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What Drives Fiscal Decentralisation?

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What Drives Fiscal Decentralisation?

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Abstract

This paper investigates the determinants of fiscal decentralisation, focusing in particular on the impact of the level of income on the level of fiscal decentralisation. Various measures of fiscal decentralisation, several of them novel in this context, are employed in a cross-country econometric model to test established and more recent hypotheses. Paying careful attention to variable measurement, model specification and sample coverage, the results suggest that there are significant relationships between a range of factors, including income, geographical size, population density, population diversity, military expenditure, the structure of the public sector and openness to trade, and fiscal decentralisation. However, these relationships may be more complicated than previously reported. For the entire sample and for the OECD subsample a positive relationship between income and decentralisation is found, which corroborates the results found in earlier studies. However, for the middle and lower income nations, higher income is found to be associated with less decentralisation.

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1. Introduction

What factors help determine the level of fiscal decentralisation (FD) – defined here as the amount of independent decision-making power involved in subnational provision of public services, expenditure and revenue decisions – in an economy?[1] In particular, does a country's level of income or economic development play a role in determining its level of FD? Attaining answers to these questions is important for several reasons. In the past decade FD has featured in policy agendas of many Organisation of Economic Co-operation and Development (OECD) countries and some countries in Eastern Europe, South America and Asia are currently involved in a process of democratisation and decentralisation. Recent empirical research has found a link between FD and growth in the capital stock and the level of human capital and a medium degree of FD has been found to be positively associated with economic growth (Thiessen 2003; Bodman and Ford, 2006; Campbell, 2008; Bodman *et al.* 2009). Moreover, debate continues over whether complex webs of intergovernmental relations act as a drag on productivity, infrastructure and public sector services.

While there is a large and growing literature on the factors that explain the extent of FD much is still not confidently known about what causes FD to be higher in one place than another.[2] In this paper we contribute to this body of literature by re-examining reported determinants of FD and test new hypotheses concerning additional potential determinants. While we principally investigate the relationship between FD and the level of national income, a number of other factors are also examined, ranging from geographical size and population density to the level of national defence spending. A major obstacle facing many researchers in this literature is how to accurately measure

[1] The term 'subnational' collectively refers to levels of government below the national government, both lower level governments (municipalities, communes or local councils) and intermediate tiers (regions, states, provinces, counties, territories or districts). The extent of fiscal decentralisation therefore depends on the ability of lower levels of government to make independent revenue and expenditure decisions regarding the provision of public goods and services within a geographic domain, without interference by the central government (Martinez-Vazquez & McNab, 1997: 2).

[2] See Letelier (2005) for a review of the existing literature

FD. In order to address this issue we employ a number of measures of FD in our study, including newly developed measures of FD.

In general, the estimation results support a priori theoretical expectations regarding the direction and significance of various potential economic determinants on the degree of FD. However, some empirical evidence is provided with respect to the relationship between FD and income that contrasts with existing results in the literature. In particular, a significant, positive relationship between FD and income is only found for the regression analyses performed for OECD countries alone, and for the complete sample of countries. When the sample contains only medium and low income countries, higher income is found to be associated with *less* decentralisation.

The paper is structured as follows. Section 2 sets out different potential determinants of the level of FD. Section 3 analyses measurements issues regarding FD, including both measures used in the literature and new data used in this paper, and regarding the determinants of FD. Section 4 presents the empirical findings and Section 5 reports the conclusions.

2. Fiscal Decentralisation and its Potential Causes

Of the potential determinants of FD, the one of greatest interest in this paper is the level of income. Several previous empirical studies have found that fiscal decentralisation is positively correlated with the level of per capita income. Examples include Oates (1972), Kee (1977), Pommerahne (1977), Bahl and Nath (1986), Wasylenko (1987), Patsouratis (1990), Panizza (1999), Eller (2004) and Letelier (2005) and Campbell (2003). Why might this be? Wheare (1964: 51) suggests that decentralisation is a desirable but expensive good that can only be afforded by affluent societies. Some authors, such as Tanzi (2000), assert that decentralisation is a superior good - with rising income, demand for variety and quality in the spectrum of public services being provided is

likely to increase. Economic development stimulates both the demand for local service delivery and increases the revenue raising capacity of governments, making decentralisation affordable.

Rising income may also automatically inflate the share of subnational expenditures for a given level of public services via a "cost-push'" effect. Since lower level government activities are usually related to labour-intensive functions, such as health, education and police, growth in productivity will be low for those that provide these services. As long as income per capita is accompanied by growth in labour productivity, these local government services will become relatively more expensive as income grows (Baumol, 1967: 418; Letelier, 2005: 158; Campbell 2003).

Letelier (2005: 157) notes one possible reason to expect a negative, rather than positive, effect of income on FD. As a country's income grows, more emphasis may be placed on income redistribution and social policies. Combined with growing demand for infrastructure such as interstate communication facilities and highways, this may increase pressure for funds to be redistributed to higher levels of government given the significant externalities arising from provision of such goods.[3]

Both Bahl and Linn (1992: 393) and Bahl and Nath (1986: 409) suggest that there exists a high threshold level of economic development at which countries begin to decentralise government as per capita income rises. However, many low income countries have lower levels of fiscal decentralisation for historical reasons. Conyers (1990) notes,

> *most less developed countries inherited relatively centralized systems of government from their colonial powers, and in the first years of independence there was often a tendency to maintain – if not strengthen – central*

[3] In federal countries this is often used as an argument to strengthen provincial or intermediate levels of government relative to local governments.

control and centralized systems of planning, in order to encourage a sense of national unity and reinforce the new government and its policies.

One difficulty in this area is the potential for bi-directional causalities between FD and economic growth. Further, there may exist unobservable and omitted variables that tend to affect both decentralisation and economic growth simultaneously. Bruess and Eller (2004), Eller (2004) and Iimi (2005) acknowledge this possibility but no cross-country study has attempted to test for such simultaneity or endogeneity.[4] If such simultaneity is statistically significant, including income as an explanatory variable of FD may yield biased results.

From these arguments, we derive the following hypothesis:

H1: fiscal decentralisation will be greater in countries with higher income levels

The demand for, and effectiveness of decentralisation, is likely to increase with the size of the population and the size of the country. Large, low density countries are likely to be more costly and logistically difficult to administer from the centre. Further, Pommerehne (1977: 298-299) suggests that larger geographic areas reduce the problem of spill-overs between local jurisdictions. Panizza's (1999: 104) model demonstrates that a larger territory or a lower population density leads to a higher ideological distance from the median voter, lowering the demand for centrally provided public goods. However, Prud'homme (1995: 205) argues that decentralisation is more warranted in a densely populated country, where secondary subnational units are still large. He asserts that for FD to be effective, the powers transferred from central to local governments should not jeopardise the efficiency of the central government, and local governments should have the critical mass required to use their powers effectively. With population growth, the rising costs of congestion at the local

[4] Iimi (2005) uses instrumental variable analysis to deal with the possible endogeneity of all the regressors in his growth equation, but does not explicitly test for the endogeneity of FD. Lin and Liu (2000) touch on the exogeneity test in their study of FD in China.

level may raise the subnational government's expenditures relative to the central government's spending (increasing FD if it is measured as the subnational expenditure share). This may increase the cost of local public goods per resident and cause a decline in demand for them. Letelier (2005: 158-159) suggests that as the demand for local public goods is generally price inelastic, the first effect will dominate.

Urbanisation may induce fiscal centralisation if the central government autonomously improves public urban facilities or if this improved urban infrastructure attracts the population from the non-urbanised part of the country. However, Letelier (2005: 160) suggests that as long as numerous relatively important cities coexist and develop in a balanced way, urbanisation will not necessarily involve more centralisation. Further, as the local governments of rural areas are faced with less diversified tax bases, increasing urbanisation may facilitate tax decentralisation (Theissen, 2000: 14). Decentralisation may allow greater local involvement in government, improving public services and reducing opposition to government. In turn, this could slow the rate of migration to big cities. Thus there may be a bi-directional relationship between urbanisation and FD.

From these arguments, we derive the following hypotheses.

H2: FD will be higher in geographically large countries.

H3: FD will be higher in countries with larger populations

H4: FD will be lower in countries with higher population growth

H4': FD will be higher in countries with higher population growth

H5: FD will be lower in countries with higher levels of population density

H5': FD will be higher in countries with higher levels of population density

H6: FD will be lower in countries with larger urban populations

H6': FD will be higher in countries with larger urban populations

H7: FD will be lower in countries with higher urban population growth

H7': FD will be higher in countries with higher urban population growth

The extent of diversity in demand between communities may also help determine the level of effective decentralisation. Panizza (1999) provides one of the only theoretical models of the determinants of FD, extending the framework developed by Alesina, Perotti and Spolaore (1996) to an economy with two levels of government. He hypothesises that a more heterogeneous population will increase the "ideological" distance from the median voter implying that voters are more likely to prefer a lower level of central government spending (Letelier, 2005:160; Panizza, 1999:100). Underlying causes of this diversity may be traced back to factors such as differences in language, ethnicity and income inequality.

The possibility of a relationship between ethnic fractionalisation and demand for central governance was explored by Oates (1972). Of course, ethnic fractionalisation is appropriate to test the effect of tastes on FD only if one assumes that the different ethnic groups are spatially separated. Support for this assumption comes from the empirical literature aimed at testing the Tiebout model (Panizza, 1999: 109). If there is considerable ethnic fractionalisation, fiscal decentralisation may be a means for integration. Ethnic and other minorities may demand FD in a bid to feel less excluded from political power (especially in the local or regional context). However, Tanzi (2000: 12) suggests that decentralisation may allow different regions of a country to view themselves as different, fuelling separatist forces – which may, over time, lead countries to centralise their institutions more thoroughly. Results presented in Campbell (2003) supports this view.

Countries with higher levels of military expenditure are generally less decentralised. Bahl and Linn (1992: 398) note that there is a propensity to give less discretionary powers to local governments in countries where there is a continuing threat of social upheaval. Peacock and Wiseman (1961: 118-119) illustrate that social disturbances provide an atmosphere in which people accept a larger government, yet local authorities do not share in this increased government spending. Therefore,

one may expect countries that are in a perpetual state of uncertainty about war or internal conflict (perhaps driven by high levels of ethnic fractionalisation, e.g. in what was Yugoslavia) would, ceteris paribus, tend to be more centralised.

Trade-oriented economies may have a tendency to be more fiscally centralised as they concentrate taxes in the hands of central government through the collection of import and export tariffs, and other related duties. Letelier (2005: 161) argues that this may more relevant for developing countries for whom a unique source of national resources often stands as the main source of foreign currency and tax revenues.

From these arguments, we derive the following hypotheses.

H8: FD will be higher in countries that are more ethnically divided

H9: FD will be higher in countries with more income inequality[5]

H10: FD will be lower in countries with higher levels of military expenditure

H11: FD will be lower in trade-oriented countries

Significant intergovernmental transfers are also likely to affect the autonomy of local governments. At the most direct level, grants may simply be a substitute for locally raised revenues. Prud'homme (1995: 214) asserts that although many public expenditures are easy to decentralise, few taxes lend themselves to decentralisation. From the perspective of securing a 'good' tax system that provides equity, little distortions, low administrative costs and income elastic revenues, property taxes and local user fees are usually considered appropriate local taxes. However, as Oates (1993: 242) points out, developing countries often do not have the administrative capacity to implement such taxes. Subnational governments are therefore unlikely to have enough own revenues to finance their expenditures, so transfers from the central government will be necessary. As grants provide

[5] Of course the direction of causality may be uncertain in this case since greater centralization may in fact facilitate transfers that reduce inequality.

some indication of the extent to which lower tiers of government can spend beyond their own revenues, they may also be a significant determinant of subnational expenditures.

This paper also considers a number of public sector decentralisation measures that have been omitted from previous studies of FD and growth. Bahl (1999: 6) suggests that the extent of fiscal decentralisation may be described by such factors. According to Oates (1972: 196), studies of fiscal decentralisation should seek "… a measure of the amount of independent decision-making power in the provision of public services at different levels of government. A perfect measure of this ... would no doubt have a number of dimensions, only some of which would involve fiscal variables".

In particular, this paper considers the number of subnational jurisdictions in intermediate and lower tiers of government as a determinant of FD. Two countries may have the same subnational share of expenditures or revenues but different numbers of participating subnational governments. More participating units, ceteris paribus, would imply more fiscal decentralisation.[6] Thus, this variable is also included in the growth regressions. An indicator was included to account for electoral decentralisation, taking the value of 0 if there are no subnational elections, 1 if either local or intermediate tiers of government are elected, or 2 if both are subject to elections.[7] The number of elected subnational tiers provides some indication of the ability of consumers to express their preferences to each level of government and the incentives for governments to respond to those preferences. Information on these two indicators is available in the World Bank's *World Development Report* (1999/2000). A similar idea, the impact of political and economic integration between nations on fiscal decentralisation within each nation, is investigated in Stegarescu (2009), but not pursued further in this paper.

[6] This was pointed out by Bahl and Nath (1986: 407) but has not been considered in an empirical study of FD and growth.

[7] France, Germany, Ireland, Italy, New Zealand, Poland and the United States were given a value of 3 as they have three elected subnational tiers.

We also account for resource decentralisation by considering the ratio of subnational government employees to central government employees, using data provided by Schiavo-Campo *et al.* (1997) for 71 countries. A dummy for federal countries was also included.[8] In federal countries, subnational governments are likely to have a more permanent right to govern their own affairs. For the OECD countries, an indicator of constitutional structure was taken from Lijphart (1999), provided in Armingeon, Leimgruber, Beyeler and Menegale's (2002) dataset.[9] This is an index of federalism on a five-point scale; (1) unitary and centralised, (2) unitary but decentralised, (3) semi-federal, (4) federal but centralised, (5) federal and decentralised. These four general aspects of public sector decentralisation provide some indication of the extent to which subnational governments are "closer to the people" and are therefore better able to account for local preferences in fiscal decision-making.

From these arguments, we derive the following hypotheses.

H12: FD will be higher in countries with significant intergovernmental transfers

H13: FD will be higher in countries with a decentralised public sector

3. Measuring Fiscal Decentralisation, Data and Empirical Methodology

3.1 Measures of Fiscal Decentralisation Used in Previous Analysis

There is no single, simple measure of fiscal decentralisation. Fiscal decentralisation is "so multidimensional that specification of a formal hypothesis for statistical testing requires stepping down from a view of the general picture, to a level which provides only a narrow slice of the panorama" (Guess, Loehr, & Martinez-Vazquez, 1997: 1). With that in mind, the primary means of

[8] Studies of FD and economic growth have not considered a federalism dummy, although of Yilmaz (1999) implements separate regressions for federal and unitary countries.
[9] The indicator is provided for 23 OECD countries. It was included in Eller's (2004) study of the determinants of FD but not in any analysis of FD and growth.

measuring FD is the budget data approach. Most studies use the subnational share of general government expenditures or revenues as a proxy for decentralisation.[10] Oates (1995) and Theissen (2000; 2003) also consider self-reliance ratios, the share of subnational government's own revenues in their total revenues.[11] Woller and Phillips (1998) use the share of subnational government revenues, less grants, in total government revenue and construct an expenditure share subtracting defence and social security spending. They argue that these provide a better of indication of the revenues and expenditures that could 'in principle' be the responsibility of either level of government.

Analyses of individual countries are able to use more sophisticated budget measures due to greater data availability. Zhang and Zou's (1998; 2001) studies of FD in China and India differentiate between different spending categories at the central and provincial level, and between budgetary and extra-budgetary spending. Lin and Liu (2000) and Desai, Freinkman and Golberg (2003) measure FD as the marginal revenue retention rate for China, and the tax revenue retention rate for Russia, respectively.

All previous cross-country studies of FD and growth have used budget data measurements based on the *Government Financial Statistics* (GFS) of the International Monetary Fund (IMF). The World Bank's *Fiscal Decentralization Indicators* (2001) has used this data to provide statistics on subnational expenditures and revenues as a share of total expenditures, subnational expenditures and revenues as a percentage of GDP, subnational tax revenue as a share of total subnational revenues, and grants and transfers from other levels of government as a share of total subnational revenues and grants. It then distinguishes between 14 expenditure categories (each expressed as a share of total subnational

[10] See, for example, Oates (1995), Davoodi and Zou (1998), Woller and Phillips (1998), Xie, Zou and Davoodi (1998), Theissen (2000; 2001), Eller (2004) and Iimi (2005).

[11] Data for the construction of self-reliance ratios is difficult to obtain. Nevertheless, the new indicators used in this study provide a more detailed alternative.

government expenditures). The GFS data has been collected since 1972 and covers 107 countries, although there are significant gaps in the time-series for most countries.

Three main deficiencies of the GFS are identified in the literature.[12] Firstly, the GFS provides a breakdown of revenues and expenditures by type and function but does not allow one to determine the degree of local revenue or expenditure autonomy. Expenditure and revenue figures are reported at the level of government which receives or operates them, irrespective of whether it has discretion over them. Thus, local expenditures that are mandated by the central government, or are spent on behalf of central government, appear as subnational expenditure. Secondly, it does not identify the sources of tax and non-tax revenues, and no distinction is made between locally determined own taxes, piggybacked or shared taxes. Thirdly, it does not disclose what proportion of intergovernmental transfers is conditional, as opposed to general purpose, and whether transfers are distributed according to an objective or discretionary measure. Therefore, although GFS data has consistent definitions across countries over time, it ignores the degree of central government control over local tax rates and tax bases. These measurement errors mean that the degree of fiscal decentralisation tends to be overestimated.

More general criticisms of the budget data measurements include the fact that they do not reflect restraints on local fiscal autonomy arising from legislation, regulation, norms, minimum quality standards, fiscal rules, and other qualitative restrictions imposed by the central government. Subnational governments that have autonomy to decide the amount and type of tax to collect, and to determine the allocation of their expenditure, are more decentralised than those whose spending and revenue is determined by national legislation – even if the formal assignment of functions or revenues are the same. Wasylenko (1987: 61) points out that fungibility of money at local level may increase local government discretion.

[12] See, for example, Ebel and Yilmaz (2002) and Stegarescu (2004).

Changes in budget data measures over time do not necessarily reflect changes in subnational government autonomy. Stegarescu (2004: 20) claims that tax bases of national and subnational governments typically have different elasticities. Therefore, business cycles cause automatic fluctuations in the revenue indicators, even though the assignment of competencies remains unchanged. Therefore, empirical studies that analyse the relationship between economic growth and the change in FD, measured by the annual change in the subnational revenue share, may suffer from substantial measurement error.[13]

Another problem with existing measures of FD is that they aggregate all subnational governments into a single group. This horizontal aggregation does not take into account the number of participating subnational governments and the differences in competencies between them. Existing budget measurements do not distinguish between regional and local governments. A country with a few large regional governments is not treated differently to one with smaller, city-wide governments, although it is arguable that the latter is more decentralised. Bahl and Linn (1992: 391) point out that the data does not indicate whether subnational revenues and expenditures are concentrated in one or two jurisdictions or are evenly distributed across all areas. The degree of fiscal autonomy may also differ between subnational jurisdictions. This is particularly a concern with regions of special status in France, Italy and Spain, or the home rule territorial arrangements for the Portuguese islands of Madeira and Azores, and for Scotland, Wales and Northern Ireland in the United Kingdom. A more correct measure of FD might consider the horizontal disaggregation of fiscal data by jurisdictions. The main difficulty with this involves finding such indicators that are comparable across countries.

[13] Eller (2004) uses this approach.

3.2 New Indicators of Fiscal Decentralisation

Two OECD datasets provide the detail necessary to generate more accurate measures of decentralisation. The OECD (2002) *Fiscal Design Surveys Across Levels of Government,* provides data specifically targeted to better measure FD for 11 EU accession countries.[14] The publication provides a more detailed breakdown of government finance statistics to help ascertain the control of lower levels of government over their budget, and contains qualitative country statements on the specific mode of subnational financial decision-making. Tax revenues are classified as "own tax revenue" if subnational governments have total or significant control over the tax base and rate. The survey also provides data on "revenues from tax sharing", specific and general purpose intergovernmental grants, and non-tax revenues. This data is also provided in Ebel and Yilmaz (2002).

The second set of OECD (1999) data comes from the survey *Taxing Powers of State and Local Government*. This survey classifies subnational taxes in decreasing order of fiscal autonomy according to three criteria: legislative abilities to determine the tax base and tax rate, the attribution of tax receipts, and tax administration. Based on the 4-digit classification of taxes by tax base reported in the annual OECD Revenue Statistics, the survey classifies each tax for each country according to the degree of decision-making autonomy as presented in the appendix Table A1. In cases (a) to (c), referred to as 'own taxes', the subnational governments have total or significant control. In the case of the revenue sharing categories (d.1) to (d.2), the subnational governments have limited influence. For categories (d.3) to (e), they have no control.

Stegarescu (2004) uses these classifications, the OECD Revenue Statistics, GFS data and 23 comprehensive surveys of national financial laws and constitutions, to create six new indicators of tax and revenue decentralisation and two indicators of expenditure decentralisation, for 23 countries.

[14] The data is available for the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Bulgaria, Romania, the Slovak Republic, and Slovenia.

His paper presents the 1996-2001 average value for each measure.[15] Further, he provides time-series data on own taxes (1965-2001) and own revenues (1975-2001), adjusting the classification of autonomy for each subnational government tax on an annual basis according to changes in legal provisions.[16]

Stegarescu's (2004: 7) three measures of tax revenue decentralisation are subnational own tax revenue (TDEC1), subnational own and shared taxes (TDEC2) and total subnational tax revenue (TDEC3), all calculated as the share of general government (GG) tax revenue. Three corresponding measures of revenue decentralisation (RDEC) are provided. Formulas for each of these measures are outlined in Table A1 of the appendix.

As far as possible, the different tiers of government were dealt with separately. In the case that local government taxes were regulated by regional or state legislation, without central government involvement, own local taxes and taxes shared with regional or state governments were classified in accordance with the degree of control exercised by the upper subnational level of government.

Stegarescu's (2004: 13) two measures of expenditure decentralisation are based on total subnational expenditure and lending, minus loan repayments, as a percentage of consolidated general government expenditure, without social security and EU payments (EDEC1). EDEC1 excludes transfers to other levels of government, whereas EDEC2 includes transfers to other levels of government net of received transfers. None of these measures have been used in previous studies of FD and growth. TDEC1 and RDEC1 were used as an alternative to self-reliance ratios. Data from the OECD's (2002) survey, reported in Ebel and Yilmaz (2002), was used to add the 11 transitional economies to the sample for TDEC1 and RDEC1.[17]

[15] With the exception of RDEC2

[16] There are gaps in the time-series for most countries before 1980. After 1980s there are some missing data points for Greece, Iceland, Italy, Japan, New Zealand and Switzerland.

[17] Data for these countries is scattered over the 1996-2000 period.

These new measures of fiscal decentralisation do not provide a remedy to all the limitations of budget data discussed earlier. For reasons of consistency and comparability, the degree of subnational fiscal autonomy is derived according to the provisions fixed in legislation and thus, actual implementation is not taken into account. Therefore, the measures only indicate the 'potential' degree of fiscal autonomy in a given institutional arrangement, and may still overestimate actual FD. The criticisms about horizontal aggregation are still valid. Nonetheless, these measures make a significant contribution toward better accounting for the decision-making competencies of subnational governments. To some extent, variation in these measures over time better reflect actual changes in FD because each tax was reclassified on an annual basis to according to changes in financial laws and constitutions.

3.3 Measuring the Potential Determinants of Fiscal Decentralisation

The measure of income used in this paper is GDP per capita. Whilst GDP measures only one aspect of economic development, it provides an easily comparable measure across countries. Use of GDP data in this study provides consistency with the previous literature of FD and economic growth. We use real GDP per capita using PPP, as taken from the World Bank's *World Development Indicators* (WDI).

Most of the remaining data for the determinants of FD equations were also taken from the World Bank. Land area, population, population growth rates, population density (people per square km) and the urban population growth rate (annual percentage change) were all taken from the WDI. The urban population as a percentage of the total population was taken from the World Bank World Tables. These series covered all the countries in the sample from 1960 to 2003.

Revenue, excluding grants, as a percentage of GDP was taken from the WDI with data scatter from 1990 to 2003. Grants were measured as transfers to subnational governments from other levels

of government, as a percentage of total subnational revenues and grants, provided in the World Bank's *Fiscal Decentralisation Indicators* between 1972 and 2000. Military expenditure as a percentage of central government expenditure was available in the WDI, but data was missing for many countries. Military expenditure as a percentage of GDP was provided by the WDI spanning 1988 to 2003 for all countries in the sample.

To account for diversity in tastes, previous studies of FD have used ethnolinguistic fractionalisation and the Gini coefficient. A number of measures of ethnolinguistic fractionalisation are available, although none over time. The commonly used Sachs and Warner (2001) measure of ethnolinguistic fractionalisation was available for 41 countries. Alternatively, Roeder (2001) provides a number of ethnolinguistic indices for 1961 and 1985 covering 153 countries. However, Alesina, Devleeschauwer, Easterly, Kurlat and Wacziarg (2003: 184-189) supply more recent indicators of ethnic, linguistic and religious fractionalisation for 190 countries and regions. The Sachs and Warner (2001) measure was initially obtained and included, but since this did not cover the entire sample, Alesina *et. al* (2003) measure of ethnic fractionalisation is used in the reported results. The Gini coefficient was taken from the WDI.

As is typical in many of these sorts of political economy analyses, the main data problems were due to the substantial gaps in the time-series, particularly for the government finance and human capital measures. Where possible these were filled by interpolation. In many cases however, time-series for different countries were short and did not overlap. This reduced the size of the country sample.[18]

[18] Previous cross-section studies with large country samples have averaged all variables between the 1970s and 1990s, using whatever data was available during this period. This may induce substantial measurement errors – some countries have only a single value for certain variables, and data on each variable is only available in different decades. It is unclear whether these single data points are close to the variable's actual average value over the period for which they are compared to average growth rates.

3.4 Regression Framework

Consistent with prominent previous studies the determinants of fiscal decentralisation are estimated by means of ordinary least squares regressions of the following form:

$$FD_i = \boldsymbol{\beta}'\mathbf{x}_i + \varepsilon_i \quad (1)$$

where FD_i is the value of the fiscal decentralisation in country *i*. The vector $\mathbf{x}_i$ contains a set of independent variables that potentially explain fiscal decentralisation, including a constant term.[19] Interest focuses upon the sign and statistical significance of the potential explanatory variables.[20]

The FD measures are bounded between 0 and 1 as these measures are shares of the total government budget. Therefore, the original FD measures are mapped onto the real line via a logit transformation. Furthermore, our model was tested using a general to specific modelling framework.[21] As data is missing for different countries for each variable, the sample size is small for the new indicators of FD. There are few degrees of freedom if all the explanatory variables are included in the one equation. Therefore, only the significant variables are reported along the variable of primary interest, the level of income.

For the panel data, a fixed-effects model of the following form is estimated:

$$FD_{it} = \alpha_i + \boldsymbol{\delta}'\mathbf{x}_{it} + \varepsilon_{it} \quad (2)$$

where FD_i is the value of the fiscal decentralisation in country *i* in period *t* = 1983, ..., 1998. The parameters α_i represent country-fixed effects. The vector $\mathbf{x}_{it}$ contains a set of control variables that are useful in explaining FD and ε_{it} is the error term, for country *i* in period *t*. We conduct a Hausman specification test for each model to test the use of fixed-effects versus random-effects specification.

[19] Given the possible bi-directional relationship between urbanisation and FD (see section 2) the initial values are used.
[20] A correlation matrix for the explanatory variables is reported in Table A2 of the appendix.
[21] This framework involves the specification of each model to be chosen by a backward elimination procedure to achieve the highest explanatory power and lowest Akaiake and Schwartz criteria. Each possible combination of explanatory variables was tried and the least significant variables were dropped one by one according to a redundant variable F-test. Note, also, that results using the transformed and untransformed dependent variables as well as Tobit estimation do not differ substantially.

For all the models we find the use of fixed-effects to be appropriate. Time-invariant variables, and variables without time-series data, cannot be included in the regressions. Some previous studies of the determinants of FD use a two-step procedure, suggested by Reilly and Witt (1996), to determine the influence of time-invariant factors. The first stage involves running a panel data regression with the time-variant explanatory variables. In the second step, the country specific fixed effects are regressed against all the time-invariant variables, in a pure cross-section regression. As this paper is primarily interested in the effect of income on FD, only the first step is conducted.

4. Results

4.1 Cross-Country Data Results

The combined country sample comprises of a total of 53 countries. However, given data availability is reduced for some indicators of FD, the sample size varies across models. The OLS results, with the transformed dependent variable, are reported in Table 1.

[Table 1]

As expected, the level of income has a positive relationship with all measures of FD, although it is not significant for the subnational own revenue share. Moreover, the effect of income on FD appears to be very small, a result which can possibly be explained with reference to the differing results we obtain from the OECD sample and the middle and lower income country sample.

All measures of FD are positively related to geographic area. Population size has a positive effect on the subnational shares of expenditure and revenue. More densely populated countries tend to have more centralised government expenditures. Increased urbanisation also has a negative effect on FD. This suggests that fiscal decentralisation is associated with low density and less urbanised populations, possibly because they are more difficult to administer from the centre.

Military expenditure has a significant negative relationship with the subnational expenditure and revenue shares. However, higher military spending does not seem to affect the share of taxes or revenues raised by the subnational government. Higher levels of trade have a significant negative relationship with the overall subnational revenue share. This is expected as import and export taxes raise the central government's share of revenues. Nevertheless, trade is not significantly correlated with the subnational own tax and revenue shares. Grants are negatively correlated with all the revenue measures. The higher the share of grants in subnational revenues, the lower the subnational revenue share of total government revenue. This may be a result of subnational governments heavily substituting grants for their own sources of funds, as indicated by the own tax and revenue measures.

Finally, federal countries tend to concentrate higher shares of expenditure in the hands of lower levels of government, but the difference between federal and unitary countries is not significant for the tax and revenue measures. The other public sector decentralisation variables are not significantly correlated with the measures of FD.

It is possible that the relationship between FD and its determinants differ for developing and developed countries. Consequently, we split the combined sample into two datasets: OECD country and medium- and low-income country samples. Focusing on the OECD sample produces a number of noteworthy results. [22] The results are reported in Table 2. The traditional measures of FD, the two new expenditure measures, and the new tax and revenue shares were found to be correlated with slightly different explanatory variables. The level of income is significant and positively related to most measures of decentralisation, which is the result we would expect. Grants are negative and significantly correlated with the all tax and revenue measures, except the own tax share. As discussed

[22] OECD sample covers a total of 17 countries. Data is missing on *GRANTS*, *TIERS*, *EMPRATIO* and *ELECTIONS* for Iceland and *MILGVT* for New Zealand so these two countries have been dropped from the sample.

earlier, this could be the result of governments heavily substituting their own revenues with grants.[23] Data on the share of military expenditure in government spending is available for this sample of countries and proved to be more significantly related to FD than the military expenditure to GDP ratio. A higher share of military expenditure in government spending is significant and negatively related to all measures of expenditure decentralisation and the traditional revenue share. EDEC1 and EDEC2 are negatively related to the government revenue to GDP ratio. Thus countries with higher overall levels government revenue tend to concentrate more expenditure in the hands of the central government. Interestingly, all the new tax and revenue measures are positively related to ethnic fractionalisation.

[Table 2]

The traditional measures of FD were positively related to land area, and negatively related to trade openness. Population growth is negatively related to EDEC2 and TDEC1. Federal decentralised countries tend to have higher shares of subnational revenue, when social security is excluded, than unitary centralised ones. A higher number of subnational governments are negatively correlated with TDEC2 and TDEC3. Thus, countries with more subnational governments tend to have lower subnational shares of tax revenue, but do not seem to have significantly different shares of own taxes. A higher ratio of subnational employees to central employees is associated with higher shares of, non-autonomous, subnational taxes and revenues. One would expect more subnational employees to raise the amount of subnational spending on wages, but one does not find a significant relationship with any of the expenditure measures. As the employment ratio is not significantly correlated with the own tax or own revenue share, this suggests that transfers from higher levels of government are positively related to subnational government employment.

[23] However, the significant negative relationship between EDEC2 and the share of grants in subnational revenue is puzzling. EDEC2 includes subnational government expenditures and transfers from subnational governments to other levels of government, net of received transfers.

We also find that a higher number of elected subnational tiers of government are associated with a higher subnational tax revenue share. One possible explanation for this is based on political business cycle theory. If more elected subnational tiers of government leads to higher turnover of subnational politicians, politicians in these countries may be less concerned about the future consequences of their actions. Roubini and Sachs (1989: 903), and Alesina and Tabellini (1990: 407) argue that political systems with frequent changes in political power generally have larger government employment, spending, deficits and debt. If this holds at the subnational level, a faster turnover of subnational politicians relative to central politicians, could lead to a higher subnational share of the government budget. Note that subnational elections are not significantly related to the own tax share, and thus more elected subnational tiers are associated with higher transfers of tax revenue from the central government. Politicians with short tenures may be more likely to incur debt, and thus more likely to borrow from the central government, inflating the subnational share of total government tax revenue. However, if this is the case, one would expect the number of elections to be significantly related to the overall expenditure or revenue shares. No clear conclusion can be made without a more disaggregated analysis.

Finally, we report the results from medium- and low-income country sample. With the exception of 11 transitional countries, the only FD indicators available for medium and low income countries are the traditional subnational expenditure and revenue measures, and so our analysis is limited to these. The results are reported in Table 3.

[Table 3]

Countries with higher population density and increasing urbanisation tend to be more centralised. The military expenditure to GDP ratio was negatively correlated with the subnational expenditure

share. Surprisingly, trade was positively related to the subnational revenue share.[24] As for the public sector decentralisation variables, the ratio of subnational government employees to central government employees is positively correlated with both the subnational share of expenditures and revenues. This is expected, given that in low and middle income countries government wages often take up a significant proportion of the budget. As in the combined country sample, federal countries tend to have higher expenditure decentralisation, but there does not seem to be a significant difference between federal and unitary countries when it comes to revenue decentralisation.

Contrary to expectations, FD is negatively related to income. Thus, in this sample, countries with lower income are more decentralised. Previous analyses of the impact of income on FD have always found a positive relationship, but none have studied a separate sample of developing countries. Consequently, our findings are supportive of the notion that that a positive relationship between income and FD only emerges after some threshold level of income is reached. However, a possible bi-directional relationship between income and FD may mean that these developing countries have lower levels of income because they are more decentralised. Thus, we remain cautious with respect to this finding.

4.2 Panel Data Results

In this section we present the results from panel estimation. The sample includes the OECD countries for which these indicators were available over the period 1981 to 1998, and thus closely corresponds to the cross-section OECD sample. The country and time sample for the panel equations was chosen on the basis of available data.[25]

[24] This may come as a surprise given that many developing countries concentrate a significant proportion of revenues in terms of trade tariffs, in the hands of the central government. Nonetheless, this subnational revenue measure reflects more than simply own revenues.

[25] All data are in three year overlapping averages. Ireland and Luxemborg were included in the panel sample. Despite their uncommonly high growth rates in the late 1990s, their growth over the whole 1981-1998 period did not seem

Table 4 reports the results computed following our empirical methodology.[26] Grants are found to have a significant negative relationship with all measures of tax and revenue decentralisation, but a positive relationship with expenditure decentralisation. As grants provide some indication of the extent to which lower tiers of government can spend beyond their own revenues, the positive relationship with the subnational expenditure share is expected. The negative relationship with tax and revenue decentralisation, consistent with the cross-section results, suggests that subnational governments substitute grants for their own revenues. Increasing urbanisation has a negative relationship with all measures of FD, as in the cross-section.

[Table 4]

All the other explanatory variables change sign depending on which measure of FD is used as the dependent variable. The signs on the coefficients of population growth, population density, urbanisation, the military to GDP ratio and trade openness are conditional on whether the traditional or new measures of FD are used. However, neither set of measures consistently has explanatory variables with the expected sign.

The signs on population growth, density and urbanisation are not theoretically clear, but when regressed on the traditional measures they have the same sign as in the cross-section. Population size has the 'wrong' sign in the own tax share regression, but this is scarcely significant at the 10 per cent level. The military expenditure share of GDP has the expected negative relationship with the new own tax share, but a surprisingly positive correlation with the traditional subnational revenue share.[27] Trade has a negative correlation with the traditional measures of FD, but is positively related to the new measures of FD.

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unusual. The sample was kept constant for each indicator but allowed to vary between indicators. Iceland and New Zealand were excluded as they were missing data on unemployment and tax revenue, respectively.

[26] The regression results including all time-variant variables are available upon request.

[27] The military expenditure share of GDP is only available from 1988.

The same inconsistencies exist for income. Income is positively related to the traditional FD measures and negatively related to the new measures. Therefore, once the time dimension is added, results concerning the determinants of FD are less clear cut. Misspecification, due to the omitted variable problem, may arise because there is no data available to account for diversity of tastes over time – an important indicator of FD in the cross-section for this sample. A summary of the results is presented in Table 5

[Table 5]

5. Conclusion

This paper has looked at the determinants of fiscal decentralisation, focusing in particular on whether the level of income has a strong influence on the level of decentralisation. In the cross-sectional analysis, the level of income is generally found to be significantly related to the level of FD. Interestingly, the correlation is positive for OECD countries but negative for medium and low income countries. This result provides some support for the notion that increasing income is only a driver of fiscal decentralisation above some threshold level.

Measures of revenue decentralisation tend to be negatively related to the share of grants in subnational revenues, for both the OECD and aggregate samples. Increasing urbanisation, population growth, population density and military spending are negatively correlated with fiscal decentralisation. The effect of trade remains ambiguous. In both the OECD sample, and the medium and low income country samples, the ratio of subnational government employees to central employees is positively related to some of the measures of FD.

In the OECD sample, all the new tax and revenue measures are significant and positively related to the level of ethnic fractionalisation, as a proxy for differing levels of demand for central governance. Federal countries have higher shares of subnational expenditure and occasionally overall

revenue shares, but do not have significantly different shares of own taxes or own revenues. Also, in the OECD sample, countries with more subnational governments and fewer elected subnational tiers of government, tend to be less decentralised in terms of tax revenue.

In the panel data analysis, the results were more mixed, with most variables having differing signs for different measures of FD. This may be a reflection of both the relatively small sample used for the panel analysis and of a possible missing variable bias, as several variables found to be significant in the cross-sectional analysis could not be included in the panel data set. The need for more time-series data is evident. Further research using panel data could be a key to finding the underlying sources of FD.

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Tables

Table 1: Determinants of Fiscal Decentralisation: Combined Country Sample

Dep. Var.	EXP	REV	TDEC1	RDEC1
C	-1.130349*** (-5.958366) [0.0000]	0.122490 (0.385874) [0.7015]	-1.885535*** (-3.473409) [0.0022]	-0.862170* (-1.808826) [0.0825]
RGDPC	1.89E-05** (2.378969) [0.0217]	1.97E-05** (2.435258) [0.0192]	4.03E-05* (1.821498) [0.0822]	1.05E-05 (0.337849) [0.5501]
AREA	4.85E-08* (1.965884) [0.0555]	7.55E-08*** (4.414744) [0.0001]	1.57E-07*** (3.664799) [0.0014]	1.06E-07*** (3.172872) [0.0040]
POP	1.54E-06*** (5.646221) [0.0000]	8.96E-07*** (4.764911) [0.0000]		
POPDEN	-0.002463*** (-2.894390) [0.0058]			
Δ URB	-0.103988* (-1.896547) [0.0643]		-0.334127** (-2.162392) [0.0417]	
MILGDP	-0.157119** -2.280627) [0.0274]	-0.322432*** (-3.768699) [0.0005]		
TRADE		-0.006119*** (-2.990731) [0.0046]		
GRANTS		-0.029655*** (-5.588058) [0.0000]	-0.022799** (-2.516523) [0.0196]	-0.019075** (-2.693193) [0.0125]
FU	0.468679** (2.655257) [0.0109]			
Adj-R^2	0.486959	0.600084	0.305440	0.238034
Obs	53	49	27	29
F-value	8.050908 [0.000003]	13.00419 [0.000000]	3.858447 [0.015991]	3.915676 [0.020226]

Notes: t-statistics are in parentheses and p-values in square brackets. Asterisks indicate significance at the 10%(*), 5%(**) and 1%(***) level. OLS: White Heteroskedasticity-Consistent Standard Errors and Covariance

Table 2: Determinants of FD: OECD

Dep. Var.	EDEC1	EDEC2	TDEC1	TDEC2	TDEC3	RDEC1	RDEC3	EXP	REV
C	0.416819 (0.406572) [0.6909]	0.321352 (0.398577) [0.6978]	-3.496141** (-2.886205) [0.0127]	-5.203528** (-2.676231) [0.0232]	-3.482030*** (-3.458610) [0.0061]	-2.275989* (-2.071453) [0.0588]	-1.668949 (-1.720655) [0.1133]	-1.453555* (-2.058326) [0.0620]	-0.820865 (-0.877331) [0.3991]
RGDPC	0.000109*** (3.039804) [0.0095]	0.000110*** (3.195952) [0.0085]	7.11E-05 (1.680258) [0.1168]	0.000134** (2.596776) [0.0266]	8.69E-05** (3.023225) [0.0128]	6.88E-05* (1.936469) [0.0749]	3.44E-05 (1.203761) [0.2539]	8.50E-05** (2.900227) [0.0133]	1.875739* (2.672378) [0.0875]
AREA								1.41E-07*** (3.624495) [0.0035]	1.25E-07** (3.339110) [0.0066]
POPGRO		-73.01386* (-2.075580) [0.0622]	-0.003600*** (-3.571705) [0.0034]						
ETH			2.784510*** (3.915677) [0.0018]	2.314281** (2.632619) [0.0250]	2.077217** (2.596997) [0.0266]	1.951533*** (4.626730) [0.0005]	1.451537** (3.047257) [0.0111]		
MILGVT	-0.147497*** (-4.167541) [0.0011]	-0.080019** (-2.299113) [0.0421]						-0.162462*** (-3.567366) [0.0039]	-0.142025** (-2.734714) [0.0194]
TRADE								-0.011997** (-2.254649) [0.0436]	-0.010362* (-2.009399) [0.0697]
REVGDP	-0.070151*** (-6.285209) [0.0000]	-0.072209*** (-5.292649) [0.0003]							
GRANTS		-0.013733* (-2.183571) [0.0515]		-0.039773*** (-3.779176) [0.0036]	-0.041532*** (-4.601666) [0.0010]	-0.026348*** (-4.258518) [0.0009]	-0.022802*** (-3.717338) [0.0034]		-0.027219*** (-4.220616) [0.0014]
FED							0.121295** (2.829240) [0.0164]		
NSGVT				-3.27E-05*** (-3.179310) [0.0098]	-2.77E-05*** (-4.210601) [0.0018]				

Table 2 (cont): Determinants of FD: OECD

Dep. Var.	EDEC1	EDEC2	TDEC1	TDEC2	TDEC3	RDEC1	RDEC3	EXP	REV
EMPLOY				0.186112**	0.147013**		0.101086**		
				(2.229519)	(2.813611)		(2.220621)		
				[0.0499]	[0.0184]		[0.0483]		
ELECT				0.735619**	0.618896***				
				(2.459158)	(3.297684)				
				[0.0337]	[0.0080]				
Adj-R^2	0.708939	0.747543	0.503240	0.741445	0.795789	0.707388	0.805755	0.521026	0.717701
Obs	17	17	17	17	17	17	17	17	17
F-value	13.99044	10.47542	6.402911	8.647068	11.39171	13.89330	14.27400	5.351185	9.135509
	[0.000230]	[0.000681]	[0.006727]	[0.001734]	[0.000568]	[0.000238]	[0.000171]	[0.010411]	[0.001221]

Notes: t-statistics are in parentheses and p-values in square brackets. Asterisks indicate significance at the 10%(*), 5%(**) and 1%(***) level. OLS: White Heteroskedasticity-Consistent Standard Errors and Covariance

Table 3: Determinants of FD: Medium and Low Income Countries

Dep. Var.	EXP	REV
C	0.220478 (0.591914) [0.5627]	-1.679043* (-1.957768) [0.0679]
RGDPC	-0.000102* (-2.045325) [0.0588]	-0.000123** (-2.479099) [0.0247]
POPDEN	-0.004138*** (-6.963783) [0.0000]	-0.005426*** (-5.980944) [0.0000]
Δ URB	-0.281380*** (-3.566801) [0.0028]	-0.187360** (-2.652789) [0.0174]
MILGDP	-0.152378** (-2.918466) [0.0106]	
TRADE		0.010673** (2.623573) [0.0184]
FU	0.564088* (1.900456) [0.0768]	
EMPLOY	0.326908* (2.072697) [0.0558]	0.719512** (2.283237) [0.0364]
Adj-R^2	0.535520	0.525399
Obs	22	22
F-value	5.035304 [0.005160]	5.649537 [0.003458]

Notes: t-statistics are in parentheses and p-values in square brackets. Asterisks indicate significance at the 10%(*), 5%(**) and 1%(***)level. OLS: White Heteroskedasticity-Consistent Standard Errors and Covariance

Table 4: Panel: Determinants of FD

Dep. Var.	EXP	REV	TDEC1	RDEC1
C	-3.216709***	-1.395808***	4.214302**	-2.848665***
	(-7.340760)	(-4.610002)	(2.268513)	(-7.616405)
	[0.0000]	[0.0000]	[0.0246]	[0.0000]
RGDPC	2.77E-05***	3.00E-06***	-9.89E-05***	-1.76E-05***
	(7.712028)	(2.587019)	(-8.530805)	(-2.770068)
	[0.0000]	[0.0106]	[0.0000]	[0.0061]
POP	6.50E-06***	1.12E-05***	-3.14E-05*	
	(12.53964)	(5.820947)	(-1.664259)	
	[0.0000]	[0.0000]	[0.0980]	
POPGRO	-6.586915**		23.36910**	
	(-2.313514)		(2.397535)	
	[0.0215]		[0.0177]	
POPDEN	-0.024640***		0.026793***	0.028530***
	(-12.95194)		(3.573053)	(5.354784)
	[0.0000]		[0.0005]	[0.0000]
URB	0.054301***	0.004517**	-0.034428***	
	(8.944390)	(2.206895)	(-4.930857)	
	[0.0000]	[0.0287]	[0.0000]	
ΔURB		-0.036081***	-0.239653***	-0.170811***
		(-3.376704)	(-3.494615)	(-4.599750)
		[0.0009]	[0.0006]	[0.0000]
MILGDP		0.135065***	-0.392552	
		(4.013017)	(-1.543464)	
		[0.0001]	[0.1247]	
TRADE	-0.001938***	-0.001988**	0.007693*	
	(-3.234497)	(-2.230728)	(2.034890)	
	[0.0014]	[0.0271]	[0.0435]	
GRANTS	0.007922***	-0.022154***	-0.061070***	-0.016125***
	(5.641330)	(-21.32463)	(-8.172834)	(-5.366100)
	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Adj-R^2	0.985696	0.996440	0.975531	0.956521
Countries	18	18	18	16
Obs	288	288	198	256
F-value	508.1241	1622.568	219.1651	165.9971
	[0.000000]	[0.000000]	[0.000000]	[0.000000]
Hausman Stat.	23.2643	19.0653	28.7886	22.4409
	[0.0056]	[0.0246]	[0.0007]	[0.0076]

Notes: t-statistics are in parentheses and p-values in square brackets. Asterisks indicate significance at the 10%(*), 5%(**) and 1%(***) level. OLS: White Cross-Section Standard Errors and Covariance (degrees of freedom corrected). White cross-section standard errors are robust to cross-equation (contemporaneous) correlation as well as to different error variances in each cross-section. The reported constant term is the average of the estimated coefficients on the country-specific effects.

Table 5: Summary of Results

Variable	*RGDPC*	*AREA*	*POP*	*POPGRO*	*POPDEN*	*URB*	*ΔURB*	*GINI*	*ETH*	*MILGDP*	*MILGVT*	*TRADE*	*REVGDP*	*GRANTS*	*FU*	*FED*	*NSGVT*	*ELECT*	*EMPLOY*
Expectation	+	+	+	?	?	?	?	+	+	-	-	-	+	?	+	+	+	?	+
Cross-Country																			
Combined																			
EXP	+	+	+		-		-			-					+				
REV	+	+	+							-		-		-					
TDEC1	+	+					-							-					
RDEC1	+	+												-					
OECD																			
EDEC1	+										-		-						
EDEC2	+			-							-		-	-					
TDEC1	+			-					+										
TDEC2	+								+					-			-	+	+
TDEC3	+								+					-			-	+	+
RDEC1	+								+					-					
RDEC3	+								+					-		+			+
EXP	+	+									-	-							
REV	+	+									-	-		-					
Medium and Low Income																			
EXP	-				-		-			-					+				+
REV	-				-		-					+							+
Panel																			
EXP	+		+	-		+	-					-		+					
REV	+		+			+	-			+		-		-					
TDEC1	-		-	+		-	-			-		+		-					
RDEC1	-			+										-					

Notes: Signs of the coefficients are reported for those variables that were found to be significant determinants of FD at least at the 10% significance level. Full results are reported in Tables 1 to 4. Note that *GINI* was not found to be significant in any of the model specifications investigated.

Appendix A

Table A1: Measures of fiscal decentralisation

Measure	Description
Expenditure share	$EXP = \frac{\text{SNG total expenditure - transfers to other levels of govt}}{\text{GG total expenditure - intergovernmental transfers}}$
Revenue share	$REV = \frac{\text{SNG total revenue - grants from other levels of govt}}{\text{GG total revenue - intergovernmental grants}}$
Tax revenue: own	$TDEC1 = \frac{\text{SNG own tax revenue (a) to (c)}}{\text{GG total tax revenue}}$
Tax revenue: shared	$TDEC2 = \frac{\text{SNG own tax revenue (a) to (c) + shared tax revenue (d.1) to (d.2)}}{\text{GG total tax revenue}}$
Tax revenue: total	$TDEC3 = \frac{\text{SNG tax revenue (a) to (e)}}{\text{GG total tax revenue}}$
Revenue: own	$RDEC1 = \frac{\text{SNG own tax rev. (a) to (c) + nontax \& capital rev.}}{\text{GG total tax rev. + nontax \& capital rev.}}$
Revenue: shared	$RDEC2 = \frac{\text{SNG tax rev. (a) to (c) + sh. tax (d.1) to (d.2)+nontax \& capital rev.}}{\text{GG total tax rev. + nontax \& capital rev.}}$
Revenue: total	$RDEC3 = \frac{\text{SNG own tax rev. (a) to (e) +nontax \& capital rev.}}{\text{GG total tax rev. + nontax \& capital rev.}}$
Expenditure: no transfers	$EDEC1 = \frac{\text{SNG direct expenditure - transfers to other levels of govt}}{\text{GG total expenditure - social security payments}}$
Expenditure: transfers	$EDEC2 = \frac{\text{SNG direct expenditure + net transfers to other levels of govt}}{\text{GG total expenditure - social security payments}}$

Classification of taxes (in decreasing order of control over revenue sources)

(a) subnational government (SNG) determines tax rate and tax base
(b) SNG determines tax rate only
(c) SNG determines tax base only
(d) tax sharing:

(d.1)	SNG determines revenue-split
(d.2)	revenue-split only changed with consent of SNG
(d.3)	revenue-split unilaterally changed by central government (CG) (fixed in legislation)
(d.4)	revenue-split unilaterally change by CG (in annual budgetary process)
(e)	CG determines tax rate and tax base

Source: OECD (1999), World Development Indicators and IMF Government Finance Statistics

Table A2: Data definitions of explanatory variables

Variable	Label	Definition
Income	*RGDPC*	real GDP per capita. *Source:* World Development Indicators
Geography	*AREA*	geographic area. *Source:* World Development Indicators
Population	*POP*	population size. *Source:* World Development Indicators
Population	*POPGRO*	population growth. *Source:* World Development Indicators
Population	*POPDEN*	population density. *Source:* World Development Indicators
Population	*URB*	urban population size. *Source:* World Development Indicators
Population	Δ*URB*	urban population growth. *Source:* World Development Indicators
Inequality	*GINI*	Gini coefficient. *Source:* World Development Indicators
Diversity	*ETH*	ethnic fractionalisation. *Source:* Alesina *et al.* (2003)
Military spending	*MILGDP*	military expenditure as a percentage of GDP. *Source:* World Development Indicators
Military spending	*MILGVT*	share of military expenditure in government spending. *Source:* World Development Indicators
Openness	*TRADE*	trade openness. *Source:* World Development Indicators
Government revenue	*REVGDP*	general government revenue to GDP ratio. *Source:* World Development Indicators
Government revenue	*GRANTS*	Grants. *Source:* World Bank's Fiscal Decentralisation Indicators
Constitutions	*FU*	a federal constitution dummy
Constitutions	*FED*	five point indicator of constitutional structure. *Source:* Lijphart (1999)
Public sector	*NSGVT*	the number of subnational government units. *Source:* World Bank's *World Development Report* (1999/2000)
Public sector	*ELECT*	the number of elected subnational tiers of government. *Source:* World Bank's *World Development Report* (1999/2000)
Public sector	EMPLOY	the ratio of subnational government personnel to central government personnel *Source:* Schiavo-Campo *et al.* (1997)

Table A3: Correlation matrix

Variable	*AREA*	*POP*	*POPGRO*	*POPDEN*	*URB*	Δ*URB*	*GINI*	*ETH*	*MILGDP*	*TRADE*	*REVGDP*	*GRANTS*	*FU*	*NSGVT*	*ELECT*	*EMPLOY*
AREA	1															
POP	0.1781	1														
POPGRO	0.3211	0.3969	1													
POPDEN	-0.2777	0.3923	0.1521	1												
URB	0.1245	-0.4822	-0.0456	0.1198	1											
Δ*URB*	0.2432	0.3202	0.8174	0.1112	-0.1103	1										
GINI	0.4094	0.0256	0.3161	0.2572	0.3866	0.1369	1									
ETH	0.2734	0.0903	0.0511	-0.1335	-0.2521	-0.0199	0.2617	1								
MILGDP	-0.0630	0.1400	0.1329	0.0672	-0.0246	0.2386	-0.1293	-0.1714	1							
TRADE	-0.2845	-0.3800	-0.3293	0.0463	0.2055	-0.3864	-0.1068	0.1955	-0.2226	1						
REVGDP	-0.4510	-0.4219	-0.0418	0.1849	0.5318	-0.1075	0.0459	-0.4681	0.4116	0.2084	1					
GRANTS	-0.1755	0.0305	0.3434	0.2820	-0.1747	0.4201	0.0729	-0.0107	-0.3189	-0.0302	-0.1598	1				
FU	0.4507	0.3200	0.3185	0.2282	0.2629	0.2006	0.2369	0.1735	-0.1970	-0.2049	-0.2512	-0.1206	1			
NSGVT	0.1622	0.9934	0.3783	0.3866	-0.4726	0.2991	0.0015	0.0679	0.1636	-0.3786	-0.3883	0.0124	0.3121	1		
ELECT	-0.0197	0.0937	0.5284	0.2777	0.2777	0.4468	0.0584	-0.3895	0.2057	-0.2854	0.3270	0.2068	0.2939	0.1078	1	
EMPLOY	0.0850	0.0174	0.0797	0.0808	0.3278	-0.1211	0.0255	-0.2725	-0.1254	-0.2507	0.0745	-0.2532	0.3846	0.0042	0.3151	1
RGDPC	0.1305	-0.2841	0.2765	0.1523	0.7193	0.0878	0.4823	-0.4104	-0.1176	-0.0190	0.4598	-0.0334	0.3778	-0.2617	0.5674	0.3885

Table A4: Country Sample

Code	Country	Code	Country
ALB	*Albania*	**ITA**	**Italy**
ARG	Argentina	*KAZ*	*Kazakhstan*
AUS	**Australia**	*KGZ*	*Kyrgyz Republic*
AUT	**Austria**	LTU	Lithuania
AZE	*Azerbaijan*	LUX	Luxembourg
BEL	**Belgium**	*LVA*	*Latvia*
BGR	*Bulgaria*	*MDA*	*Moldova*
BLR	*Belarus*	*MEX*	*Mexico*
BOL	*Bolivia*	MNG	Mongolia
BRA	Brazil	*MUS*	*Mauritius*
CAN	**Canada**	MYS	Malaysia
CHE	**Switzerland**	**NLD**	**Netherlands**
CHL	*Chile*	**NOR**	**Norway**
CHN	China	NZL	New Zealand
CZE	*Czech Republic*	PER	Peru
DEU	**Germany**	POL	Poland
DNK	**Denmark**	**PRT**	**Portugal**
ESP	**Spain**	*PRY*	*Paraguay^*
EST	Estonia	ROM	Romania
FIN	**Finland**	RUS	Russia
FJI	*Fiji^*	*SVK*	*Slovak Republic*
FRA	**France**	SVN	Slovenia
GBR	**Great Britain**	**SWE**	**Sweden**
HRV	Croatia	*THA*	*Thailand*
HUN	*Hungary*	*URY*	*Uruguay*
IDN	*Indonesia*	**USA**	**United States of America**
IND	India	*ZAF*	*South Africa*
IRL*	**Ireland**	*ZWE*	*Zimbabwe^*

Notes: Countries in **bold** are OCED country sample. Countries in *italics* are the middle and low income sample. (*) Included in the panel sample only. (^) Included in the low and middle income sample only.