Decentralization or Fiscal Autonomy? What Does Really Matter?
Effects on Growth and Public Sector Size in European Transition Countries

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Abstract

This paper examines the importance of fiscal autonomy in the analysis of decentralization. Using new data published by the OECD (2001, 2002), it reproduces several indicators and proposes new measures of decentralization that take into consideration subnational governments' autonomy over their revenues. Two models are reproduced: Davoodi and Zou (1998) on decentralization and economic growth, and Oates (1985), on decentralization and public sector size. Some evidence suggests that fiscal autonomy positively affects economic growth. Also, it seems to affect the size of the state, but evidence on this relation is limited. Despite some statistical weaknesses, there are sufficient indications to argue that subnational governments' fiscal autonomy should be a major concern when measuring decentralization.

Introduction

A number of studies evaluate the impacts of decentralization on economic growth and public sector size (Davoodi and Zou, 1998; Akai and Sakata, 2002; Oates, 1985; Ehdaie, 1994; and Jin and Zou, 2002). Most of them use the *Government Finance Statistics* (GFS) of the International Monetary Fund to measure decentralization (the only cross-country data available then). Unfortunately, GFS indicators do not include information on the level of autonomy of subnational governments in terms of their revenues or expenditures, which is important information when analyzing decentralization.

The OECD has recently published surveys on the fiscal design of 10 European transition countries (OECD 2001, 2002). OECD data allow users to compute indicators of fiscal decentralization that take into consideration the fiscal autonomy of subnational governments. It is then possible to evaluate whether fiscal autonomy affects the relation between decentralization and economic outcomes. Ebel and Yilmaz (2002) use part of this information (2001) to illustrate how previous estimation results could be sensitive to the choice of fiscal decentralization indicator.

This paper uses the combined 2001 and 2002 publications of the OECD. Part I examines the definition of fiscal decentralization and the existing empirical work dealing with its effects on growth and public sector size. Part II introduces the data of the OECD surveys, as well as the decentralization indicators, and the regression models. Finally, part III presents the results.

I – Decentralization and the empirical work

The “what” and “why” of decentralization

There is no right or unique definition of fiscal decentralization. It encompasses the three related processes of “devolution”, “delegation” and “deconcentration” (Bird, 2001; Bird and Vaillancourt, 1998; Litvak and al., 1998; and Martinez-Vazquez and McNab, 1997). The first one, devolution, is a process by which a central government transfers some authority to subnational governments, including the ability to raise taxes and formulate expenditure budgets. Delegation is a process by which a central government transfers a responsibility to subnational governments, remaining responsible for the service and keeping the authority to revoke this transfer at any time. At the end of the spectrum, there is deconcentration, where the central government gives responsibilities for certain services to regional branch offices. It does not require any participation of subnational governments. Each process involves a different level of fiscal autonomy.

The conceptual framework of fiscal decentralization is well established, drawing largely on contributions by Tiebout (1956), Musgrave (1959) and Oates (1972). In a decentralized state, mobility of citizens, voting power and competition among local governments ensure the matching of local public services production with preferences of citizens and enhance efficiency (Tiebout, 1956). Also, Oates (1972) argues that in a world with little externalities and heterogeneous tastes, local governments are best suited to provide local public services because they can better adapt to differences in tastes and because they have an information advantage on tastes over central government. This can be referred to as *Oates’ decentralization theorem*. An efficient allocation of local public services means that subnational governments provide services up to the point at which the value placed on the last unit of services for which citizens are willing to pay is just equal to its benefits. This implies that subnational governments must be free to levy “own-source” revenues to match citizens’ preferences on expenditures. It then suggests a relation between efficiency and fiscal autonomy (at the margin).

It must be noted however that no convincing empirical evidence exists on the efficiency gain from decentralization. Most of the discussion about fiscal decentralization is theoretical and refers to anecdotal evidence from a few studies (Bardhan, 2002; and Litvack, 1998). These studies suggest generally positive effects of decentralization, but it is hard to draw any conclusive lessons.

Empirical work

Economic growth. It is expected that if decentralization brings more efficiency in the allocation of public services, it should also bring economic growth. Indeed, most measures of fiscal decentralization using subnational governments' share of revenue or expenditure are positively correlated with the level of economic development measured by per capita income (Martinez-Vazquez and McNab, 1997). This means that fiscal decentralization is either a superior good or otherwise helps economic development. In the second case, a positive relation between decentralization and economic growth should exist. This is not however what Davoodi and Zou (1998) find. Using spending share net of intergovernmental transfers as the measure for decentralization, they find a negative relationship with economic growth for developing countries, and no relationship at all for developed countries.

Davoodi and Zou's work is critiqued by Akai and Sakata (2002) for the cultural bias of their data set. According to Akai and Sakata, using data in which the cultural, historical, and institutional differences between countries are substantial makes it difficult to determine the true effect of fiscal decentralization unless adjustments are made to the data in order to account for these differences (this idea is also defended by Bird and Vaillancourt, 1998). To control the cultural and historical bias, Akai and Sakata use data for one country (the 50 states of the United State) and find that decentralization of government contributed to the states' economic growth.

Public sector size. The relation between fiscal decentralization and the public sector size relies on the theory of the Leviathan State elaborated by Brennan and Buchanan (1980).

Brennan and Buchanan model the government as a monolithic entity that systematically seeks to maximize its total revenue. According to them, the capacity of government to maximize its revenue is only limited by constitutional constraints, among which is decentralization. Citizen mobility and competition between subnational governments will limit their tax pricing power and encourage more efficient allocation of public services. Consequently, other things being equal, the state should be smaller the more it is decentralized.

The theory of the Leviathan State has limited empirical support. Oates (1985) conducted a study on this relationship using subnational governments' share of revenue and expenditure as proxies for decentralization. He finds no empirical support for the Leviathan hypothesis. Ehdaie (1994) points out a weakness in the Oates (1985) study, arguing that taxing and spending decisions should not be taken separately in the decentralization process. Computing measures of fiscal decentralization and fiscal collusion, he finds that decentralization of taxing power has a negative correlation with the public sector size, while the amount of transfers has no significant correlation. More recently, Jin and Zou (2002), adding the time series dimension to cross-section analysis, find that expenditure decentralization leads to a larger state, while revenue decentralization leads to a smaller state, and finally that vertical imbalances increase the size of the public sector.

Measurement problem. Most of previous studies use GFS data to compute indicators of fiscal decentralization. Most decentralization measures computed with GFS data are defined on the basis of a single aspect of decentralization that is subnational share of aggregate government revenue or expenditure. This gives a limited representation of fiscal decentralization. It does not take into account the subnational governments' control over tax bases or rates.

Ebel and Yilmaz (2002) use new information from OECD (2001) to estimate models with different degrees of subnational governments' revenue autonomy. From the most decentralized to the most centralized, elements of fiscal revenue used were tax autonomy, non-tax autonomy, fiscal dependency and tax sharing (see Table A-1 for details). They

reproduce the model of Davoodi and Zou, on decentralization and growth, using their own measures of decentralization and find that tax autonomy and non-tax autonomy have a positive correlation with economic growth, while tax sharing has a negative one. Since in most developing economies tax sharing and grants are the main instruments of decentralization, this may explain the findings of Davoodi and Zou (1998). These results of Ebel and Yilmaz suggest that the level of subnational governments' control over their revenues can influence economic performance.

Ebel and Yilmaz (2002) also replicate the model of Oates with their own indicators of decentralization. They find that fiscal autonomy lead to a smaller state while fiscal dependency and tax sharing had no significant impact. They also find that non-tax autonomy had a positive impact on the public sector size, which makes the interpretation of their results difficult. It should be mentioned though that the transition economies included in their analysis had gone through a major restructuring in the past decade (Bird and Banta, 1999), which can explain in part their mixed results.

In the Ebel and Yilmaz study, no variable of total decentralization has been computed. Ratios of different subnational revenue sources over total revenue are the only independent variables. Also, no attention has been given to the size of subnational governments. The subnational share of government revenue or expenditure is not part of any measure, leaving aside this important aspect of fiscal decentralization.

II - Econometric models and data sources

The OECD data on government finance

We now present the data from the OECD surveys (2001, 2002) on 10 European transition countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia).

Figure 1 : Subnational governments revenue sources (1999)
10 European transition countries

Source : OECD, *Fiscal Design Across Levels of Government*, 2001, 2002.

Note : Every vertical bar represents 100 % of subnational governments revenue. Parts that appear above the horizontal axis represent the own source revenues (grants with autonomy, non-tax autonomy and tax autonomy). Parts that appear under, with scale in parentheses, represent dependent revenues (fiscal dependency and tax sharing).

Figure 1 illustrates the different sources of subnational governments revenues for the ten countries while Table 1 provides more details. Like GFS data, OECD identifies three main sources of subnational revenues: tax revenues, non-tax revenues and intergovernmental grants. However the OECD data provide additional information on tax revenues that allows further subdivisions into “own tax revenue” and “tax sharing”. The first represents the portion of subnational tax revenue on which subnational governments have significant control (over rates and/or bases). The other, tax sharing, represents the portion on which subnational governments have no significant control. The main source of own tax revenue for the sample used here is taxes on property, while the main source of tax sharing is taxes on income, profits and capital gains. non-tax revenues from OECD surveys include income from business operations, property, administrative fees, duties, and fines. Usually, non-tax revenues are considered as fully controlled by subnational governments. However central government can set some prices for local services or administrative fees. In the liberal interpretation given here to the revenue autonomy, non-

tax revenue will always be considered as own source revenue. Finally, more detailed information about intergovernmental grants is also given in OECD data, allowing their subdivision as either general-purpose or specific grants. General-purpose grants are ones that can be seen as own revenue when they are provided based on objective criteria. But their allocation may as well be made at the central government's discretion. Specific grants are earmarked for certain purposes. Their allocation may be conditional across subnational governments as well as unconditional, which gives more autonomy.

A comparison presented in Table 2 of the GFS and OECD aggregate data for subnational share of government expenditure and revenue shows little differences. However, a more detailed analysis shown in Table 3 of OECD data reveals that in most countries, subnational governments do not have a significant control over their revenues. On average for this sample, about 50 % of subnational governments revenues came from tax sharing in 1999. This share ranges from 14% for Poland to 91% for Lithuania.

Table 1: Details on subnational government revenue sources (1999)
10 European transition countries

Country	Tax Revenue		Non-tax Revenue	Grant	
	Own-Taxes	Tax-Sharing		General Purpose	Specific
Bulgaria	-None	-60 % from taxes on payroll and workforce -30 % from taxes on income, profits and capital gains.	-Fees bring over 50% of revenue -S.n. governments set the fees within the limits provided by law	-Mainly objective criteria without own tax effort -Redistribution purposes -20 % discretionary	-Social assistance grants -Conditional, based on standard costs
Czech Republic	-70 % from taxes on property -25 % from taxes on goods and services	-Mainly taxes on income, profits and capital gains -Small contribution from taxes on goods and services	-Fees represent 30 % of revenue -S.n. governments set the prices except for rents and water supplies -Capital gains from sales of stocks were important in 1999	-None	-Operating grants are mainly unconditional and represent about 60 % of revenues -Capital grants (40 %) are mainly conditional and based on actual costs
Estonia	-Mainly taxes on property	-Mainly taxes on income, profits and capital gains	-Sales of goods and services is the major source of revenue -No regulation on fines and sales from central government	-Exclusively objective criteria without own tax effort -Redistribution purpose	-Conditional and based on standard costs
Hungary	-More than 80 % from business taxes and tourism -Less than 20 % from taxes on property	-Mainly taxes on income, profits and capital gains	-Charges and fees are the major source -No restriction from central government	-Mainly discretionary	-Mainly conditional, based on standard costs. -Development purposes
Latvia	-None	-Nearly 80 % from taxes on income, profits and capital gains -Small contribution from taxes on property	-Service fees is the major source of revenue (60 %) -No central government control on revenues	-Objective criteria without own tax effort. -Equalization system	-Operating grants (mainly for salaries), conditional and based on standard costs.

Table 1 (continued)

Country	Tax Revenue		Non-tax Revenue	Grant	
	Own-Taxes	Tax-Sharing		General Purpose	Specific
Lithuania	-None	-Mainly taxes on income, profits and capital gains. -Small contribution from taxes on property	-Mostly fees -S.n. governments set rates	-Objective criteria without own tax effort -Important decrease in 1999 due to raise of income tax revenues	-Oriented to State social policy implementation -Conditional grants based on standard costs reduced in 1999 (30 %) -Conditional grants based on actual costs raised in 1999 (70 %)
Poland	-Mainly taxes on property (Real estate tax)	-Mainly taxes on income, profits and capital gains	-Service fees is the major source of revenue -No central government control on revenues	-Objective criteria without own tax effort -Redistribution and education purposes	-Mainly operating grants -60 % based on actual costs -40 % based on standard costs
Romania	-Mainly taxes on property -Small contribution of taxes on income, profits and capital gains	-Mainly taxes on income, profits and capital gains -Small contribution from taxes on property	-Service fees is the major source of revenue -Fees are regulated by subnational governments	-None	-All grants are conditional and based on actual costs -Mostly capital grants
Slovak Republic	-80 % from taxes on property -20 % from taxes on goods and services	-Mainly taxes on income, profits and capital gains -Small contribution from taxes on property	-Mainly fees, sales, and fines -Prices of services set by s.n. governments -Administrative fees, rents and waste disposal charges are set by central government	-None	-All unconditional -Operating grants
Slovenia	-Mainly taxes on property -Small contribution from taxes on goods and services	-Mainly personal income tax -Some taxes on property and goods and services	-Rental revenue is the major source -The majority of non-tax revenues are within the competence of s.n. governments	-Objective criteria without own tax effort -Financial adjustment purposes	-Conditional grants based on standard costs serves for promotion of bilingualism -Conditional co-investment grants are based on actual costs

Source : OECD, Fiscal Design Across Levels of Government, 2001, 2002.

Table 2 : **Comparison of GFS data with Fiscal design surveys of OECD (1999)**
10 European transition countries

Country	Subnational share of government expenditure (GFS)	Subnational share of government expenditure (OECD)	Subnational share of government revenue (GFS)	Subnational share of government revenue (OECD)
Bulgaria	19,0	19,1	18,1	18,6
Czech Republic	16,3	18,3	20,9	20,8
Estonia	17,9	19,7	21,8	22,2
Hungary	21,2	23,7	25,2	26,7
Latvia	21,6	23,1	24,6	26,0
Lithuania	22,0	19,6	21,9	22,9
Poland	28,7	27,6	32,4	28,9
Romania	9,2	9,4	11,7	11,9
Slovak Republic	5,5	7,0	6,3	4,9
Slovenia	8,0	11,6	11,6	11,9
Mean	17,0	17,9	19,4	19,5

Source : OECD, Fiscal Design Across Levels of Government, 2001, 2002

Table 3 : **Composition of subnational governments' revenue (1999)**
10 European transition countries

Country	Tax Revenue		Non-tax Revenue	Grant		Total
	Own-Taxes	Tax-Sharing		General Purpose	Specific	
Bulgaria	0,0	47,2	13,4	36,3	3,2	100
Czech Republic	3,9	43,8	36,3	0,0	16,0	100
Estonia	6,3	62,1	9,1	13,4	9,1	100
Hungary	16,3	16,8	17,0	1,7	48,2	100
Latvia	0,0	56,0	20,4	2,3	21,3	100
Lithuania	0,0	91,0	4,8	2,3	1,9	100
Poland	10,4	14,4	24,6	30,5	19,9	100
Romania	6,1	64,1	14,9	0,0	14,9	100
Slovak Republic	25,2	43,8	21,4	0,0	9,7	100
Slovenia	10,6	49,3	17,5	15,9	6,6	100
Mean	7,9	48,9	17,9	10,2	15,1	100

Source : OECD, Fiscal Design Across Levels of Government, 2001, 2002.

Table 4 provides further details on subnational own revenues. The first column presents own revenues over which subnational governments had policy control in 1999. As mentioned earlier, non-tax revenue is considered as own source revenue here. The second and third columns report intergovernmental grants that could be considered as own source revenues. Following Ebel and Yilmaz (2002), “we risk the overestimation bias and include general-purpose grants with objective criteria and non-conditional specific grants in the decentralization variable”. The main argument is that subnational governments have at least expenditure autonomy over these grants. This transformation pushes the average subnational governments’ revenue autonomy from barely 25 % up to 37 % for the whole sample in 1999. In Bulgaria and Poland, where subnational governments received nearly 30 % of their own revenues from such grants, the change is major. However, even with this liberal interpretation, the measure of decentralization suggested here is obviously different than the ones based on GFS. In every case, the degree of subnational governments’ fiscal autonomy is far from 100 %.

*Table 4 : Subnational governments' own source revenues
as share of their total revenues (1999)
10 European transition countries*

	Own-Taxes + Non-Tax Revenue	General Purpose Grants (with objective criteria)	Specific Grant (not conditional)	Total Own Source Revenues
Bulgaria	13,4	28,6	0	42
Czech Republic	40,2	0	7,5	47,7
Estonia	15,4	13,5	0	28,9
Hungary	33,3	0,3	0,9	34,5
Latvia	20,4	2,3	0	22,7
Lithuania	4,8	2,3	0	7,1
Poland	35,1	30,6	0	65,7
Romania	21	0	0	21
Slovak Republic	46,6	0	9,7	56,2
Slovenia	28,1	15,9	0	44
Mean	25,8	9,4	1,8	37,0

Source : OECD, Fiscal Design Across Levels of Government, 2001, 2002.

New measures of decentralization

In order to estimate the effects of decentralization it is important to find a good measure for it. Ebel and Yilmaz have shown that expenditure or revenue share were not reliable measures of decentralization because they did not take any consideration of subnational governments' control over their revenues. The new indicators they proposed were interesting in the way that they illustrated which element of decentralization had positive or negative effect on economic outcomes. However, they revealed nothing about the effects of overall decentralization.

To fill this gap, three new measures of decentralization are proposed in this paper. The first one, called "revenue autonomy", is the ratio of subnational governments own source revenue over its total revenue. Own source revenue is defined in the previous section of this text. It is the sum of tax autonomy, non-tax autonomy and intergovernmental grants

considered as own revenue (Table 4). This new variable is illustrated in the upper part of Figure 1. This measure takes into account total fiscal autonomy. For example, if one country has considerable proportion of non-tax revenue, like the Czech Republic, and another has a considerable proportion of tax autonomy, like the Slovak Republic, partial measures will show a different level of tax autonomy while overall both countries have a similar level of fiscal autonomy.

*Figure 2 : Subnational share (%) of governments revenues (1999)
10 European transition countries*

Source : OECD, Fiscal Design Across Levels of Government, 2001, 2002.

It is important to know how much subnational governments are in control of their own revenues, but it is essential to keep in mind that the size of subnational governments also matters. It is agreed that subnational shares of government expenditure or revenue are not the best approximations of decentralization, but this does not mean that they are irrelevant. For example, subnational governments in the Slovak Republic have a very high level of control over their revenues (see Figure 1). One could think of a high degree of decentralization. However, subnational governments in the Slovak Republic represent a small proportion of aggregate government revenues as shown in Figure 2. Hence subnational governments in the Slovak Republic have a high degree of autonomy over a relatively small share of revenue. In this case, should the Slovak Republic be classified as more or less decentralized?

One answer to this question is to use a measure of decentralization that takes into consideration the interaction between the relative size of subnational governments and their fiscal autonomy. Such a measure will be computed here as the “own revenue ratio”. It is the ratio of subnational governments’ own revenue, to aggregate government revenue. Opposed to this, we can also easily compute the “dependent revenue ratio”, which is the ratio of subnational governments revenue controlled by central government, to aggregate government revenue. These measures are illustrated as shares (black/white areas of bar graphs) of the revenue shares in Figure 2.

The models

This paper replicates:

- The models of Davoodi and Zou, and Oates using their original variables. This reveals if results are influenced by a sample effect. Both studies originally used sample of the world economy on a certain period of time. It could be normal then to have different results if this study uses a different sample representing the particular economy of European transition countries at another period of time.
- The models Davoodi and Zou, and Oates using Ebel and Yilmaz variables. These authors based their study on surveys from OECD (2001), which only included data from six of the ten European transition countries. The replication of their estimations, adding data from surveys of OECD (2002) augment the size of their sample and add strength to their results
- The models of Davoodi and Zou, and Oates and of Ebel and Yilmaz using new variables. This gives the opportunity to compare all results and to test if subnational governments’ fiscal autonomy matters when analyzing decentralization effects.

All estimations are based on an unbalanced panel data model with fixed effects:

$$Y_{it} = \delta_1 + \delta_2 \theta_{it} + \delta_3' \alpha_i + \delta_4' \lambda_t + \delta_5' X_{it} + \varepsilon_{it}$$

where $i \in [1, N]$ and $t \in [1, T]$ refers to country i at time t ; δ_1 and δ_2 are scalar parameters while δ'_3 , δ'_4 and δ'_5 are vectors; Y_{it} is the dependent variable; θ_{it} is the measure of decentralization; α_i is a vector for country fixed effects; λ_t is a vector for time fixed effects; X_{it} is a vector of control variables; and ε_{it} is the error term that is assumed to be serially uncorrelated. Differences of magnitude in variables across observation units indicate a possible presence of heteroskedasticity in ε_{it} .

The major difficulty associated with using OECD surveys is that they have been conducted on an occasional basis and data are available only for three years (1997 to 1999 for Czech Republic, Estonia, Hungary, Latvia, Lithuania and Poland; and 1998 to 2000 for Bulgaria, Romania, Slovak Republic and Slovenia). Given the small size of the unbalanced panel sample of this study (30 observations), only simple basic econometric tools can be used for estimations. Feasible General Least Square correcting for panel heteroskedasticity is too costly in degree of freedom to be estimated (adding 10 more coefficients to estimate). The solution to this has been to ignore panel heteroskedasticity and to consider instead the sample as equivalent to a 30 observations cross-section heteroskedastic sample when using feasible GLS.

All the variables used in regressions are summarized in Table A-1. In the replication of the Davoodi and Zou model, the dependent variable (Y_{it}) is the annual per capita GDP growth rate. Davoodi and Zou only used one proxy for decentralization (θ_{it}) in their study: subnational share of government expenditure, net of grants. Measures of decentralization from Ebel and Yilmaz as well as the new measures of this study will also be included as θ_{it} . As it was the case in the Davoodi and Zou study, countries fixed effects (α_i) as well as time fixed effects (λ_t) will be considered in this model. Joint significance F-test on both sets of dummies reveals that both effects are significant in this model. The set of control variables (X_{it}) included in the replication is the same one as in the original study, except for the tax rate variable, which was dropped due to non-

significance. Variables that remain are GDP per capita, secondary school enrolment ratio (or human capital investment), annual population growth and gross capital formation as ratio of GDP (which is considered as investment).

In their study, Davoodi and Zou used five-year and ten-year average data to smooth over short-term effects. Here, with a limited sample that covers only three years for each cross-section, no such average could be used. However, centred three-year moving averages^{*} have been applied on dependent and control variables to minimize any short-term effects. What is estimated here is not the relation between decentralization and growth on a short-term or year-to-year basis. It is the relation between decentralization and growth on an average medium-term basis.

In the Oates model, the dependent variable (Y_{it}) is the public sector size measured as total aggregate government current expenditure as a share of GDP. In the original model, two proxies for decentralization (θ_{it}) were used: revenue share and expenditure share. Again, measures of decentralization of Ebel and Yilmaz and the new measures of this study will be added as θ_{it} . In this model, only countries fixed effects (α_i) will be considered. Joint F-test on fixed effects reveals that time dummy coefficients are not significant, while country dummies are significant. The set of control variables (X_{it}) will be the same as in the original study, including urban population ratio, GDP per capita and total population. Because the dependent variable in this model is computed from the OECD data, which are available for only three-year period, it is impossible to use three-year moving averages to smoothen for short-term effects. It must be notice dough that no average data was used in the Oates study. It was a cross-section analysis over only one-year data.

Every model is estimated with each indicator of decentralization, once in a multiple regression including control variables, and once again in a simple regression.

^{*} A three-year moving average is a process by which data X_t is replaced by $(X_{t-1} + X_t + X_{t+1}) / 3$.

III – Results and analysis

Economic growth

Table 5 reports estimation results of the Davoodi and Zou model. Sign and significance of coefficients of all decentralization variables are summarized in Table 6 to facilitate the analysis. The first thing that can be noticed is that no significant relation is found between spending ratio net of grants and economic growth (Panel A of Table 5). This is similar to the findings of Davoodi and Zou (1998) for industrial countries, but different from developing countries. This could be explained by the fact that countries in the sample share some key characteristics with developed economies.

Table 5 : Replication of the Davoodi and Zou model : Decentralization and economic growth

Panel A : Davoodi and Zou, and Ebel and Yilmaz decentralization variables

		Multiple regressions					Simple regressions				
		Per capita GDP growth					Per capita GDP growth				
Decentralization measure variables	Subnational spending ratio net of grants	0,246 (0,254)					-0,083 (0,466)				
	Subnational tax autonomy		-0,052 (0,828)					-0,121 (0,667)			
	Subnational tax sharing			0,05 (0,228)					-0,071 (0,023)		
	Subnational fiscal dependency				-0,093 (0,072)					0,019 (0,698)	
	Subnational non-tax autonomy					0,198 (0,013)					0,217 (0,024)
Control Variables	GDP per Capita	-0,093 (0,032)	-0,06 (0,056)	-0,071 (0,046)	-0,063 (0,041)	-0,032 (0,144)					
	School enrollment	-0,081 (0,538)	0,007 (0,953)	-0,188 (0,280)	-0,156 (0,398)	-0,162 (0,334)					
	Population Growth	-0,905 (0,522)	-2,12 (0,091)	-4,03 (0,013)	-3,34 (0,024)	-1,15 (0,330)					
	Investment	0,406 (0,010)	0,294 (0,014)	0,42 (0,020)	0,466 (0,009)	0,437 (0,001)					
	Adj R-square	0,9221	0,9467	0,9927	0,9045	0,969	0,836	0,9016	0,8909	0,824	0,8686
	Control variable joint significance P-Value	0,0325	0,0282	0,0081	0,029	0,0185					
	Nom. Obs.	30	30	30	30	30	30	30	30	30	30

P-Values are in parentheses, showing levels of significance.

Panel B : New decentralization variables

		Multiple regressions			Simple regressions		
		Per capita GDP growth			Per capita GDP growth		
Decentralization measure variables	Subnational revenue autonomy	0,112 (0,084)			0,223 (0,000)		
	Subnational own revenue ratio		0,083 (0,679)			0,386 (0,061)	
	Subnational dependent revenue ratio			-0,449 (0,182)			-0,767 (0,003)
Control Variables	GDP per Capita	-0,037 (0,217)	-0,058 (0,065)	-0,059 (0,052)			
	School enrollment	0,001 (0,996)	0,036 (0,755)	-0,22 (0,245)			
	Population Growth	-1,783 (0,297)	-1,699 (0,164)	-3,193 (0,048)			
	Investment	0,274 (0,030)	0,26 (0,031)	0,382 (0,003)			
	Adj R-square	0,9729	0,93	0,9379	0,9808	0,8971	0,946
	Control variable joint significance P-Value	0,198	0,0885	0,0195			
	Nom. Obs.	30	30	30	30	30	30

P-Values are in parentheses, showing levels of significance.

Estimation results of the Davoodi and Zou model using indicators of Ebel and Yilmaz also appear in the Panel A of Table 5. In the Ebel and Yilmaz study, tax autonomy and non-tax autonomy both had a significant and positive relation with per capita GDP growth, and tax sharing had a significant negative one. Except for tax autonomy, which is not significant here, results of simple regressions reported on the right side of Panel A are similar to the ones of Ebel and Yilmaz. However, when controlling for other variables' effects, the tax sharing coefficient loses its significance. Non-tax revenue still has a positive and significant coefficient and fiscal dependency now gets a negative and significant one (see also Table 6).

Table 6 : Sign and significance of estimated coefficients, decentralization variables of the Davoodi and Zou Model

<i>Variables</i>	Per capita GDP growth	
	Multiple regression	Simple regression
Subnational spending ratio net of grants	(+)	(-)
Subnational tax autonomy	(-)	(-)
Subnational tax sharing	(+)	(-)**
Subnational fiscal dependency	(-)***	(+)
Subnational non-tax autonomy	(+)***	(+)***
Subnational revenue autonomy	(+)***	(+)*
Subnational own revenue ratio	(+)	(+)***
Subnational dependent revenue ratio	(-)	(-)*

* Significant at the 1 % level. **Significant at the 5 % level. ***Significant at the 10 % level.

The most interesting results here are the one presented in Panel B of Table 5. Estimation results of multiple regressions, on the left side, show a positive and significant coefficient for the subnational revenue autonomy variable and no significant coefficient for the two other variables. This implies that, even if subnational share of governments' revenue has no significant impact on economic growth, the composition of revenue has a significant impact on it. Other things being equal, economies with a higher level of subnational

governments' fiscal autonomy tend to grow faster. Also, simple regressions results presented on the right side of Panel B suggest a positive and significant relation between subnational own revenue ratio and economic growth, and a negative and significant relation for the subnational dependent revenue ratio (see also Table 6). This confirms the importance of subnational governments' fiscal autonomy. Decentralization of fiscal power to subnational governments seems to improve economic performance, while decentralization of expenditures coming with centrally controlled revenues seems to be an obstruction to economic growth.

The coefficients of the control variables of the Davoodi and Zou model reported in Table 5 show similarities with the original study. Economies with smaller GNI per capita and smaller population growth tend to grow faster. Higher investment share of GDP brings higher economic growth. School enrolment has the wrong (negative) sign, but is never significant. P-values of joint significance test for the set of control variables are sometimes high (over 5 %). This is an indication of the weakness of the model. The small size of the sample might be part of the explanation.

Public sector size

Table 7 presents estimation results of the Oates model. Sign and significance of decentralization coefficients are summarized in Table 8. The estimated coefficients of Oates decentralization variables appear in the first two lines of Panel A (Table 7). It shows a significant and positive relation between decentralization, measured as subnational share of government revenue and expenditure, and the public sector size. According to the theory of the Leviathan State, this relation should be negative. Results presented in Panel A of Table 7 are similar to the ones of the original study: there is no evidence of the Leviathan State theory.

Table 7 : *Replication of the Oates model : Decentralization and public sector size**Panel A : Oates, and Ebel and Yilmaz decentralization variables*

		Multiple regressions						Simple regressions					
		Public sector size						Public sector size					
Decentrali- zation measure variables	Subnational revenue ratio	0,112 (0,073)						0,044 (0,650)					
	Subnational spending ratio		0,154 (0,018)						0,027 (0,746)				
	Subnational tax autonomy			-0,772 (0,001)						-0,389 (0,062)			
	Subnational tax sharing				0,051 (0,280)						0,089 (0,045)		
	Subnational fiscal dependency					-0,059 (0,335)						-0,087 (0,097)	
	Subnational non-tax autonomy						0,097 (0,031)						0,136 (0,000)
Control Variables	Urban population ratio	-2,092 (0,027)	-2,98 (0,014)	-3,746 (0,000)	-1,801 (0,077)	-1,598 (0,104)	-1,752 (0,069)						
	GDP per capita	-0,002 (0,820)	0,001 (0,903)	-0,001 (0,903)	0,006 (0,391)	0,008 (0,357)	0,008 (0,239)						
	Population Growth	-0,394 (0,001)	-0,35 (0,002)	-0,431 (0,000)	-0,318 (0,010)	-0,328 (0,008)	-0,253 (0,012)						
	Adj R-square	0,9678	0,961	0,9863	0,9686	0,968	0,9719	0,9461	0,9514	0,9435	0,9697	0,9539	0,944
	Control variable joint significance P-Value	0,0003	0,0013	0,0000	0,0265	0,0218	0,0218						
	Nom. Obs.	30	30	30	30	30	30	30	30	30	30	30	30

P-Values are in parentheses, showing levels of significance.

Panel B : New decentralization variables

		Multiple regressions			Simple regressions		
		Public sector size			Public sector size		
Decentrali- zation measure variables	Subnational revenue autonomy	-0,181 (0,167)			-0,104 (0,005)		
	Subnational own revenue ratio		0,217 (0,258)			-0,049 (0,802)	
	Subnational dependent revenue ratio			0,222 (0,420)			0,548 (0,021)
Control Variables	GDP per Capita	-1,508 (0,183)	-2,763 (0,020)	-1,216 (0,193)			
	Population Growth	-0,003 (0,755)	0,006 (0,441)	-0,002 (0,879)			
	Urban population ratio	-0,196 (0,075)	-0,227 (0,011)	-0,418 (0,001)			
	Adj R-square	0,9505	0,9524	0,964	0,9493	0,9446	0,9596
	Control variable joint significance F-statistic	0,155	0,0081	0,0037			
	Nom. Obs.	30	30	30	30	30	30

P-Values are in parentheses, showing levels of significance.

Estimation results of the coefficients of Ebel and Yilmaz variables also appear in Panel A of Table 7. Simple regression results presented on the right side suggest a negative and significant coefficient for tax autonomy and a positive and significant one for non-tax autonomy. These results are the same as in the Ebel and Yilmaz study. Simple regression results in Panel A also reveal a significant and positive coefficient for tax sharing and a negative and significant one for fiscal dependency. These results are a little hard to explain. However, when controlling for the effects of other variables, only coefficients of tax autonomy and non-tax autonomy remain significant, with respect to results of the Ebel and Yilmaz study. Table 8 also illustrates this.

Table 8 : Sign and significance of estimated coefficients, decentralization variables of the Oates Model

<i>Variables</i>	Public sector size	
	Multiple regression	Simple regression
Subnational revenue ratio	(+)**	(+)
Subnational spending ratio	(+)**	(+)
Subnational tax autonomy	(-)*	(-)**
Subnational tax sharing	(+)	(+)**
Subnational fiscal dependency	(-)	(-)**
Subnational non-tax autonomy	(+)**	(+)*
Subnational revenue autonomy	(-)	(-)*
Subnational own revenue ratio	(+)	(-)
Subnational dependent revenue ratio	(+)	(+)**

* Significant at the 1 % level. **Significant at the 5 % level. ***Significant at the 10 % level.

Panel B of Table 7 reports estimation results of the new decentralization variables. Multiple regression results suggest that no variable has a significant impact on the public sector size. This is coherent with the findings of Oates. However, simple regression results show a negative and significant relation between revenue autonomy and the public sector size. They also show a positive and significant relation between subnational

dependent revenue ratio and the public sector size (see also Table 8). Results presented here are not strong enough to confirm the Leviathan theory, but they at least suggest that fiscal autonomy might be related to the size of public sector.

Estimated coefficients of the control variables in this model are similar to the ones estimated by Oates (Table 7). Everything else being constant, higher urbanization and higher population seem to bring smaller aggregate public sector size. The GDP per capita coefficient was expected to be positive, but is not significant here. The p-value of joint significance test for control variables is over 5 % for only one estimation. Overall, the Oates model seems to work well enough.

Conclusion

As already mentioned, a multidimensional process like decentralization is difficult to define and measure. In empirical study, the measurement problem is crucial, since it may be far-reaching in policy design. This paper has presented an empirical analysis on the importance of considering subnational governments' fiscal autonomy when measuring decentralization. In the past, good data were unavailable to conduct such analysis. The new data published by the OECD (2001, 2002) have allowed us to compute new decentralization measures, based on the level of subnational governments' fiscal autonomy, and to estimate their impacts on economic performance.

Empirical results on the relation between decentralization and economic growth lead to two conclusions. First, the subnational share of governments' expenditure does not seem to be related to economic growth in European transition countries. Second, the degree of revenue autonomy of subnational governments does seem to be positively related to growth.

Even if less convincing, empirical results on the relation between decentralization and public sector size seem to point in the same direction. No negative relation seems to exist

between decentralization and public sector size for European transition economies. However, a negative relation is observed between fiscal autonomy of subnational governments and public sector size. This relation disappears in the multiple regression analysis, but it at least suggests that public sector size could be influenced by fiscal autonomy.

The collection of more data on fiscal design across levels of governments should be a major goal for future work on decentralization. In this paper, the small size of the sample restricts the validity of results that are not wrong but are not strong. Better data will bring better empirical analysis on decentralization. It will help to understand this ongoing process that already affects most developing and transition economies.

Table A-1 : Specific Definitions of indicators and of data sources
(grouped by models)

Panel A - Variables Specific to the Davoodi and Zou Model

Variable		Definition	Cross-Sect.	Obs.	Mean	Max.	Min.	Std.	Data Source
Dependant (3-year moving average smoothing)	GDP per capita growth	GDP per capita annual growth rate	10	30	0,036	0,074	-0,040	0,026	WDI, World Bank
Decentralization (Davoodi and Zou)	Spending ratio net of grants	Ratio of subnational government spending to aggregate government spending, net of grants	10	30	0,109	0,213	0,042	0,046	GFS, IMF
Control Variables (3-year moving average smoothing)	GNI per capita, Atlas method	GNI per capita in constant US\$ (x1000)	10	30	3,891	9,933	1,307	2,361	WDI, World Bank
	School enrolment	Ratio of students enrolled in secondary school to population of secondary school age	10	30	0,919	1,062	0,793	0,072	WDI, World Bank
	Population growth	Annual population growth rate	10	30	-0,003	0,002	-0,012	0,004	WDI, World Bank
	Investment	Gross capital formation : ratio of total investment including inventories over GDP	10	30	0,253	0,327	0,149	0,048	WDI, World Bank

Panel B - Variables Specific to the Oates Model

Variable		Definition	Cross-Sect.	Obs.	Mean	Max.	Min.	Std.	Data Source
Dependent Variable	Public sector size	Ratio of aggregate government current expenditures (excluding capital expenditures) over GDP	10	30	0,391	0,463	0,286	0,049	OECD
Decentralization (Oates)	Subnational Revenue ratio	Ratio of subnational governments revenue to aggregate government revenue	10	30	0,188	0,324	0,063	0,065	GFS, IMF
	Subnational Spending ratio	Ratio of subnational governments spending to aggregate government spending	10	30	0,162	0,287	0,055	0,063	GFS, IMF
Control Variables	Urban population ratio	Ratio of urban population over total population	10	30	0,643	0,747	0,503	0,072	WDI, World Bank
	GDP per capita	GDP per capita in constant 1995 US\$ (x1000)	10	30	4,043	11,659	1,372	2,757	WDI, World Bank
	Population	Population (x1000000)	10	30	10,467	38,666	1,387	11,297	WDI, World Bank

Table A-1 (continued)

Panel C - Decentralization variables added to both models

Variables		Definition	Cross-Sect.	Obs.	Mean	Max.	Min.	Std. Dev.	Data Source
Decentralization (Ebel and Yilmaz)	Subnational Tax Autonomy	Ratio of subnational tax revenue on which subnational governments have control over total subnational government revenue	10	30	0,078	0,252	0,000	0,075	OECD
	Subnational Tax Sharing	Ratio of subnational tax revenue on which subnational governments have no control on total subnational government revenue	10	30	0,476	0,910	0,144	0,181	OECD
	Subnational Fiscal Dependency	Ratio of subnational grant revenue excluding general purpose grants with objective criteria and unconditional specific grants over total subnational government revenue	10	30	0,155	0,531	0,000	0,140	OECD
	Subnational Non-Tax Autonomy	Ratio of subnational non-tax revenue over total subnational government revenue	10	30	0,177	0,363	0,040	0,076	OECD
New decentralization measures	Subnational Revenue Autonomy	Ratio of own source revenues over total revenues of subnational governments	10	30	0,370	0,657	0,071	0,158	OECD
	Subnational own revenue ratio	Ratio of subnational own source revenue over aggregate government revenue	10	30	0,068	0,212	0,016	0,040	OECD
	Subnational dependent revenue ratio	Ratio of subnational dependent revenue over aggregate government revenue	10	30	0,121	0,204	0,028	0,053	OECD

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