EXPLAINING FISCAL DECENTRALIZATION

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This study uses a panel of sixty-four countries to test empirically various hypotheses about the causes of decentralization at the government level and in different functional spending areas. The empirical results find a negative impact of urbanization on decentralization. In the general case, a higher income per capita favors decentralization, with this effect being stronger for high-income countries. However, the use of functional measurements of decentralization shows that income per capita has a negative effect on health decentralization. Urbanization has a negative impact on the fiscal decentralization of health and education, and it has a positive effect on the share of housing expenditures being made by subnational governments.

Keywords: *political economy; median voter; fiscal federalism; decentralization*

1. INTRODUCTION

There is a large and growing literature on the factors that explain the extent of fiscal decentralization. However, the results of these analyses are inconclusive. This article reexamines the determinants of fiscal decentralization (FD). Its contributions rest on three basic issues. First, it uses a panel of sixty-four countries to test a comprehensive set of hypotheses on the causes of FD. Second, it goes beyond former studies by examining the causes of FD in different functional areas of the public sector. Third, although residuals from the regression analysis are random as a group, some outliers can be gathered into small clusters and characterized by common features.

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The estimation results generally support some former evidence on the effect of a set of related variables on FD. As opposed to existing evidence, urbanization appears to have a negative effect on FD, and although federations and democratic regimes seem to be more fiscally decentralized, this research does not find a significant effect of population diversity and income distribution. Moreover, the impact of explanatory variables generally differs by functional category. Finally, after controlling for all the measurable factors considered in the model, the plot of residuals from the regressions still suggests common patterns across clusters of countries.

The remainder of this article is organized as follows. Section 2 shows the theoretical context in which FD is being explained. Section 3 presents the most prominent existing studies on the causes of FD. The results of new empirical evidence obtained in this research are shown in section 4. Concluding remarks are presented in section 5.

2. THEORETICAL FOUNDATIONS OF THE DEGREE OF FISCAL DECENTRALIZATION

There is no unique and well-accepted theory to be tested regarding the identification of causes for FD to vary across countries and over time. What we do find instead is a number of hypotheses that provide some economic rationale to the effects that specific variables may have on FD. There is, however, consensus that some broad, basic elements can be singled out. As in any optimization process, the social welfare function in each country must take into consideration a number of restrictions. The basic question refers to which variables determine the social welfare function and which can be accounted for as the relevant restrictions.

Insofar as the median voter demonstrates his or her demand for the amount and basic characteristics of local public goods, policy makers and politicians act accordingly. The literature stresses that voters' preferences will be shaped by numerous idiosyncratic characteristics. Demographic, social, and ethnic features can be mentioned, among others. Restrictions are also numerous but of a different kind. They rank from cost considerations of FD to the more obvious fact that the political framework of the country at stake may not permit median

voters to express themselves freely. When the effects of these factors are properly controlled for, the following sets of time-varying variables should be considered.

INCOME

One negative and three positive effects of income on FD can be found in the literature. The negative effect comes from the change in the structure of demand for public goods as a country's income grows. On one hand, more emphasis on income redistribution and socially oriented policies will be required. On the other hand, a growing demand for highways and public transportation facilities will arise as a response to the higher standard of living (see, e.g., Pryor 1967). Due to the significant externalities involved in the provision of this kind of public goods, some displacement of expenditure from the lower to the higher levels of government is likely to occur. In federal countries, some have argued that this has strengthened the state (provincial) or intermediate level of government (Pommerehne 1977; Marlow 1988; Wallis and Oates 1988).

The first positive effect of income on FD has to do with the demand for variety and quality in the spectrum of services being provided by the state. Wheare (1964) first made this point, suggesting that decentralization is a desirable but expensive "good" and thus could only be afforded by rather affluent societies. The potential link between quality of life and decentralization rests on theoretical and empirical arguments. The theory stresses the advantages in terms of better information being available to local bureaucrats and politicians (Von Hayek 1945),[1] the likely similarity between a competitive market and the competition between jurisdictions (Tiebout 1956; Tirole 1994), the benefits accruing from more innovative public services (Rose-Ackerman 1980), and the increasing degree of government accountability (Seabright 1995). Although the empirical evidence is not conclusive in supporting decentralization as a way to enhance growth (Woller and Phillips 1998; Davoodi and Zou 1998; Miyazaki, Zhang, and Zou 1998; Ebel and Yilmaz 2003), some recent evidence shows a positive and significant relationship between FD and "good governance" (Huther and Shah 1998). In the areas of education and health, both cross-country evidence and country case studies strongly sup-

port the hypothesis that decentralization improves government performance (Letelier 2001, 2004).

If we confront the national median voter's preferences with a budget-maximizing Leviathan type of government, a second positive effect of income on FD can be seen. Panizza (1999) captures the mechanics of this interaction. By taking advantage of its agenda-setting condition, the government is supposed to take the lead in deciding the level of fiscal centralization. This depends on the national median voter's preferences regarding the type and level of government expenditures. Since the government obtains rents from staying in office, there will be a hedge between the median voter's demand for government and the government's optimum. As the median voter's income rises, it also raises the median voter's demand for spending. However, the median voter will avoid the realization of government's rents by forcing more decentralization, which diminishes the power of government to administer the budget.

A third positive impact is based on the hypothesis that income growth may lead to a "cost-push" effect derived from the kind of services being provided by local governments. Since local governments are usually related to labor-intensive functions (education, health, police, etc.), growth in productivity will tend to be rather low for those that provide these services. As long as income per capita is accompanied by growth in labor productivity, local government's services will become relatively more expensive as income grows (Baumol 1967).

POPULATION, POPULATION DENSITY, AND POPULATION DIVERSITY

A second demand-related aspect of FD refers to the effect of population, population density, and population diversity. Litvack and Oates (1971) hypothesize that as population grows, the rising costs of congestion at the local level will tend to raise the subnational government's expenditures relative to the central government's. This will certainly increase the cost of local public goods per resident and cause a decline in its demand. They assert, however, that the demand for local public goods is generally price inelastic, making congestion increase the cost per resident. This effect should be weighed against the gains from the benefit of distributing a fixed cost over a larger pop-

ulation (Buchanan 1950). Litvack and Oates argue that the first effect will predominate. They provide one more reason to expect a positive relation between population and expenditure FD. This hinges on the fact that local public goods are subject to important indivisibilities. This makes local governments more likely to offer a wider range of local public goods as the population becomes numerous enough to reach some threshold after which further decentralization becomes affordable.

From the viewpoint of the general government, the basic point to consider is that large and low-density countries are costly to administer from the center. A good example might be tax collection, which is more efficiently performed by the central government as long as population density is high enough to make it worthwhile. Ceteris paribus, this involves a negative effect of population on FD. Federations such as Russia, Canada, and the United States are good examples of this kind.

In the context of the same model referred to above, Panizza (1999) argues that a larger territory—and therefore a lower population density—leads to a higher "ideological" distance from the median voter. This will, in turn, induce a lower demand for government spending. Since the government chooses the level of centralization by matching its marginal costs (as more centralization induces the median voter to choose a lower level of spending) with its marginal benefit (because of greater budget control), the following two effects of population density should be observed. On one hand, a lower population density will lower spending, reducing the government's marginal benefit of centralization, which is directly proportional to the rents obtained from spending. On the other hand, given that the median voter's marginal utility is decreasing in government expenditures, a lower government budget implies a higher marginal utility of public goods versus private consumption. This leads to a more significant negative effect of more centralization on the median voter's demand for spending, raising the marginal cost of centralization. Although Panizza distinguishes the effect of population from that of territory (see section 3), a comprehensive account of this hypothesis can be interpreted by saying that a lower population density will favor more decentralization.

As regards population diversity, three effects emerge. First, whatever the nature of this diversity, less homogeneous voters will favor a wider spectrum of demands when it comes to local preferences for public goods (Tiebout 1956). Second, more diversity may also involve a tendency for small groups to have more influence at the political level, leading to a more centralized pattern of public expenditures. A similar case can be made on income distribution and its impact on FD. A third factor stems from the hypothesis that a more heterogeneous population will increase the "ideological" distance from the median voter (Panizza 1999). Similar to the case of population density, less homogeneous voters are likely to prefer a smaller level of government spending, lowering the government's marginal benefit of centralization and raising its marginal cost. This will induce a positive relationship between population diversity and FD.

URBANIZATION

Another time-varying variable is urbanization. A better urban infrastructure will induce centralization either because the central government may autonomously decide to improve public urban facilities or because such an improved infrastructure may attract more population from the nonurbanized part of the country, leading to further concentration of public expenditures. This is likely to be the case in some Latin American countries, where a large share of the population is concentrated in very few (usually one) urban poles. However, as long as numerous and relatively important cities coexist and develop in a balanced way, urbanization will not necessarily involve more centralization.

GRANTS

The impact of grants has been noted in former studies (Kee 1977; Bahl and Nath 1986). Although the data set being used in this research does not permit an accurate distinction of the type of grants given to subnational governments, it provides a rough estimate of the extent to which lower tiers of government can spend beyond their own revenues. As long as grants are not meant to be a perfect substitute for

some kind of expenditure that subnational governments are already doing, they should have a positive effect on expenditures.

MILITARY EXPENDITURES AND TRADE ORIENTATION

It should also be expected that the structure of expenditures of the (general) government will have some impact on the extent to which more FD is easily achievable. This is indeed the case of military expenditures. Since these expenditures are mostly made by the central government, we can expect these to have a negative impact on FD. Similarly, trade-oriented economies tend to concentrate a large proportion of taxes in the hands of the central government through the collection of import and/or export tariffs and other related duties. We can expect a negative relationship between trade and FD. This effect will be probably more significant among low-income countries in which a unique source of national resources often stands as the main source of foreign currency and tax revenues.

3. THE EXISTING EMPIRICAL EVIDENCE

Two proxies of FD are used in most studies (see Table 1). One is "expenditure FD" (EFD), and the other is "revenue FD" (RFD) (see appendix). In the first case, FD is measured as the share of the general government's expenditures made by subnational governments. In the second case, the proxy variable is the share of subnational governments' revenues in the general government's revenues.

In some of the earliest work, Pryor (1967) finds that income is positively related to decentralization for time-series data but is negatively related to income in cross-section data. He attributes this result to the higher weight of social services in high-income countries' central government budgets, as well as the fact that any potential change in the degree of FD can be captured only over long periods of time.

The use of cross-section data for fifty-eight countries allows Oates (1972) to test some basic hypotheses on the causes of FD. The effect of economies of scale is captured by population size, which appears significant and positively related to FD. Demand for FD is captured in per capita income and various dummy variables intended to measure

TABLE 1: Some Previous Empirical Studies on the Causes of FD

Variable	*Effect on FD*	*Reference*
Income per capita	+	Oates (1972). Cross-country evidence. (EFD, RFD)
	+	Wasylenko (1987). Cross-country evidence. (EFD, RFD)
	+/–	Patsouratis (1990). Time series for various countries. (EFD, RFD)
	+	Kee (1977). Cross-country evidence. (EFD, RFD)
	–	Pryor (1967). Time-series data. (EFD)
	+	Pryor (1967). Cross-country evidence. (EFD)
	+	Pommerehne (1977). Cross-country evidence. (EFD)
	+	Bahl and Nath (1986). Cross-country evidence. (EFD)
		Panizza (1999). Cross-country evidence. (EFD, RFD)
Population and population density	+	Oates (1972). Cross-country evidence. (EFD, RFD)
	+	Pryor (1967). Cross-country evidence. (EFD)
	+	Pommerehne (1977). Cross-country evidence. (EFD)
	+/–	Patsouratis (1990). Time series for various countries. (EFD, RFD)
		Panizza (1999). Cross-country evidence. (EFD, RFD)
Urbanization	+	Kee (1977). Cross-country evidence. (EFD, RFD)
	+	Bahl and Nath (1986). Cross-country evidence. (EFD)
	+	Pommerehne (1977). Cross-country evidence. (EFD)
Government military expenditures	–	Bahl and Nath (1986). Cross-country evidence. (EFD)
Trade openness	–	Kee (1977). Cross-country evidence. (EFD, RFD)
Income inequality	–	Pommerehne (1977). Cross-country evidence. (EFD)
Ethnic heterogeneity	NS	Pommerehne (1977). Cross-country evidence. (EFD)
	NS	Oates (1972). Cross-country evidence. (EFD)
	+	Panizza (1999). Cross-country evidence (EFD, RFD)
Grants to LGs	+	Kee (1977). Cross-country evidence. (EFD, RFD)
	NS	Bahl and Nath (1986). Cross-country evidence. (EFD)

NOTE: Dependent variables are in parentheses. FD = fiscal decentralization; EFD = expenditure FD; RFD = revenue FD; LG = local government; NS = not significant.

interjurisdictional preference diversity. While only per capita income seems to have a positive impact on FD, Oates does not provide clear-cut results concerning the effects of preference diversity.

In a later study, Kee (1977) measures the impact of urbanization, income per capita, central government transfers to the local governments, and the degree of trade orientation on FD. Kee finds that grants to subnational governments seem to be very significant. However, this holds only for EFD and not for RFD. He also finds that both income and urbanization appear to be positively related to FD. Finally, Kee estimates that the degree of trade orientation has a negative impact on FD for developing countries; this last result is believed to reflect the revenue-centralizing effect of a tax structure based on tariffs on imports and/or exports, which is a common feature among developing countries.

Another comprehensive study on the causes and consequences of FD was conducted by Pommerehne (1977). He concludes that only population appears to be systematically significant and positively related to FD. The effects of all remaining variables are sensitive to the specific model being tested, showing ambiguous signs and nonsignificant coefficients.

Bahl and Nath (1986) show that a proxy for economic development, defined as a linear combination of related variables obtained through principal components, affects FD positively. Interestingly enough, expenditures on defense as a proportion of the gross domestic product (GDP) also turn out to be significant and negatively related to FD.

Wasylenko (1987) uses four alternative measurements of FD, two for expenditures and two for revenues. When forty-seven developed countries are pooled in the sample, a cross-country regression shows that both per capita income and a federal country dummy positively affect EFD. However, per capita income is not significant for RFD. When the estimations are performed with separate samples for developed and developing countries, many of the coefficients lose their significance. Wasylenko interprets this as evidence of a threshold point of per capita income and urbanization effects on FD. Although other explanatory variables are also included in the estimations, they do not have a clear-cut impact.

More recently, Panizza (1999) explains "fiscal centralization" by setting up a model that uses the interaction between the national median voter and a budget-maximizing Leviathan government, which is then tested for fifty-six countries and three different years. His results confirm a negative effect of income, ethnic fractionalization, and country area on FD. Furthermore, more democratic countries appear to be more decentralized. Interestingly, Panizza explores the influence of history on fiscal centralization by including lagged values of the dependent variable in some regressions. Since such a variable turns out to be very significant, he concludes that historical episodes not being considered by the conventional economic modeling matter a lot in explaining the dynamics of FD.

Concerning time-series analysis, the work by Patsouratis (1990) is worth mentioning. He compares eleven Organization for Economic Cooperation and Development (OECD) countries from the early 1960s to the mid-1980s. With only one exception, the empirical evidence shows that per capita income as a proxy for economic development positively affects FD. Political factors are also important, although Patsouratis does not provide further rationale about the sign of that coefficient. The population variable is also significant for most of the countries under analysis. Nonetheless, the impact of population on FD is not equally signed in all cases.

4. A NEW PANEL DATA ESTIMATION

DATA

The most common source for measuring FD is the Government Financial Statistics (GFS) publication by the International Monetary Fund. Nevertheless, given that such a source does not provide information on the tax rate–setting authority of subnational governments, some argue that the GFS-based proxy to FD is potentially misleading (Bahl 1999). A recently published database on FD for the OECD countries further divides tax and grants between those under subnational governments' control and those regarded as mere tax-sharing arrangements. Although Ebel and Yilmaz (2003) show some evidence in favor of using such a data set, two considerations should be made.

One is that the data set covers a relatively small group of countries for which these measurements are made for only one year, which severely limits statistical analysis. The second is that, even if the GFS figures might give an incorrect measurement of the degree of FD, there is no evidence of a systematic measurement error across countries. Should that error be nonsystematic, which is most likely to occur, regression results will not be affected as long as the sample is large enough. Although this study takes advantage of a panel in which numerous countries and various years are combined, it maintains the standard use of the GFS figures on fiscal data.

Related data come from *World Development Indicators* (World Bank 1999), *United Nations Statistical Yearbook* (United Nations 1997), Sachs and Warner (1997), and *The World Fact Book* (U.S. Central Intelligence Agency 1997). The information on FD covers a sample of sixty-four countries for which data on local and/or state governments are provided in the IMF Government Finance Statistics.

REGRESSION ANALYSES

Methodological Aspects

Regression analysis is done using an unbalanced panel of sixty-four countries for the (general) government and a subset of this panel in the cases of the functional expenditures. Yearly frequency data are used between 1973 and 1997. A separate estimate is conducted for three-year average data, which is meant to capture the long-term effects of the variables being considered.

The basic model may be summarized as follows:

$$FD_{ti} = \alpha + \beta_1 \mathbf{X}_{ti} + \beta_2 \mathbf{Z}_i + \beta_3 \mathbf{Q}_i + \mu_{ti}, \quad (1)$$

where FD stands for fiscal decentralization, **X** accounts for the set of time-varying variables that affect FD, **Z** captures country-specific characteristics for which only one observation per country is available, and **Q** accounts for the country's institutional factors.

Those variables included in **X** are income per capita (GDPCAP); population density (DENSPOP); military expenditures as a share of

central government expenditures (MILGOV); trade orientation, measured as the share of exports plus imports on the GDP (TRADE); grants as a share of subnational governments' total revenues (GRG); and the share of the urban population as a proxy of urbanization (URBAN). The social heterogeneity indexes are GINI, ETHNIC, and HI form the vector **Z** (see the appendix for details). There is only one observation on these last three variables for each country, and some of the countries in the sample are not represented. The vector **Q** includes two institutional variables: a dummy for constitutional federations (CSTAT) and a dummy for nondemocratic countries (PSTAT).

The estimation procedure follows a methodology proposed by Reilly and Witt (1996), which consists of estimating the model in two separate stages. In the first stage, a fixed-effect panel data estimation is conducted with the set of explanatory variables for which a significant variation is likely to be observed over time, all of which are grouped in vector $\mathbf{X}_{ti}$ (equation (2)). In the second stage, the estimated country fixed effects from equation (2) (vector $\hat{\alpha}^*$) are regressed on **Z** and **Q** together (equation (3)):

$$FD_{ti} = \alpha_i^* + \beta_1^* \mathbf{X}_{ti} + \mu_{ti}^*, \tag{2}$$

$$\hat{\alpha}_i^* = \delta + \beta_2^* \mathbf{Z}_i + \beta_3^* \mathbf{Q}_i + \varepsilon_i^*. \tag{3}$$

Relative to a single-stage estimation of equation (1), this procedure saves degrees of freedom at each separate stage, and it avoids the potential for collinearity in equation (1) arising from the fixed-effect country dummies and the set of time-invariant variables included in vectors **Z** and **Q**.

To address the issue of likely different behavior between high- and low-income countries, three sets of estimations of equation (1) are performed. All of them are repeated for the two general indexes of fiscal decentralization (EFD and RFD). The first one takes data from the thirty-two richer countries in the sample (according to the GDPCAP), while the second is for the thirty-two low-income countries only. The third estimation uses the whole sample. In this last case, the estimation is repeated for annual and three-year average data.

The General Government Definition of FD

The first estimation results are in Table 2. With the exception of MILGOV and GRG, all the variables are expressed in natural logarithms (*L*).[2] The potential endogeneity of grants was considered by performing a Hausman test on regression model 4, and no statistical evidence of endogeneity was found.[3] Time effects of regressions are removed, and the equation is reestimated whenever these effects are statistically nonsignificant.

The effect of GDPCAP is clearly positive and significant for the high-income subsample and for the whole sample. The fact that low-income countries are statistically responsive to income suggests the likelihood of some kind of threshold in the responsiveness of FD with respect to income (Wasylenko 1987). Although GDPCAP is just below significance in the three-year average sample (model 5), it keeps the same sign and roughly the same value as the other estimations.

Urbanization has a systematically negative effect on FD, which is clearly stronger among low-income countries. As stated above, the reason probably lies in the fact that, very often, low-income countries have only one or two large cities from which most public affairs are overseen. Although the political economy of such a phenomenon might be difficult to identify in statistical terms, this sheds light on the fact that some Latin American countries are very centralized and have a large proportion of their populations living in few very large cities.

MILGOV has the expected sign, as does grants (GRG). In this last case, transfers do appear to have an impact on subnational governments' expenditures. It must be noted, however, that in most countries, an important proportion of these grants is categorical. The impact of population (DENSPOP) is unambiguously positive, and this effect appears to be stronger among low-income countries. Once again, a feasible explanation is that there is a threshold in terms of GDPCAP, after which the effect of population becomes more evident. Effective FD might be feasible as long as a minimum number of taxpayers can afford the cost of some local public goods.

As for the revenue definition of FD (RFD), results in Table 3 tend to confirm the same hypotheses that were previously tested for EFD. The only difference between this set of estimations and the ones reported

TABLE 2: Panel Data: General Government Expenditure Fiscal Decentralization

	High-Income Countries	*Low-Income Countries*		*Whole Sample*	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Constant	–0.547	7.994		5.043	5.081
	(–0.392)	(3.784)**		(6.413)**	(5.425)**
LGDPCAP	0.185	–0.082	0.011	0.154	0.106
	(2.179)**	(–0.626)	(0.087)	(2.265)**	(1.565)
LURBAN	0.215	–2.50	–2.632	–1.404	–1.488
	(0.779)	(–7.301)**	(–7.461)**	(–8.194)**	(–5.872)**
MILGOV	–0.008	–0.016	–0.020	–0.009	–0.005
	(–2.845)**	(–2.433)**	(–2.45)**	(–3.241)**	(–1.01)
GRG	0.004	0.005	0.006	0.005	0.006
	(4.737)**	(2.618)**	(2.578)**	(6.108)**	(4.953)**
LDENSPOP	0.309	1.192	1.387	0.644	0.823
	(1.937)*	(2.164)**	(4.301)**	(4.060)**	(3.57)**
Area fixed effect	Yes	Yes	Yes	Yes	Yes
df	30	32	32	62	62
χ^2	1531.20**	678.65**	678.65**	2352.715**	1162.26**
Time effect	Yes	Yes	No	Yes	Yes
df	27	25		27	9
χ^2	87.469**	14.135		44.871**	22.423**
Observations	546	292	292	837	318
Adjusted R^2	0.957	0.914	0.919	0.949	0.972

NOTE: *t* statistics are in parentheses. Model 5 uses the three-year average sample.
*Significant at 10 percent. **Significant at 5 percent.

for EFD is the absence of GRG in the regressions. Although a direct causality might be expected from grants onto expenditures, this relationship is not theoretically clear when it comes to revenues. It is certainly worth noting from Table 3 that both the magnitude and the sign of the estimated coefficients are reasonably stable in the three sets of estimations. Interestingly, LURBAN appears to be significant for the low-income countries only, which confirms the result achieved when using the expenditure definition of FD in Table 2. Although LTRADE has the anticipated sign in all the parsimonious estimations for each sample (models 2, 4, and 8), it only becomes significant when the whole sample is used (model 8). Note that the *t* ratios are higher for low-income countries.

The second stage of the regression analysis is shown in Table 4.[4] Two basic points can be made. The first is that none of the diversity indexes appears to explain EFD or RFD, although it should be noted that many of the countries in the regressions reported in Tables 2 and 3 do not have information on these diversity indexes, so the sample becomes considerably smaller. The second point is that, as expected, federal and democratic countries appear to be more decentralized.

A relevant question is the extent to which decentralization can be autonomously induced by the political authority. One interpretation of these results argues that the government may spur decentralization indirectly through the impact of public policies on income per capita, urbanization, military expenditures, and population density. Moreover, as long as the political authority can determine the amount of grants being given to subnational governments, the regression analysis suggests that this is a direct channel to decentralize. Alternatively, it can be assumed that all of the variables considered in the regressions are exogenous to the government in office. If this were the case, the natural evolution of these variables over time would change the preferences of the median voter, forcing the government to decentralize. In this context, decentralization can be seen as an endogenous process that responds to political demands. Nevertheless, results in Table 4 show that only between 7 percent and 27 percent of the residuals obtained in stage 1 are explained by the econometric analysis. A natural next step would therefore be to examine the pattern of residuals and

TABLE 3: Panel Data: General Government Revenue Fiscal Decentralization

	High-Income Countries			*Low-Income Countries*			*Whole Sample*			
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*	*Model 10*
Constant	–2.471		–0.651	4.713		5.025	3.062		5.694	
	(–1.354)		(–0.429)	(3.152)**		(3.260)	(3.792)**		(7.323)**	
LGDPCAP	0.310	0.216	0.100	0.366	0.423	0.017	0.344	0.359	0.039	0.221
	(2.584)**	(2.586)**	(0.99)	(3.548)**	(4.159)**	(0.157)	(4.925)**	(5.617)**	(0.591)	(3.095)**
LURBAN	–0.061	–0.399	0.458	–0.840	–0.871	–1.772	–0.922	–0.997	–1.183	–1.21
	(–0.191)	(–1.185)	(1.706)*	(–2.974)**	(–3.285)**	(–6.207)**	(–5.582)**	(–5.973)**	(–7.239)**	(–4.839)**
LTRADE	0.078	–0.063	0.031	–0.077	–0.065	–0.015	–0.070	–0.073	0.022	–0.07
	(0.945)	(–0.803)	(0.456)	(–1.341)	(–1.270)	(–0.258)	(–1.713)*	(–1.750)*	(0.595)	(–1.111)
LDENSPOP	0.594	0.418	0.300	–0.429	0.016	1.077	0.154	0.253	0.469	0.398
	(3.039)**	(2.517)**	(1.82)*	(–1.062)	(0.059)	(2.653)**	(1.003)	(1.69)*	(3.190)**	(1.862)*
GRG			–0.017			–0.008			–0.011	
			(–19.361)**			(–5.464)**			(–14.429)**	
Area fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
df	31	31	30	31	31	31	63	63	62	63
χ^2	1398.32**	1398.32**	1577.76**	848.84**	848.84**	868.43**	2630.37**	2630.37**	2522.01**	1027.72**
Time effect	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	No
df	27		27	25		25	27		27	
χ^2	34.75		50.12**	21.026		24.38	23.22		25.56	
Observations	595	595	538	362	362	323	957	957	861	354
Adjusted R^2	0.949	0.949	0.970	0.923	0.925	0.940	0.943	0.943	0.958	0.944

NOTE: Model 10 uses the three-year average sample.
*Significant at 10 percent. **Significant at 5 percent.

TABLE 4: Cross Section: General Government

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*	*Model 10*
Constant	0.175 (0.276)	0.08 (0.24)	–0.861 (–1.164)	–0.271 (–1.470)	–0.282 (–1.558)	2.640 (5.385)**	2.669 (10.58)**	2.814 (6.16)**	2.789 (17.920)**	2.778 (18.123)**
GINI	–0.003 (–0.187)					0.002 (0.205)				
ETHNIC	–0.001 (–1.467)	–0.011 (–1.46)				–0.002 (–0.436)	–0.002 (–0.387)			
HI			0.001 (0.885)							
CSTAT	0.884 (2.011)**	0.956 (2.186)**	0.839 (2.122)**	0.803 (2.160)**	0.854 (2.33)**	0.765 (2.984)**	0.803 (2.717)**	0.645 (2.317)**	0.728 (2.592)**	0.766 (2.894)**
PSTAT	–1.713 (–5.378)**	–1.295 (–2.169)**	–0.825 (–1.067)	–1.017 (–1.381)	–1.630 (–3.14)**	–2.079 (–6.18)**	–0.96 (–1.809)*	–0.618 (–0.973)	–0.613 (–1.102)	–1.070 (–2.717)**
Observations	37	46	61	63	64	37	46	62	64	63
Adjusted R^2	0.118	0.172	0.10	0.10	0.20	0.268	0.17	0.07	0.10	0.20
Br-Pagan	8.142(4)	0.835(3)	3.612(3)	7.376(2)	0.383(2)	1.822(4)	1.180(4)	8.456(3)	6.398(2)	0.109(2)

NOTE: *t* ratios are in parentheses. Degrees of freedom are in parentheses for the Br-Pagan test.
*Significant at 10 percent. **Significant at 5 percent.

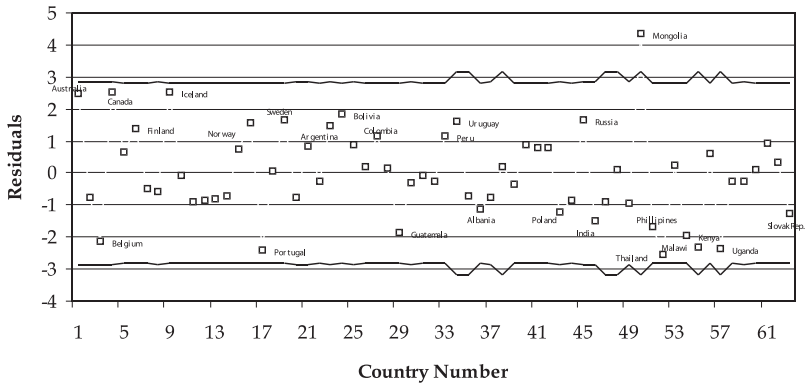

Figure 1: Pattern of Residuals for Model 4 in Table 4

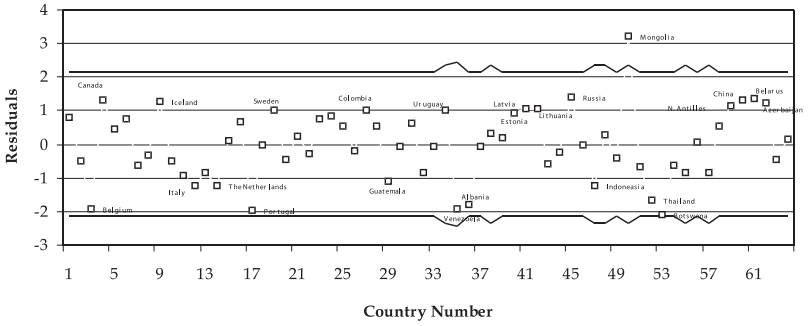

Figure 2: Pattern of Residuals for Model 9 in Table 4

the share of their variation left unexplained by the regressions. The next section performs this analysis.

Residuals, Outliers, and Clusters

Figures 1 and 2 present the pattern of residuals for models 4 (EFD) and 9 (RFD) in Table 4, respectively. Only the case of Mongolia clearly stands as a positive outlier. The particular aspect in which Mongolia differs significantly from the other countries is its extremely low pop-

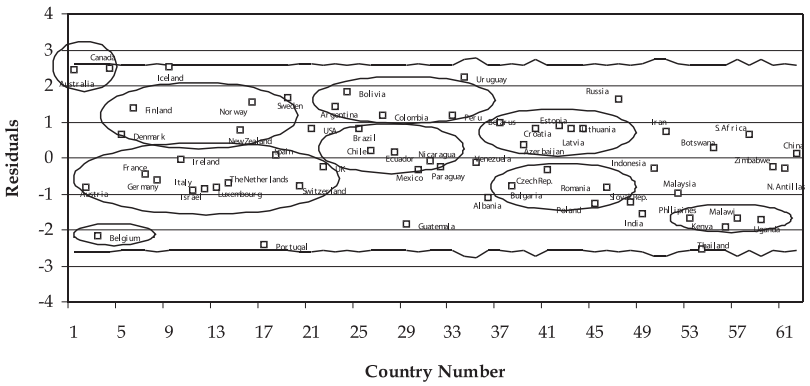

Figure 3: Pattern of Residuals for Model 5 in Table 4

ulation density. Moreover, despite being a low-income country, Mongolia ranks above average in both measures of FD. This combination of factors makes the predicted value of both measures of FD (EFD and RFD) substantially lower than the real ones.

To control for the case of Mongolia, and also because models 4 and 9 exhibit signs of heteroskedasticity (as indicated by significant Br-Pagan tests), new estimations were performed excluding Mongolia from the sample. They are presented as models 5 and 10 in Table 4. These results clearly improve the adjustment and eliminate the heteroskedasticity. As a result, the statistical significance of the country's political status becomes apparent. The plots of residuals of these two regressions are shown in Figures 3 and 4. Although no outliers are observed beyond the 95 percent confidence intervals, clusters of observations can be said to belong to five broader categories. One is represented by Australia and Canada. The second is formed by various European countries, among which Belgium stands as a centralized case, while Scandinavian nations are in the opposite extreme. The third group is represented by the former communist countries, among which Russia itself ranks as relatively decentralized in the sample. The last two clusters are Latin American and African countries. Only the cases of Venezuela and Paraguay are worth mentioning as extreme cases of centralization.

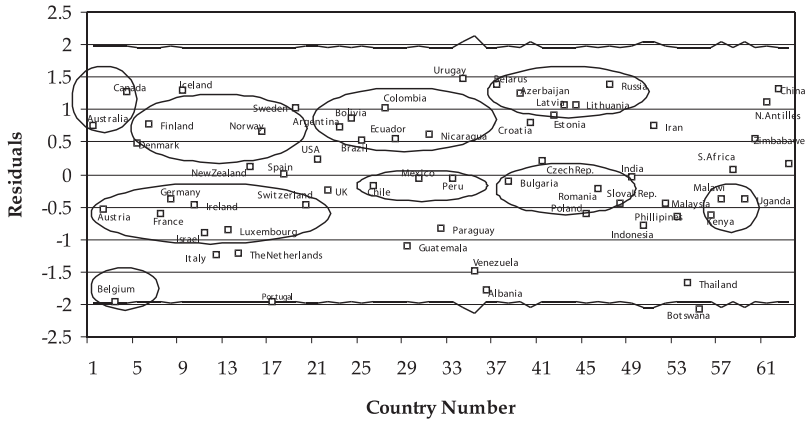

Figure 4: Pattern of Residuals for Model 10 in Table 4

The pattern of residuals described above suggests that some idiosyncratic factors of the countries in the sample are not being captured through the regression analysis. One feasible explanation is that, despite Mongolia being removed from the sample on account of its low population density, it continues to be true that residuals closer to the upper bound in Figures 3 and 4 generally correspond to countries with low population density. This is the case of Canada, Iceland, Australia, Russia, and, to a lesser extent, Uruguay. Since the regression analysis only distinguishes federal from nonfederal countries, there is still the chance that low population density could be positively related to a constitutional structure that favors decentralization.

Another unobserved factor in the regressions is the dynamics of decentralization over time. Very few authors have addressed this issue, and most of the evidence available refers to specific countries for which there are some historical records on FD (Pommerehne 1977; Marlow 1988; Wallis and Oates 1988). If this factor is indeed important, it follows that countries with similar characteristics are going through a similar stage in their process of decentralization.

It might also be argued that "history" matters (Letelier 2002; Panizza 1999); that is, regardless of the above-mentioned dynamics, some specific historical episodes could be of much help in explaining

decentralization. Once again, Figures 3 and 4 give some evidence in favor of this hypothesis by showing countries with similar historical backgrounds grouped together. Interestingly, this finding supports the view that, regardless of the use of grants as a government tool to spur decentralization, the political will to intervene in the institutional design might significantly affect the degree of decentralization. As long as the government in office sets the agenda on the institutional design, it has some leeway to move from a very centralized unitary country to a very decentralized federal country.

Functional Definition of FD

Two features of specific public goods might explain differences in empirical results with respect to those achieved with the general government definition of FD. One is the degree to which decentralization might cause local benefits from public services to spill over into other jurisdictions, leading to a suboptimal provision of local public goods. The other is the cost-saving potential from economies of scale in the provision of some public goods (Oates 1985). If we conceive of "centralization" as a cost to the median voter (Panizza 1999), it can be argued that this cost will be lower the more significant are the spillovers and the economies of scales involved in the provision of particular public goods.

The empirical analysis for the cases of education, housing, and health is reported in Table 5.[5] It should be noted that income relates positively to EDU and HOUS but negatively to HEL. This is consistent with the hypothesis that centrally provided public health services avoid the aforementioned spillovers and favor a better coordination of national policies.[6] As long as the national median voter weighs that benefit sufficiently, the negative effect of income on FD predominates.

Another result worth mentioning is the estimated effect of urbanization on housing FD. As opposed to HEL and EDU, this has a positive effect on HOU. However, it makes sense that urbanization itself might be positively related to the share of subnational government expenditures in housing. Indeed, it could be expected that, as urban infrastructure becomes more developed, housing-related problems

TABLE 5: Panel Data: Expenditure Fiscal Decentralization by Function

	EDU1	*EDU2*	*HEL1*	*HEL2*	*HOUS1*	*HOUS2*
Constant	7.540 (4.892)**		7.322 (3.523)**		9.000 (3.550)**	
LGDPCAP	0.304 (2.277)**	0.249 (3.018)**	–0.578 (–3.138)**	–0.520 (–2.772)**	–0.066 (–0.298)	0.336 (2.209)**
LURBAN	–1.593 (–5.912)**	–1.520 (–4.089)**	–0.931 (–2.571)**	–0.93 (–2.217)**	1.295 (2.928)**	1.329 (2.597)**
GRG	0.005 (3.019)**	0.005 (1.656)*	0.011 (3.906)**	0.008 (3.643)**	0.0001 (–0.067)	
LDENSPOP	–0.030 (–0.107)		1.127 (2.982)**	1.055 (2.974)**	–2.495 (–5.462)**	–1.765 (–4.529)**
Area fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
df	41	41	41	41	40	41
χ^2	1239.92**	1232.44**	1311.06**	1311.06**	663.239**	804.32**
Time effect	Yes	No	Yes	No	Yes	No
df	24		24		24	
χ^2	20.363		24.41		30.60	
Observations	407	408	385	385	400	486
Adjusted R^2	0.956	0.956	0.964	0.965	0.849	0.864

NOTE: *t* statistics are in parentheses.
*Significant at 10 percent. **Significant at 5 percent.

will demand more attention at the local level. A similar phenomenon is likely to occur with LDENSPOP, which appears to have the opposite sign relative to EDU and HEL.

As far as grants are concerned, they have a significant impact on EDU and HEL but not on HOUS. This is consistent with the fact that, very often, subnational governments perform as agents of the central government in the areas of education and health, funding these functions through categorical or even block grants. Concerning housing, although subnational governments may have some advantages in running local housing programs, which explains the positive effect of income, their funding is certainly subject to important positive spillovers to nonresidents. Although country-based information is not available, the regression analysis supports the hypothesis that central government housing programs are not channeled through grants given to subnational governments.

5. CONCLUDING REMARKS

In general, the results achieved with the general government definition of fiscal decentralization confirm some previous findings. In particular, positive effects using a broad definition of FD are found for the cases of income, population density, and government grants. As opposed to previous studies, urbanization has a negative effect. Constitutional federations and democratic governments exhibit a higher degree of FD. Neither population diversity nor income distribution has a significant impact.

Interesting differences arise when closer examination is made of the two generic definitions of FD (EFD and RFD) and the estimation of the model for two separate samples (high- and low-income countries). First, the effect of income is stronger for high-income countries, which suggests the existence of a threshold above which a higher income leads to more FD. Another difference concerns urbanization, which is significant for low-income countries only. When it comes to the revenue definition of FD (RFD), population density is only significant in high-income countries.

Examination of the residuals from the regressions allows some clusters of homogeneous countries to be identified. Three hypotheses

are put forward to explain these residuals. One is that unobserved political characteristics of the countries in the sample might be significant. The second is that the regression analysis does not consider the dynamics of FD over time and thus misses an important explanatory factor. Third, it could be hypothesized that history matters in explaining FD, which explains why residuals from countries with similar historical backgrounds tend to cluster together.

Finally, as opposed to the general government definition of FD, specific public goods can be said to differ in two aspects. One is the potential for spillover effects between jurisdictions arising from different types of public goods. The second is the cost-saving effect from economies of scale. Opposite results relative to what was found for RFD and EFD are observed. For example, income appears to have a negative effect on health and housing decentralization. However, population density diminishes and urbanization increases housing decentralization. Furthermore, this last definition of FD appears to be nonsensitive to grants.

APPENDIX
Definitions and Sources of Variables

- *Expenditure fiscal decentralization (*EFD*)*. Share of the general government's expenditure being spent by state/provincial governments and/or local governments. Source: International Monetary Fund, Government Financial Statistics, various issues.

$$\text{EFD} = \frac{\begin{array}{l}\textit{State / Provincial Government Expenditures} + \\ \textit{Local Government Expenditures}\end{array}}{\begin{array}{l}\textit{Consolidated Central Government Expenditures} + \\ \textit{State / Provincial Government Expenditures} + \\ \textit{Local Government Expenditures} - \\ \textit{Grants to Local Governments} - \\ \textit{Grants to State / Provincial Governments}\end{array}}.$$

- *Revenue fiscal decentralization (*RFD*)*. Share of the general government's revenues received by state/provincial governments and/or local governments. Source: International Monetary Fund, Government Financial Statistics, various issues.

$$\text{RFD} = \frac{\begin{array}{l}\textit{State / Provincial Government Revenues (Net of Grants)} + \\ \textit{Local Government Expenditures (Net of Grants)}\end{array}}{\begin{array}{l}\textit{Consolidated Central Government Revenues} + \\ \textit{State / Provincial Government Revenues (Net of Grants)} + \\ \textit{Local Government Revenues (Net of Grants)}\end{array}}.$$

- *Fiscal decentralization in education (*EDU*)*. Share of the general government's expenditure on education being made by state/provincial governments and/or local governments. Source: International Monetary Fund, Government Financial Statistics, various issues.

$$\text{EDU} = \frac{\begin{array}{l}\textit{State / Provincial Government Expenditure on Education} + \\ \textit{Local Government Expenditure on Education}\end{array}}{\begin{array}{l}\textit{Consolidated Central Government Expenditure on Education} + \\ \textit{State / Provincial Government Expenditure on Education} + \\ \textit{Local Government Expenditure on Education}\end{array}}.$$

- *Fiscal decentralization in health (*HEL*)*. Share of the general government's expenditure on health being made by state/provincial and/or local governments. Source: International Monetary Fund, Government Financial Statistics, various issues.

$$\text{HEL} = \frac{\begin{array}{l}\textit{State / Provincial Government Expenditure on Health} + \\ \textit{Local Government Expenditure on Health}\end{array}}{\begin{array}{l}\textit{Consolidated Central Government Expenditure on Health} + \\ \textit{State / Provincial Government Expenditure on Health} + \\ \textit{Local Government Expenditure on Health}\end{array}}.$$

- *Fiscal decentralization in housing (*HOUS*)*. Share of the general government's expenditure on housing being made by state/provincial and/or local governments. Source: International Monetary Fund, Government Financial Statistics, various issues.

$$\text{HOUS} = \frac{\begin{array}{l}\textit{State / Provincial Government Expenditure on Housing} + \\ \textit{Local Government Expenditure on Housing}\end{array}}{\begin{array}{l}\textit{Consolidated Central Government Expenditure on Housing} + \\ \textit{State / Provincial Government Expenditure on Housing} + \\ \textit{Local Government Expenditure on Housing}\end{array}}.$$

- Gross domestic product per capita (GDPCAP) is measured in real terms (constant 1995 U.S. dollars). Source: *World Development Indicators* (World Bank 1999).

- Military expenditures (MILGOV) are proxied as the share of military expenditures on the central government's total expenditures. Source: International Monetary Fund, Government Financial Statistics, various issues.

$$\text{MILGOV} = \frac{\textit{Military Expenditures}}{\textit{Consolidated Central Government Expenditures}}.$$

- Trade orientation (TRADE) is represented by the sum of exports and imports on the GDP. Source: *World Development Indicators* (World Bank 1999).
- DENSPOP is population density, measured by the number of inhabitants per square kilometer. Source: *World Development Indicators* (World Bank 1999).
- URBAN is the proportion of the total population living in urban areas. Source: *World Development Indicators* (World Bank 1999).
- GINI is the Gini coefficient for a restricted sample of fifty countries. Source: *World Development Indicators* (World Bank 1999).
- HI is the Herfindahl index applied to ethnic diversity, only available for sixty-two countries. It is estimated for each country by using the information on ethnic diversity from the U.S. Central Intelligence Agency (1997), according to the following formula:

$$\text{HI}_m = \sum_{i=1}^{n} \alpha_i^2,$$

where n is the number of recorded ethnic categories for country m, and α_i is the share of ethnic group i.

- ETHLING represents the probability that two randomly selected people from a country will not belong to the same ethnic or linguistic group (only available for forty-six countries). These data are based on Mauro (1995), Easterly and Levine (1996), and Taylor and Hudson (1972), as cited in Sachs and Warner (1997).
- GRG is the share of grants in the total revenues (grants and own sources) of local and state governments. Source: International Monetary Fund, Government Financial Statistics, various issues.

NOTES

1. Although Von Hayek (1945) does not explicitly refer to fiscal decentralization (FD), his concern about decentralization as a positive attribute of a freely working market is entirely applicable in the case under analysis.

2. This responds to the need to include in the sample those countries that report MILGOV or GRG equal to 0.

3. The Hausman test consists of running the following regressions:

$$FD_{ti} = \alpha + \beta_{11}LGDPCAP_{ti} + \beta_{12}LURBAN_{ti} + \beta_{13}MILGOV_{ti}$$
$$+ \beta_{14}GRANTS_{ti} + \beta_{15}LDENSPOP_{ti} + \gamma \hat{GRANTS}_{ti} + \eta_{ti},$$

where η_{ti} is a Gaussian error, and $\hat{GRANTS}$ are the fitted values from regressing on all the exogenous variables. Using the F test, the hypothesis $\gamma = 0$ is tested. In this case, the hypothesis is not rejected (F value close to zero), which allows the use of GRANTS as exogenous.

4. Regressions in Table 4 are estimated by using the estimated fixed effects of the whole sample, or model 4 in Table 2 and model 8 in Table 3.

5. Since fewer countries are represented in this case, only the results for the full sample are presented. For the same reason, the second stage in the estimation procedure is not reported for the functional areas of expenditures.

6. This important negative effect of FD was originally put forward by Oates (1972) in the context of the "redistribution function of government." An excellent formalization of this problem in the case of tax collection can be found in Gordon (1983).

REFERENCES

Bahl, Roy W. 1999. *Implementation rules for fiscal decentralization*. Atlanta: Andrew Young School of Policy Studies, Georgia State University. Accessed from www.worldbank.org/decentralization

Bahl, Roy W., and S. Nath. 1986. Public expenditure decentralization in developing countries. *Environmental and Planning C: Government and Policy* 4 (4): 405-18.

Baumol, William J. 1967. Macroeconomics of unbalanced growth: The anatomy of urban crisis. *American Economic Review* 57 (2): 415-26.

Buchanan, James. 1950. An economic theory of clubs. *Economica* 32 (125): 1-14.

Davoodi, Hamid, and Heng-fu Zou. 1998. Fiscal decentralization and economic growth: A cross-country study. *Journal of Urban Economics* 43 (2): 244-57.

Ebel, Robert D., and Serdar Yilmaz. 2003. On the measurement and impact of fiscal decentralization. In *Public finance in developing countries: Essays in the honor of Richard M. Bird*, edited by James Alm and Jorge Martinez-Vazquez, 101-20. Northhampton, MA: Elgar.

For 80 cents more. 2002. *The Economist*, August 17, 20-2.

Gordon, Robert. 1983. An optimal taxation approach to fiscal federalism. *Quarterly Journal of Economics* 95 (4): 567-86.

Huther, J., and Anwar Shah. 1998. Applying a simple measure of good governance in the debate on fiscal decentralization. Working Paper No. 1894, World Bank, Washington, DC.

Kee, W. 1977. Fiscal decentralization and economic development. *Public Finance Quarterly* 5 (1): 79-97.

Letelier, S. L. 2001. Effect of fiscal decentralisation on the efficiency of the public sector: The cases of education and health. Paper presented at the IIPF Conference on Public Finance, August, Linz, Austria.

———. 2002. Four essays on fiscal decentralization. Ph.D. diss., University of Sussex.

———. 2004. Fiscal decentralization as a mechanism to modernize the state. *Journal of Institutional Comparisons* 2 (1): 15-20.

Litvack, Jennifer, and Wallace Oates. 1971. Group size and the output of public goods: Theory and application to state-local finance in the United States. *Public Finance* 25 (2): 42-58.

Marlow, M. 1988. Fiscal decentralization and government size. *Public Choice* 56 (3): 259-69.

Miyazaki, T., T. Zhang, and Heng-fu Zou. 1998. Fiscal decentralization, public spending, and economic growth in China. *Journal of Public Economics* 67 (2): 221-40.

Oates, Wallace. 1972. *Fiscal federalism*. New York: Harcourt Brace.

———. 1985. Searching for Leviathan: An empirical study. *American Economic Review* 75 (4): 748-57.

Panizza, U. 1999. On the determinants of fiscal centralization: Theory and evidence. *Journal of Public Economics* 74 (1): 97-139.

Patsouratis, V. 1990. Fiscal decentralization in the EEC countries. *Public Finance* 45 (3): 423-39.

Pommerehne, Werner. 1977. Quantitative aspects of federalism: A study of six countries. In *The political economy of fiscal federalism*, edited by Wallace Oates, 275-355. Lexington, MA: D. C. Heath.

Pryor, F. 1967. Elements of a positive theory of public expenditures. *Finanzarchiv* 26 (3): 405-30.

Reilly, B., and R. Witt. 1996. Crime, deterrence and unemployment in England and Wales: An empirical analysis. *Bulletin of Economic Research* 48 (2): 137-59.

Rose-Ackerman, Susan. 1980. Risk taking and reelection: Does federalism promote innovation? *Journal of Legal Studies* 9 (3): 593-616.

Sachs, J., and A. Warner. 1997. Fundamental sources of long-run growth. *American Economic Review* 87 (2): 184-88.

Seabright, P. 1995. Accountability and decentralisation in government: An incomplete contracts model. *European Economic Review* 40 (1): 61-89.

Tiebout, Charles M. 1956. A pure theory of local expenditures. *Journal of Political Economy* 64 (5): 416-24.

Tirole, Jean. 1994. The internal organization of government. *Oxford Economic Papers* 46 (1): 1-29.

United Nations. 1997. *United Nations statistical yearbook*. New York: United Nations.

U.S. Central Intelligence Agency. 1997. *The world factbook*. Washington, DC: U.S. Central Intelligence Agency.

Von Hayek, F. 1945. The use of knowledge in society. *American Economic Review* 35 (4): 519-30.

Wallis, J., and Wallace Oates. 1988. Decentralization in the public sector: An empirical study of state and local government. In *Fiscal federalism: Quantitative studies*, edited by Harvey S. Rosen. Chicago: University of Chicago Press.

Wasylenko, Michael. 1987. Fiscal decentralization and economic development. *Public Budgeting and Finance* 7 (4): 57-71.

Wheare, K. C. 1964. *Federal government*. 4th ed. Oxford, UK: Oxford University Press.

Woller, G., and K. Phillips. 1998. Fiscal decentralisation and the LDCs economic growth: An empirical investigation. *Journal of Development Studies* 34 (4): 139-48.

World Bank. 1999. *World development indicators*. Washington, DC: World Bank.

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