the coefficient is the same for each level of government: the speed of the adjustment from the deviation in the long run relationship between tax autonomy and consolidated public expenditure is identical. The model converges quickly to equilibrium, with a discrepancy of about 12% corrected in each period. Computed long run coefficients indicate that greater tax autonomy leads to long-term rises in local public expenditure. Again, we find that this increase is not completely compensated for by the long-term decrease in national expenditure, leading to long-term increases in aggregate public spending.

Next, we look at the results for vertical imbalance. Table 4 shows that the error correction coefficients have statistically significant, positive signs in all regressions equations and the magnitude of the coefficients is broadly the same: between 12% and 14% of discrepancy is corrected in each period. In the long run, vertical imbalance tends to increase the sizes of subnational, national and aggregate governments while there is no impact in the short run.

As for the control variables, the results are the same. A rise in GDP per capita has no significant effect on public sector size. The results show a positive and significant coefficient of change in the unemployment rate for consolidated and central public spending. But coefficient on the change in the unemployment rate has no effect on subnational public expenditures. Finally, a higher proportion of elderly people in the population leads to a slightly significant rise in each category of public spending, while density of population has no significant impact on the level of government spending.

6 Conclusion

Our aim was to contribute to the debate on the impact of fiscal decentralization on the size of government spending, in the European context, in the knowledge that some supranational institutions argue that “inherently” centralized countries, such as the Central and Eastern European states, should move towards greater decentralization.

¹¹ We chose Blundell and Bond’s consistent estimator to initialize the bias correction.

Table 4 Error correction model

GOVSIZE	Aggregate	National	Subnational	Aggregate	National	Subnational
DEC	TDEC	TDEC	TDEC	VI	VI	VI
$\Delta Govsize_{i;t-1}$	-0.01 (-0.60)	-0.05*** (-2.71)	-0.003 (-0.15)	-0.02 (-0.94)	-0.08*** (-4.66)	-0.02 (-0.68)
$\Delta DEC_{i;t}$	0.008 (1.44)	0.003 (0.38)	-0.11*** (-5.16)	-0.003 (-0.30)	-0.01 (-0.65)	0.11** (2.45)
$\Delta DEC_{i;t-1}$	0.003 (0.62)	0.001 (0.07)	0.03 (1.50)	0.01 (0.95)	0.02 (0.32)	-0.06 (-1.31)
<i>ECM</i>	-0.11*** (-4.16)	-0.12*** (-3.71)	-0.12*** (-5.28)	-0.12*** (-4.34)	-0.14*** (-6.25)	-0.13*** (-5.01)
$DEC_{i;t-2}$	-0.11*** (-3.98)	-0.13*** (-3.62)	-0.10*** (-4.14)	-0.11*** (-4.02)	-0.13*** (-5.56)	-0.16*** (-6.65)
Summation of short run coeff	0.01* (1.69)	0.005 (0.35)	-0.07*** (-2.95)	0.008 (0.43)	0.006 (0.10)	0.04 (0.57)
Long run coeff	0.001* (1.84)	-0.05*** (-8.16)	0.17* (1.83)	0.07** (2.08)	0.05*** (2.84)	0.31* (1.88)
Control variables						
$\Delta GDPCAP_{i;t}$	-0.09* (-1.86)	-0.05 (-0.72)	-0.32* (-1.74)	-0.08* (-1.91)	-0.05 (-0.93)	-0.27 (-1.50)
$GDPCAP_{i;t-1}$	0.01 (0.86)	-0.006** (-2.50)	0.05 (0.93)	0.01 (0.69)	-0.01** (-2.66)	0.04 (0.68)
$\Delta Unempl_{i;t}$	0.009* (1.90)	0.02*** (5.25)	-0.006 (-0.33)	0.01* (1.94)	0.02*** (5.87)	-0.01 (-0.68)
$Unempl_{i;t-1}$	0.004 (1.48)	0.005** (2.05)	-0.01 (-1.20)	0.004 (1.59)	0.006*** (2.63)	-0.02 (-1.63)
$\Delta PP65_{i;t}$	0.22 (1.43)	0.22 (0.59)	0.75 (1.36)	0.28** (2.05)	0.21 (0.56)	0.23 (0.44)
$PP65_{i;t-1}$	0.02 (0.61)	0.03 (0.58)	0.17 (1.33)	0.03 (1.08)	0.01 (0.23)	0.28** (2.24)
$\Delta DENS_{i;t}$	-0.06 (-0.61)	-0.17 (-1.16)	0.37 (0.91)	-0.08 (-0.74)	-0.18 (-1.09)	0.39 (0.93)
$DENS_{i;t-1}$	0.02 (0.86)	0.05*** (3.65)	-0.12 (-1.12)	0.03 (1.21)	0.06*** (17.67)	-0.15 (-1.38)
$\Delta OPEN_{i;t}$	-0.08** (-2.53)	-0.01 (-0.51)	-0.23* (-1.71)	-0.08** (-2.55)	-0.03 (-1.26)	-0.17 (-1.22)
$OPEN_{i;t-1}$	-0.08*** (-5.68)	-0.17*** (-5.15)	0.28*** (5.64)	-0.09*** (-5.79)	-0.19*** (-4.01)	0.32*** (6.68)
$\Delta SELF_{i;t}$	0.02 (0.30)	0.06*** (2.91)	-0.49** (-2.29)	0.02 (0.39)	0.06** (2.17)	-0.60*** (-2.62)
$SELF_{i;t-1}$	-0.03* (-1.88)	-0.07** (-2.28)	0.009 (0.17)	-0.04** (-2.05)	-0.07** (-2.43)	-0.01 (-0.16)
Nb of countries	15	15	15	15	15	15
Nb of obs.	495	495	495	495	495	495

We analysed empirically whether fiscal decentralization has an impact on the size of government spending, applying a spatial dynamic panel model and an ECM to a EU-15 data set. We find first that government spending changes very slowly over time, and there are some interactions in public expenditures among the EU-15. Vertical imbalance tends to increase the sizes of subnational, national and aggregate governments. Thus, our results are consistent with those of Edhaie (1994), Ebel and Yilmaz (2002) and Jin and Zou (2002). However, we show that revenue decentralization reduces national government size while it increases subnational government size and to a greater extent—thus leading to a larger aggregate government size. Consequently, increasing subnational revenue autonomy may produce the unexpected outcome of an increase in the size of aggregate government. In future research, we need to determine whether the nature of the taxes available to subnational governments plays a role in this process.

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