



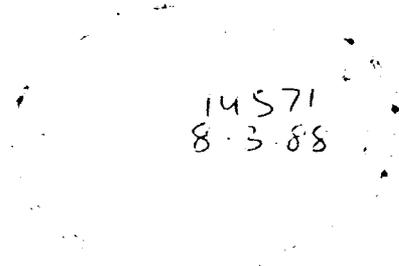
PUBLIC EXPENDITURE DECENTRALISATION IN
DEVELOPING COUNTRIES



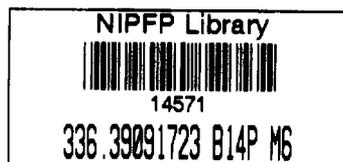
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The decentralisation of population and economic activity is a goal of many developing country governments and the advice of international agencies. This strategy may or may not enhance the rate of national economic growth, but it is clear that any decentralisation strategy holds important implications for the assignment of expenditure responsibility and taxing power among levels of government. Some would argue that increased local fiscal autonomy - bringing expenditure and tax level determination closer to the people - would contribute to improving public services outside the largest city and hence slow rural-urban migration. On the other hand, fiscal decentralisation is a process that goes slowly and may not be substantially speeded up by government policy.

How far have LDC governments gone in decentralising their fiscal activities, how much of the inter-country variation can be explained, and what settings seem most conducive to assigning more expenditure responsibility to state and local governments? These questions are central to this paper. The intent here is to investigate the extent of government fiscal decentralisation among developing countries, and to analyse its determinants. Our concern is with the relative fiscal importance of subnational governments, defined here to include states (departments, provinces, etc.), cities, municipalities, local government enterprises, and special districts.

1. Fiscal Assignment and Economic Development

Unfortunately, economic theory cannot lead us to a firm conclusion about the optimal division of fiscal responsibilities among levels of government, i.e., about optimal fiscal decentralisation. It can, however, suggest the considerations relevant in making the best fiscal assignments. Musgrave's view of the stabilisation, redistribution and allocation roles of government budgets has long served as the traditional starting point for the discussion of the appropriate division of taxing powers and expenditure responsibility^{1/}. The stimulation of stable economic growth and the distribution of income, it is argued, are budget objectives that properly belong to the Central government. The open economy problem rules out local government success in either area and leaves allocation as the major budget role for subnational governments. Subnational governments, it is said, are closest to voter-consumers and are in the best position to read local preferences for public services and for various kinds of taxes and user charges. Centralisation, for all its virtues, neglects the individual voter, i.e., uniform levels of public provision carry an element of compulsion in consumption when groups differ in preferences and incomes. The 'proper' degree of decentralisation, then, depends on the importance attached to efficiency gains, the extent to which these gains can be actually realised, and the extent to which there are offsetting externalities^{2/}.

Taking this general view of the proper assignment of functions, the case for fiscal centralisation is much stronger in the developing than in the developed countries. Consider first the generally accepted hypothesis that moving govern-

ment (public service provision) "closer to the people" can lead to gains in the welfare of consumer-voters. Because the theory of fiscal assignment was developed with reference to industrialised countries, it was heavily influenced by democratic processes of budget making, e.g., the median voter theories of public expenditure determination. Under such models, the level of tax effort and the expenditure mix in local areas are responsive to changes in relative prices and income, and the potential efficiency losses from higher level government interference can be substantial (as can the potential gains from increased local government fiscal autonomy). While this approach is based on a number of questionable assumptions, a substantial body of empirical research has shown that the behaviour of American state and local governments more or less squares with the model^{3/}.

The median voter model of expenditure determination does not so readily apply in developing countries, with the result that the efficiency gains to be had from decentralisation may not be so great. This is partly because voter preferences are not so readily translated into budget outcomes as in advanced countries. Local councils and chief officials are often not elected and adjustments in the allocation of local resources are often constrained by Central government controls^{4/}. These controls include approval of the budget, central appointment of chief local government officers, Central government regulation of tax administration, mandates as to local government employee salary levels, and the general absence of a mechanism by which local voters may reveal their preferences for a larger or smaller sized government. In this setting - where the devolution of revenue authority and expenditure

responsibility is not accompanied by relaxed Central government control over local fiscal decision-making - there is less pressure for tax/expenditure decentralisation than would be the case in advanced countries. In general, then, the potential efficiency gains do not offer the same impetus for fiscal decentralisation in LDCs as in developed countries.

On the other hand, the a priori arguments for fiscal centralisation are much stronger in LDCs than in industrialised countries. Stabilisation is especially important since low income economies are less diversified and therefore are more "exposed" to international fluctuations in commodity prices, natural disasters, wars, worldwide recession, etc. This means that the Central government needs to control the major tax and borrowing instruments. The implementation of economic growth policy may also be taken to argue for fiscal centralisation, i.e., investment capital is short, and must be mobilised and directed by the Central government to maximise returns. Finally, there are income distribution arguments that support a continued pattern of centralisation. The most important is that regional (and rural-urban) disparities in income and wealth are usually pronounced, an important national concern, and may be accentuated by fiscal decentralisation because the already wealthier urban local governments will benefit most from increased local government taxing powers. On top of these considerations, there is the superior capacity of Central governments in the areas of tax administration and the management and delivery of public services.

In light of this scorecard, one should expect a significantly higher degree of fiscal centralisation in

LDCs than in advanced countries. Any move toward decentralisation, we shall argue, comes with the movement to a higher stage of economic development and the accompanying urbanisation, increased degree of local administrative capacity, and improved implementation skills of local governments.

2. Measuring Fiscal Decentralisation

There are a number of conceptual and empirical problems with devising an appropriate index of fiscal decentralisation. First is the issue of what kind of fiscal decentralisation one wants to measure and then the problem of constructing the index. As always, the difficulties are best resolved by a careful thinking through of the questions being asked, and by accepting at the outset that some degree of subjectivity will be involved. All measures will be flawed in some ways and the "best" choice will depend ultimately on which questions are the most important.

The fiscal "importance" of subnational government might be measured in terms of the share of revenues generated or the share of expenditure made. The revenue measure would help determine the extent to which local governments are mobilising an increasing or decreasing share of public resources through their tax and user charge systems, but would ignore the division of final expenditure and service delivery responsibility. Alternatively, one could measure the subnational government share of expenditures and ignore the question of where the funds are raised. Indeed, it is important to note that an increasing expenditure share at

the subnational level might indicate increasing "fiscal decentralisation", even though revenue-raising authority remains highly concentrated at the Central government level. Such a result could occur if there were substantial use of inter-governmental grants. It is expenditure decentralisation that is the focus of this paper, and specifically, our index is the subnational government share of total government expenditures.

This measure is subject to important limitations. First, subnational government expenditure responsibility may or may not indicate subnational government fiscal autonomy. On this issue, Musgrave has properly pointed out that local governments which act as central expenditure agents do not reflect expenditure decentralisation in a meaningful sense just as centrally collected but shared taxes do not constitute true revenue decentralisation^{5/}. This difference between the constitutional and "just for the sake of administrative convenience" division of fiscal functions cannot be discerned from the expenditure decentralisation measure used here.

There are two other problems that reduce the comparability of this ratio across countries. First, two countries may have the same subnational share but the number of participating subnational units may be different. More participating governments, ceteris paribus, would seem to imply more fiscal decentralisation. Second, there is the issue of defence. Countries which are at war, or ever close to it, are more centralised. Our explanations of the determinants of fiscal decentralisation attempt to adjust for the second problem, but not the first.

3. The Pattern and Trend in Fiscal Decentralisation

The hypothesis that advanced countries are more fiscally decentralised than developing countries appears to be borne out by U.N., World Bank, and I.M.F. data^{6/}. Using fiscal data for 1973, a sample of 23 developed and 34 developing countries for which data were available, and the expenditure share of subnational governments as the measure of fiscal decentralisation, the greater dominance of central governments in LDCs is clear^{7/}. On average, subnational governments in the advanced countries accounted for 32.2 per cent of all government expenditures, compared to 14.9 per cent in the LDCs. Moreover, only four LDCs (all in Latin America) had a fiscal decentralisation ratio above the developed country average.

Did this pattern change during the sixties and early seventies? To consider this possibility we have used World Bank data on a more limited sample to compare expenditure decentralisation ratios for the 1960-1973 period^{8/}. For the 43 developed and developing nations for which comparable data were available, the subnational government share of total government expenditures increased more in the developed than in the developing countries. On average, subnational government expenditures increased by 6.3 per cent of total spending in advanced countries but only 0.3 per cent of total expenditures in LDCs (see Table 1).

Another interesting observation might be made from the very limited data presented in Table 1. Federal countries, advanced or developing, are more fiscally decen-

tralised than are countries governed under unitary systems. In part, this is because subnational governments are given access to more income elastic sales and income taxes, an access that is denied in many unitary countries and, in part, because countries have adopted federal structures due to the underlying pressures from large and diverse populations^{10/}. However, the data in Table 1 do not indicate increased decentralisation to be the trend for federalist-LDCs.

4. The Determinants of Fiscal Decentralisation

A thesis suggested by the a priori arguments and the simple comparison above is that there is a pattern of increased fiscal responsibility of subnational governments during the process of economic development. Empirical work on this subject, however, is not at all consistent in support of this hypothesis. The lack of consistency in these studies is no great surprise since they analysed different years with different samples and different estimating equations. Moreover, most studies on this question have been cross-section, and have addressed the issue of what determines relative levels of fiscal decentralisation. Few have studied long enough time series properly to explain the relationship between economic development and fiscal decentralisation. Some analysts have found a relationship between the stage of a country's development, as measured by per capita GNP, and its degree of fiscal decentralisation^{11/}. Since these results are based on samples including developed and less developed countries, they show that, on average, advanced countries are significantly more decentralised. This suggests that if

economic development matters, the decentralisation adjustments are worked out only in the very long run.

Others have found different explanations for inter-country variations in fiscal decentralisation. Martin and Lewis concluded that the higher degree of centralisation may be an outcome of economising scarce skilled personnel in the early stages of development and pointed out that the absence of strong local governments was due to the country size rather than to the level of development^{12/}. Some other findings are common in these few studies. There tends to be more fiscal decentralisation in countries with larger populations and greater land areas, than in those with more "sectionalism". Both Oates and Pommerehne find no tendency for countries with heterogenous populations to be more decentralised; indeed, they observe the opposite.

Of the few authors who have limited their study to developing countries, Kee cannot find a significant relationship between per capita GDP and fiscal decentralisation^{13/}. This finding would support the hypothesis that the "threshold" beyond which fiscal decentralisation occurs is at a fairly high level of economic development. He does find, however, more decentralisation in countries that are more urbanised, have more open economies, and are governed under a federal system.

Another strand of thought would have fiscal decentralisation affected by the stability of a country's environment. There is a theory that government grows by large amounts in periods of crisis (e.g., wars) and that subnational governments share less than proportionately in this episodic

growth. Peacock and Wiseman's study of government finances in the United Kingdom concluded that social disturbances, such as war and depression, provide an atmosphere in which people become willing to accept a larger government revenue and expenditure share of GNP than in normal times^{14/}. Their results showed that local authorities did not share fully in this upward "displacement" of government spending after World War I and did not share at all in the displacement after World War II. Following this reasoning, then, one might expect that countries which are in a perpetual state of uncertainty about war or internal revolution (e.g., Korea or certain of the Middle East nations) would (cet. par.) tend to be more centralised.

5. An Empirical Model

A testable theoretical model of expenditure decentralisation, into which we might fit these hypotheses, is not offered here. In particular, we are a long way from being able to offer a behavioral model to anticipate and explain the fiscal decisions of local governments in developing countries. Rather, we follow the practice of earlier studies in searching for a pattern which explains why some LDCs are more decentralised than others, and why LDCs are more centralised than developed countries.

One approach to searching out the explanatory influences is to ask how some governments have transferred a greater share of expenditure responsibility to sub-national governments than have others. To do this, we may begin with a balanced budget requirement, i.e., local expenditures (LE) must equal local revenues, hence,

$$LE = LR = LG + OLR \quad (1)$$

where LG = Central grants received by the local government

OLR = Locally raised revenues

Central government revenues (CR) and expenditure (CE) must also be equal so

$$CE = CR = OCR + B + A \quad (2)$$

where OCR = domestically raised central government revenues

B = borrowing

A = external assistance

Finally, central expenditures may be seen as the sum of direct spending (DCE) and grants to local governments,

$$CE = DCE + LG \quad (3)$$

We may now define our fiscal decentralisation measure (DE) as

$$DE = LE / (LE + CE) \quad (4)$$

and by assuming no central borrowing or external assistance^{15/},

$$DE = LG / (LG + OLR + CR) + OLR / (LG + OLR + CR) \quad (5)$$

From equation (5), we might identify two effects on fiscal decentralisation. First there is an "inter-

governmental grants" effect, $(LG/(LG+OLR+CR))$, i.e., the greater the share of central revenues devoted to inter-governmental transfers, ceteris paribus, the greater the degree of expenditure decentralisation. Kee used inter-governmental transfers directly in his estimating equation and found the expected positive effect on decentralisation. This still leaves unexplained, however, why some countries make extensive use of intergovernmental transfers while others do not. Second, there is a local revenue effect $OLR/(LG+OLR+CR)$ which suggests that more decentralisation will be found where (a) greater revenue raising authority is given to local governments, (b) there is a greater willingness of local residents to pay taxes, and (c) the ability of local governments to administer taxes and manage their affairs is greater.

From these two "effects" on fiscal decentralisation, we might begin to identify the underlying determinants. The search for the explanatory variables under such an approach is not casual, but it is clearly subjective. While this is not the best basis on which to specify an empirical model, a moment's reflection will remind that the identification of explanatory variables would be subjective even if a proper theoretical model were posited. One might speculate that paucity of data would severely limit the choice of explanatory variables, and their measurement, to about the same subset as presented here.

We hypothesise that four factors exert a significant influence on the degree of fiscal decentralisation. First, expenditure decentralisation is directly related to the stage of economic development. We proxy this effect with

Urbanisation (U) and per capita GDP (Y), both of which should reflect a greater demand for local public goods and a greater capacity to finance the provision of these goods. We have also included a dummy variable for developing countries (V) to capture the wide per capita income variation within this sample.

A second influence on fiscal decentralisation is country size. In some cases this has led to the choice of a federal system of governance, while in others it has led to the delegation of more fiscal responsibility to sub-national governments. Henderson, among others, has shown a significant linkage between urban deconcentration, urban population, and the choice of a federal system of government^{16/}. The point is that fiscal management in very large countries becomes unwieldy and, cet. par., leads to a much stronger role for the subnational government sector. We would thus expect more fiscal decentralisation in countries with larger populations (P) and/or with federal structures (F). Data limitations prohibit us from stretching this to a consideration of what might be important influences of the demographic structure on fiscal decentralisation^{17/}.

Third, there is the "crisis" effect, i.e., the propensity to give less discretionary powers to local governments in countries where there is a continuing threat of social upheaval. We measure this effect with the percentage of total government expenditures devoted to defence (ED) and hypothesise that higher levels of defence spending will be associated with more fiscal centralisation.

Finally, there is a Central government revenue effort effect. Increased revenue mobilisation by the Central government may result in increased grants to local governments and even increased local taxes in countries where shared taxes operate. If these 'rollout' effects increase LG and OLR more than in proportion to Central revenues, we would find a positive association between Central government revenue mobilisation and fiscal decentralisation. On the other hand, grant policies are discretionary and central tax bases are not always shared; hence, increased central revenue may mean increased fiscal centralisation. The Central government revenue effort effect (R_y) is measured here as the ratio of Central government revenues raised from own sources to GDP.

Definitions of the independent variables and a listing of sources are in Appendix A, as is a list of countries included in the sample.

6. Estimation and Statistical Results

These explanatory factors are used to explain variations in expenditure decentralisation across a pooled sample of 57 countries, and separately for 34 developing and 23 developed countries. All variables are entered into the regressions as measured, except population size, which is expressed in logarithms. The basic estimating equation is

$$DE = f(Y, \ln P, U, F, V, ED, R_y) \quad (6)$$

where Y = per capita GDP
P = population
U = Urbanisation rate

F = Federalism dummy
V = Developed Country dummy
 R_y = Ratio of current revenues to GNP
ED = Per cent of expenditures for defence

There are three problems with straightforward OLS estimation of equation (6). First, expenditure decentralisation and revenue effort may be simultaneously determined. Where central grants or shared taxes are an important source of local revenue, more decentralisation may result from greater central government revenue mobilisation efforts. On the other hand, a greater overall revenue mobilisation may occur because a country is more decentralised and has better developed its local taxing system^{18/}. Using a Hausman test^{19/}, we have rejected this hypothesis - that R_y is endogenous (see Appendix C) - and have estimated (6) with OLS.

A second problem is substantial correlation among the explanatory variables, as suggested by the pattern of simple correlations. The variables which reflect economic development - Y, V, and U - and those which reflect the size effect - P and F - overlap considerably and their separate effects on fiscal decentralisation could not be disentangled. Accordingly, we have employed a factor analysis in an effort to combine these measures to more general indicators of "development" and "size". The rotated factor pattern, shown in Table 2, provides such a result. The first factor is loaded heavily on Y, V, and U and is used to generate an index of development (D). The second factor is loaded heavily on P and F and is used to generate an

index of country size (S). These uncorrelated factors are entered into the regression as independent variables (D and S respectively). The resulting indexes are reported in Appendix B.

Third, the theory of fiscal assignment, as noted above, suggests that fiscal decentralisation will be more responsive to economic development after some threshold level of development has been reached. To account for this effect we have introduced a dummy interaction term, LD, where L = 1 for World Bank classified "low income" countries and L = 0 otherwise^{20/}.

As may be seen from the linear OLS estimates in Table 3, the explanatory variables all have the expected sign and nearly two-thirds of the variance in the 57-country pooled sample is explained. Fiscal decentralisation appears to have gone significantly farther in countries which are larger/federalist and have reached higher levels of development. This finding suggests that some of the primary determinants of fiscal decentralisation are beyond the reach of short-term government policies. The results also show that greater levels of defence spending, cet. par., significantly dampen fiscal decentralisation, e.g., a 10 per cent higher defence spending share is associated with a 2.26 per cent lower expenditure share of subnational governments. We also find that countries that mobilise a greater share of GNP in revenues are less centralised, but the relationship is not significant.

The sample has been split into a developed and developing country subsample, and the OLS estimation repeated. The results for the advanced country analysis

roughly conform to these for the pooled sample, i.e., development and size exert a positive effect on fiscal decentralisation and a higher defence spending share is associated with a lower level of fiscal decentralisation. The advanced country sample shows a stronger negative relation between Central government revenue mobilisation and the public expenditure share of subnational government expenditures, but again, the relationship is not significant. The results for the developing country subsample also show that half of the intercountry variation in fiscal decentralisation can be explained. Again, it is the size and development variables that most influence the fiscal importance of subnational governments.

The separate analysis of the advanced and developing country subsamples suggests the existence of threshold effects on decentralisation, i.e., a country must reach a certain level of development before the demand for fiscal decentralisation begins to respond to increasing population, income urbanisation, etc. The dummy variable for low income countries had the expected negative sign in both the pooled and developing country samples (indicating that, cet. par., the fiscal decentralisation response to development is less in low income countries than anywhere else), but is significant at the 0.05 level in neither case. Yet the inclusion of this variable raised the explained variation in the model and improved the significance of the economic development variable. This result reinforces the notion of a "threshold" effect, and leads us to attempt a more precise estimate of the relationship between fiscal decentralisation and economic development.

We have attempted to estimate the threshold effect by specifying

$$DV = f(D(\lambda), S, ED, R_y) \quad (7)$$

where $D(\lambda)$ is a Box-Cox transformed variable. The result shows

$$DV = 1.2252 + 4.7206D^{1.88} + 9.0511S - 0.2521ED - 0.1627R_y$$

(1.11) (5.98) (-1.81) (-0.81)

$$R^2 = 0.6460$$

while $\hat{\lambda} > 1$ does fit our a priori notion of a threshold effect, the t-value for λ (1.84) is not significantly greater than unity. We cannot reject the hypothesis that a linear specification is appropriate, and hence cannot make a clear estimate of thresholds.

7. Conclusions

These results suggest three explanations for fiscal decentralisation. First, there would appear to be a direct relationship between the level of economic development and the level of public expenditure responsibility given to subnational governments. Development stimulates the demand for services provided by local governments and/or for more local service delivery, in addition to increasing the taxable capacity of local governments. Second, countries with larger populations are more decentralised, perhaps because direct Central government service provision becomes all but

impossible for many functions. Finally, countries whose budgets carry less of a defence burden have been able to decentralise fiscal activities to a greater extent.

These results are, of course, tentative because the sample is so limited, important data are not available, and one needs to reestimate this model with many more developing countries included. Moreover, data for a later year may show different results if there really has been a concentrated movement toward decentralisation in the past decade. These caveats aside, this work does suggest some hypotheses about government policy. First, fiscal decentralisation would appear to accompany the economic development process, but the threshold level of economic development - beyond which countries decentralise government as per capita income rises - would appear to be quite high. The implication of this finding is that government policies to promote fiscal decentralisation are likely to be much more effective for middle and upper income countries. Second, foreign assistance to promote defence budgets, cet. par., could have an important effect on fiscal decentralisation. If foreign military aid is a substitute for defence expenditures from domestic budgets, fiscal decentralisation will be promoted. If, on the other hand, foreign military aid stimulates increased domestic military spending (e.g., the expenditures associated with maintaining equipment and a larger army, repayment of loans for military aid, etc.), then fiscal decentralisation will be retarded by increased defence assistance. In the latter case, some donor countries (e.g., the USA) are in the position of providing development assistance to promote decentralisation while simultaneously providing defence

assistance which may slow the rate of fiscal decentralisation. Finally, the relationship between central government resource mobilisation and expenditure decentralisation is not strong, but it is consistently negative. As Central governments raise more money through the revenue system, the subnational government share of expenditures falls - taxes are more likely to stick where they hit, than to be passed through as grants to local governments. The implication here is that the best route to expenditure decentralisation is to assign local governments particular revenue bases or to guarantee them shares of particular central taxes. Otherwise, increasing central tax effort will not be shared proportionately with subnational governments and increasing fiscal centralisation will result.

TABLE 1

Trends in Fiscal Decentralisation
Average Share of Subnational Governments in
Total Public Expenditure
1960/1973

Countries	Developing (25)	Developed (18)	Total (43)
Federal (8)	39.5/32.5	53.8/61.2	48.4/50.4
Non-federal (35)	20.0/21.4	42.6/48.4	28.4/31.4
Total	22.4/22.7	45.7/52.0	32.1/35.0

Source: International Bank for Recon-
struction and Development/World
Bank, World Tables, 1976.
(Baltimore: Johns Hopkins
University Press, 1976):
Table 7.

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8.3.88

TABLE 2

Rotated Factor Pattern:
Five Independent Variables for 57 Countries*

Variable	Factor 1	Factor 2
Y	0.93546	0.12372
U	0.82659	0.02345
lnP	-0.00479	0.82313
V	0.91898	0.06585
F	0.13412	0.80914
Variance Explained	2.420881	1.352437

* VARIMAX ROTATION

TABLE 3

Ordinary Least Squares Regressions of Expenditure
Decentralisation against Selected
Explanatory Variables^{a, b}

	Pooled Sample of 57 Countries	23 Developed Countries	34 Developing Countries
Intercept	27.0725 (5.5606)	34.2305 (3.554)	20.6383 (2.5849)
D	10.5680** (5.5482)	12.6347* (2.350)	11.6136* (1.8246)
LD	-6.1615 (-1.5395)	-	-6.2094 (-1.3706)
S	8.8914** (5.9064)	6.3344** (2.522)	10.1204** (5.1368)
ED	-0.2264* (-1.6577)	-0.4645* (-1.979)	-0.0953 (-0.5326)
R _y	-0.1746 (-0.8793)	-0.4214 (-1.510)	0.1230 (0.3839)
R ²	0.6544	0.4840	0.5269
Mean Level of Decentra- lisation	21.30	32.24	13.90

a = t-values shown in parentheses below
regression coefficients

b = Hypotheses tests are one-tailed, as specified in the text

* = Indicates significance at 0.05 level

** = At 0.01 level

Appendix A

DATA

A variety of sources were used in constructing the data set. The primary sources were the International Monetary Fund's (IMF), Government Finance Statistics Yearbook and International Finance Statistics Yearbook^{21/}. Additional sources were the World Tables and various country studies published by the World Bank^{22/}, and the United Nations Yearbook of National Account Statistics and Demographic Yearbook^{23/}.

The use of different sources was necessary because the number of countries with detailed information in one source did not provide enough observations. Where data were available from two or more sources, the estimates were checked for comparability, but IMF data were used in the estimation, if available.

Observations are for the year 1973. Where data were unavailable, the closest year was substituted (1972 or 1974). A detailed definition of each variable along with its source is in Table A-1.

TABLE A-1

Definitions of Variables in Estimating Equation

- DE Total local government expenditures as a percentage of total central plus local government expenditures. The primary source is the IMF Government Finance Statistics Yearbook. The secondary source (used for Belgium, Botswana, Greece, India, Japan, Luxembourg, Netherlands, New Guinea, Panama, Philippines, Portugal, South Africa, Swaziland, Sweden, Switzerland, and Zambia) was the UN Yearbook of National Account Statistics. Sources for Turkey, Pakistan, Ecuador, Thailand, and Chile were recent World Bank publications on each country (see References).
- Y Gross National Product (or if not available, Gross Domestic Product) divided by population and then converted into US dollars. The primary source is the IMF International Finance Statistics Yearbook.
- U Per cent Urban Population as reported in the UN Demographic Yearbook.
- R_y Central government current revenue as a percentage of GNP or GDP. Primary sources are IMF Government Finance Statistics Yearbook, and International Finance Statistics Yearbook.
- O Imports plus exports expressed as a percentage of GNP. The primary source is the IMF International Finance Statistics Yearbook.
- ED Expenditure on defence as a percentage of general government revenue. The primary source is World Bank, World Tables, and the secondary source is IMF Government Finance Statistics Yearbook.

Contd...

TABLE A-1 (Contd.)

- V Developed countries as defined in IMF Government Finance Statistics Yearbook are given a value of 1, less developed countries are given a value of 0.
- F Those countries judged as having a federalist structure are given a value of 1, others are given a value of 0.
- P Population is from estimates reported in the International Finance Statistics Yearbook.

Selected Variables

Country	DE	Development (D)		Size (S)	
		Index	Rank	Index	Rank
Australia	40.3	1.4535	7	1.2015	8
Austria	32.2	0.7569	18	1.0726	9
Belgium	15.0	1.5671	6	-0.4323	36
Botswana	9.6	-1.1442	52	-1.2168	53
Brazil	40.9	-0.5808	33	2.1220	3
Canada	59.3	1.5792	5	1.4285	6
Chile	45.8	0.0401	24	-0.3376	33
Colombia	26.2	-0.4208	29	0.0083	25
Costa Rica	6.5	-0.4892	31	-0.9010	50
Cyprus	2.7	-0.3520	27	-1.3030	54
Denmark	45.0	1.5996	3	-0.6691	44
Dominican Republic	4.6	-0.6728	36	-0.5571	40
Ethiopia	4.2	-1.3066	56	0.2147	21
El Salvador	5.0	-0.7216	39	-0.6148	41
Ecuador	20.6	-0.7632	41	-0.3997	35
Finland	36.0	0.8576	16	-0.6227	42
France	16.9	1.2371	10	0.2610	19
Germany	46.1	0.7725	17	1.9311	4
Greece	19.2	0.5076	22	-0.3820	34
Honduras	6.7	-0.9105	46	-0.6841	45
Iceland	18.8	1.1274	13	-1.8062	57
India	53.0	-1.3569	57	2.8951	1
Iran	2.4	-0.6846	37	0.1901	22
Ireland	29.0	0.6444	19	-0.7953	47
Israel	10.6	1.2033	11	-0.8592	49
Italy	17.5	0.5559	20	0.3356	15
Japan	47.1	1.0108	14	0.5342	12
Korea	30.6	-0.7921	42	0.2337	20
Luxembourg	16.6	1.5924	4	-1.6678	56
Madagascar	5.4	-0.8616	45	-0.2871	31
Malaysia	20.6	-0.9420	47	1.3495	7
Mauritius	5.8	-0.5583	32	-1.2055	52
Mexico	22.4	-0.4416	30	1.8406	5
Netherlands	31.9	1.3501	8	-0.2862	30
New Guinea	6.7	-1.1941	53	0.8370	11
Norway	38.7	0.9310	15	-0.6623	43
Pakistan	27.3	-1.0792	51	0.5204	13
Panama	4.6	-0.4061	28	-0.9797	51
Paraguay	4.7	-0.7252	40	-0.7702	46
Philippines	11.1	-0.9634	48	0.3164	16
Portugal	7.8	-0.6379	35	-0.2628	29
South Africa	27.8	0.2391	23	0.0082	26
Spain	9.7	0.5525	21	0.1269	23
Sri Lanka	4.3	-1.0758	50	-0.0855	28
Sudan	19.5	-1.2440	54	-0.0037	27
Swaziland	3.3	-1.0058	49	-1.3628	55
Sweden	44.0	1.8465	1	-0.4796	37
Switzerland	62.9	1.3241	9	1.0107	10
Thailand	6.0	-1.2654	55	0.3641	14
Tunisia	6.1	-0.6254	34	-0.4887	38
Turkey	10.8	-0.7930	43	0.2794	17
United Kingdom	30.6	1.1442	12	0.2653	18
United States	46.5	1.6193	2	2.3121	2
Uruguay	9.2	0.0290	26	-0.8321	48
Venezuela	3.6	0.0347	25	-0.2911	32
Yugoslavia	24.8	-0.7153	38	0.0546	24
Zambia	9.5	-0.8468	44	-0.5100	39

Appendix C

TESTING FOR ENDOGENEITY

For reasons described in the text, it would be reasonable to question the exogenous specification of revenue effort (R_y) used in this paper. To address this question, we use a test described by Hausman to evaluate specification error^{24/}. The Hausman procedure asymptotically tests for correlation between a regressor and the error term. If the null hypothesis of no correlation is not rejected, then the regressor can be treated as exogenous to the system, and OLS can yield consistent estimates. If the null hypothesis is rejected, then endogeneity, errors in variables, and omission of a relevant regressor are all possible causes for the correlation.

In the case of the concern here (that R_y and DE may be simultaneously determined), the test proceeds as follows: First, estimate

$$\hat{z} = \gamma_0 + \gamma_1 [X]$$

where z = either the tax ratio (R_y) or expenditure decentralisation (DE)

X = all exogenous variables in the system ($F, U, ED, Y, O, \ln P, V$)

O = the ratio of imports plus exports to GNP

These are the standard variables used in studies of the determinants of the revenue share, and follow the early work of Lotz and Morss (1970)^{25/}.

Compute z from the first regression. Then, to test $H_0: E(R_y \varepsilon) = 0$, estimate

$$y = \beta_0 + \beta_1 [W] + \beta_2 z + \alpha \varepsilon$$

where

$$y = R_y \text{ if } z = DE \text{ or } y = DE \text{ if } z = R_y, \text{ and}$$

W = exogenous variables in the structural equation for y .

Hausman has shown that testing α for significance amounts to testing for correlation between the regressor and the error term.

The results can be interpreted as follows. If $H_0: \alpha = 0$ is rejected for both variables (R and DE), simultaneity is indicated. If the null hypothesis is rejected for one variable only, that variable is treated as being endogenous. If the null hypothesis is not rejected for either variable, both are treated as being exogenous. The results from these data (see Table C-1) support an exogenous specification of R_y .

TABLE C-1

Hausman Test Results

Dependent Variable	Exogenous Variable	α	t-value	Sample
DE	R _y	-0.01495	-0.0281	Pooled (n=57)
R _y	DE	-0.06491	-0.3382	Pooled (n=57)
DE	R _y	-0.42654	-0.5256	Developed (n=23)
R _y	DE	-1.15699	-0.8367	Developed (n=23)
DE	R _y	0.44926	0.4744	Developing (n=34)
R _y	DE	1.17483	0.8489	Developing (n=34)

NOTES

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