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Measuring Fiscal Decentralization – Exploring the IMF's Databases

Claudia Dziobek, Carlos Gutierrez Mangas, and Phebby Kufa

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Abstract

Conventional wisdom postulates that there are benefits from decentralizing government finances but there is little empirical evidence about actual country practices. This paper presents data on fiscal decentralization for about 80 countries over a period of about 20 years (1990-2008) from the IMF's *Government Finance Statistics Yearbook (GFSY),* the only global database with fiscal data for several levels of government. The data show that in many countries, revenue collection remains relatively more centralized than expenditures and that employment tends to be concentrated in lower levels of government. Except for transition economies, the levels of decentralization are relatively stable over the time period. The findings are shown by degree of economic development, constitutional power arrangements, and geographic area, broadly confirming key factors identified in the literature as determining the extent of fiscal decentralization.

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I. INTRODUCTION

The contribution of this paper is to present and discuss statistics that are available to support the empirical analysis of fiscal decentralization. While there is a rich literature on the theory and policy of the subject, there are relatively few empirical studies. Fiscal decentralization, also referred to as fiscal federalism can be broadly defined as the study of the structure and functioning of multi-tiered governments. Oates (2005) presents a comprehensive survey on the literature, dividing it into two strands, the first-generation theory and the second-generation theory.

Summarizing his findings, the early contributions in the first-generation can be found in the seminal papers of Samuelson (1954, 1955), who defined the nature of public goods, Arrow (1970), who conceptualized the roles of the private and public sectors, and Musgrave (1959), who proposed the functions of the government (income distribution, market failure correction, and macroeconomic stabilization). The first generation concludes that it would be best for the central government to take a lead in macroeconomic stabilization policy, income redistribution, and provision of national public goods. Local governments would be best positioned to provide local public goods because of their superior knowledge of local preferences. However, the central government should monitor and balance the provision of local public goods if there are negative spillovers that could affect other local governments.

The first generation literature also devotes attention to the question of taxation in a multi-layered government. This became known as the "tax assignment problem" and a conclusion was that taxation executed by the local governments should focus on *property taxes* and *user fees*. Other types of taxes executed by local governments would introduce distortions in the location and levels of economic activity since tax bases can be highly mobile and residents can easily relocate to those areas with relatively low taxes.

The second-generation theory encompasses a range of academic disciplines in economics and political science. Key contributions to the theory of federalism focus on information problems, moral hazard, and free riding among the various levels of governments. For example Weingast (1995) and McKinnon (1997) place emphasis on the reliance on local government's *own* sources of revenues for the finance of decentralized budgets. They also distinguish between *hard versus soft* budget constraints where *soft* budget constraints are ignored by the local governments on the belief that a bailout by the central government is possible. This became known as the problem of "raiding the fiscal commons." Rodden (2003) expanded these ideas by suggesting that it is not decentralization that matters per se but *what form* it takes. A decentralization process with local governments relying on their own resources should be more efficient than a decentralization based on transfers which could also lead to perverse forms of decentralization.

Despite the extensive theoretical literature and country case studies, few studies focus on cross-country evidence. For example, Panizza (1999) conducted empirical research on the factors determining decentralization using the IMF's *Government Finance Statistics Yearbook (GFSY)* database. He found that decentralization is positively related to country

size, income per capita, ethnic fractionalization, and level of democracy. The data used by Panizza were presented in the format of the *Government Finance Statistics Manual 1986* (*GFSM 1986*), and the database did not allow for an analysis of intra-governmental transfers, a key feature of fiscal federalism. With the introduction of the *Government Finance Statistics Manual 2001 (GFSM2001)*, the database was restructured. This permits a more nuanced analysis of the various levels of government as illustrated in this paper which includes an enhanced perspective of some of Panizza's findings.

A first step to defining the parameters of fiscal decentralization is to define the institutional structure of government. A generic structure is set out in the *GFSM 2001*, an important innovation which enhances the cross country comparability of fiscal data.[1] The introduction of an explicit institutional definition of government in the IMF's database also supports consistency with other major macroeconomic datasets. The generic structure of government as defined in the *GFSM2001* is shown in Figure 1. We refer to the general government as government level 3 (GL3). The general government's responsibilities or activities can be executed by GL3 and its subsectors, the budgetary central government (GL1), consolidated central government (GL2), or state and local governments, including any social security and extrabudgetary units which are included in GL3. Some government responsibilities are concentrated at the budgetary central government and other responsibilities are devolved or decentralized to lower level governments.

Macroeconomic analysis refers to the level of government that executes significant portions of public policy as general government (GL3), and, for surveillance and cross-country comparisons, this measure is most relevant. In this paper, decentralization is measured as a ratio of GL2/GL3 for selected fiscal indicators.

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[1] Dziobek, et al., 2011, "The IMF's Government Finance Statistics Yearbook – Maps of Government for 74 Countries," IMF WP/11/127 (Washington: International Monetary Fund).

Figure 1. Government Finance Statistics: Institutional Structure of the General Government (GL1-GL3)
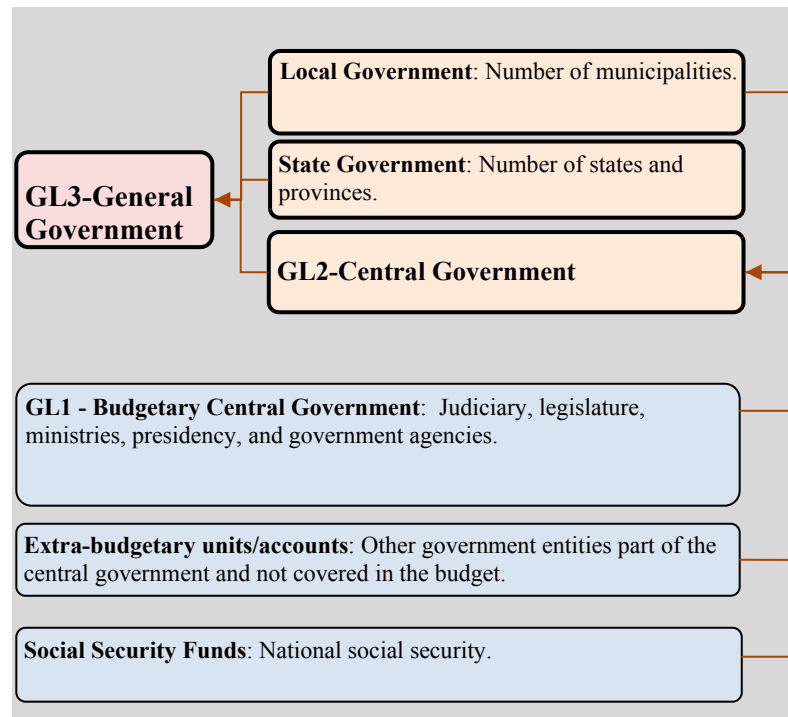
Source: *Government Finance Statistics Manual 2001*

We study the level of centralization in terms of four main indicators: revenue, tax effort, expenditure, and compensation of employees. The source data come from the *Government Finance Statistics Yearbook (GFSY)* which goes back to 1972, but in this paper we only consider data from 1990 to 2008 because the database has a break in the series in 1990.[2] This database tracks government finance statistics for IMF members. Currently the IMF has 187 country members, but in 1990, when our sample begins, the IMF had approximately 150 members. From this set we eliminate the countries that never reported GL3 data. This leaves approximately 80 countries. The dimensions of this database are 19 years, about 80 countries, and four fiscal indicators yielding 5,760 potential observations. There are some data gaps with missing data for one or more years. We have 730 observations for Revenue, 762 observations for Tax Effort, 687 observations for Expenditures, and 736 observations for Compensation of Employees for a grand total of 2,915 observations.

The paper is organized as follows: Section II shows decentralization of government finances for each of the four fiscal indicators. For each indicator, we present the extreme observations in the cross-section for the current year as well as countries with the largest changes. We also

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[2] Prior to 1990, the database contains statistics in the format of the *Government Finance Statistics Manual 1986,* from 1990 the database contains back-filled and current statistics compiled under the *Government Finance Statistics Manual 2001*. A project is in train to link the *pre*-1990 and *post*-1990 data and to fill or explain missing observations.

present the distribution of the ratio for the current year and the changes over time (the difference between the last and first observation for each country). An important caveat is that because of data gaps, the number of years for which the change is reported differs from country to country. Section II examines global trends in fiscal decentralization, and Section III considers changes of government structures over time. Section IV presents the findings by standard IMF country groupings using World Economic Outlook (WEO) classification, by the distinction between unitary and federal governments—the paper follows the definitions in the political science literature—and by groupings based on the accounting basis of recording —as reported in the *GFSY* metadata—. Section V presents a summary and some conclusions for statistical work including techniques to develop more timely fiscal data.

II. GLOBAL TRENDS IN FISCAL DECENTRALIZATION

The degree of decentralization is studied using four measures: revenue, tax effort, expenditure, and compensation of employees. Tax effort, sometimes referred to as fiscal burden, is defined as the sum of tax revenue and compulsory social security contributions *(GFSM 2001, paragraph 5.11)*. The definitions of the other measures are also taken from the *GFSM2001*. The data are consolidated for intra-flows to and from other government units to reflect the autonomous execution of a level of government for a particular aggregate. We compute these aggregates using data from the *GFSY;* the data codes and description of the database used to calculate these aggregates can be found in the forthcoming technical note *Working with the Government Finance Statistics Yearbook Database: A User's Guide (forthcoming 2011).*

Figure 2 provides an example of the challenge in measuring decentralization and the need for several indicators to address it. In 2008, the central government (GL2) of South Africa collected about 95 percent of the taxes of the general government (GL3). The state and local governments executed a relatively high level of government employment captured in the *GFSY* data as compensation of employees. Here, the central government (GL2) accounts for only about 34 percent. The government of South Africa can be described as relatively decentralized when measured by the compensation of employees and more centralized when measured by the tax effort.

Figure 2 South Africa GL2/GL3 Ratios for Selected Fiscal Indicators
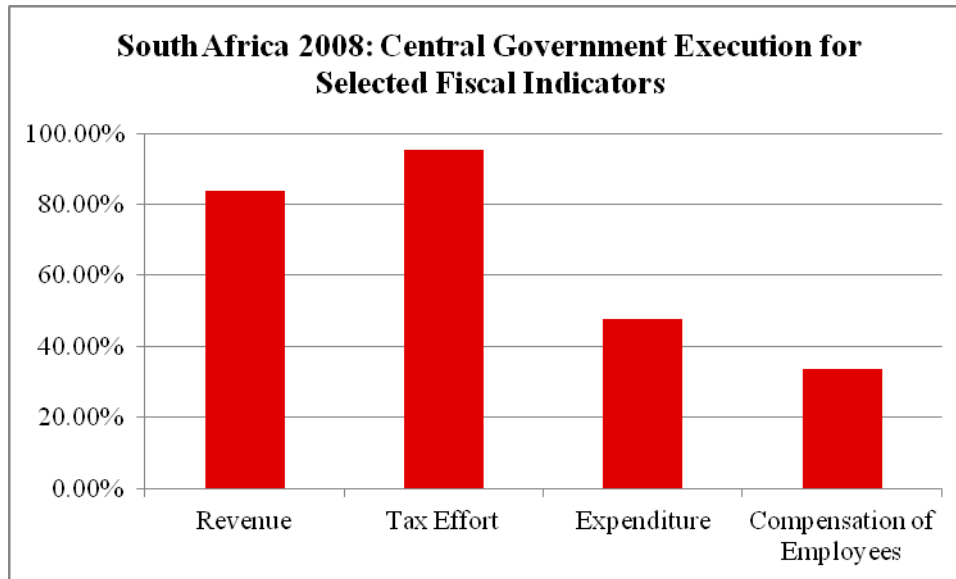
GL2 = Central Government, GL3 = General Government (*Government Finance Statistics Manual, 2001*)

Source: Government Finance Statistics Yearbook (2009)

Visual images for the full set of countries in Figures 3, 5, 7, and 9 plot the results for all countries, respectively, for each of the four GL2/GL3 ratios. These charts are helpful to calibrate high versus low levels of centralization. Figures 4, 6, 8, and 10 present changes of the fiscal aggregates for each country for the years available in the database. An important caveat is that the time period (number of years) is not uniform across countries due to limitations of the database.

More selective data are in Tables 1, 3, 5, and 7 presenting the ten highest and lowest observations for each of the fiscal aggregates (the five most centralized governments and the five least centralized). Tables 2, 4, 6, and 8 present the countries in the sample with the largest changes, respectively for each fiscal aggregate. These changes may provide evidence of a trend or changes in the economic structure of the government. For example, these changes could be driven by reforms aimed at decentralizing the public administration in recent history. However, given the limitations of the database, conclusions should take into account the number of years covered which varies across countries. For example in Table 1, the data for Maldives cover 19 years while for the People's Republic of China (mainland) the time period covered is only three years. The trends need to be interpreted in light of these data limitations. The remainder of this section presents the data for each of the four fiscal indicators.

A. Fiscal Decentralization Measured in Terms of Revenue (GL2/GL3 Ratios)

Figure 3 plots the GL2/GL3 ratios for government revenue for the 74 countries. The data show that most countries fall into the range of 80-100 percent with a small number of countries with ratios well below 50 percent and a larger number of countries at 100 percent. Table 1 lists countries with the lowest and highest ratios. Argentina, Canada, the People's Republic of China, Denmark, India, South Africa, Switzerland, and the United States are among the most decentralized countries in the world. The central government in the five most decentralized countries collects 47 to 62 percent of the general government's revenue. The ranges for the other three fiscal aggregates are: 50 to 64 percent for tax effort, 35 to 50 percent for expenditure, and 12 to 23 percent for compensation of employees.

Figure 4 looks at changes over the time period studied and the largest number of countries are in the 'no change' range which suggests that over the time period studied, the ratio is relatively stable and there is no trend towards more decentralization. As noted above, since data availability is limited, the changes are not fully comparable. For example data for China cover just three years while data for Canada cover a 20 year period. Table 2 shows the countries that experienced the largest changes in terms of revenue collected by the central government. It suggests that in Bolivia, Italy, San Marino, Spain, and Switzerland, local governments have obtained a greater role in the collection of revenue while Bulgaria, Georgia, Kazakhstan, Mongolia, and Romania appear to have adopted a more centralized approach. The same group of countries experienced the largest increase in the GL2/GL3 ratio for Tax Effort as shown in Table 4.

Tax effort is the fiscal indicator with the lowest dispersion both in terms of the cross-section and over time. The cross-sectional range (highest minus the lowest ratio) for tax effort is 52 percent, similar to the one for revenue (53 percent) which can be derived from the data shown in Table 3. The GL2/GL3 ratio range for expenditure is somewhat higher at 65 percent (Table 5) and 88 percent for Compensation of Employees. Figure 6 suggests that tax effort is the most stable ratio evidenced by the large number of countries in the "no change" zone and the relative small magnitude of the countries that have experienced change. The stability of this indicator is also evident when we compare Figure 6 and Figure 10. In Figure 6, there are only two countries with an increase of the GL2/GL3 ratio of more than 20 percent while in Figure 10 which plots changes of the ratio for compensation of employees, there are five countries with an increase greater than 20 percent (Armenia, Bulgaria, Georgia, Ireland, and Mongolia) and three of the countries show changes of more than 40 percent.

The data raise a number of questions which are, however, not analyzed in this paper. For example, are there economies of scale in the collection of taxes that justify a more concentrated function? Is it a pattern reflecting governance or political choices?

The countries that appear to be most centralized in terms of the fiscal data are the bottom five observations of Tables 1, 3, 5, and 7. Maldives, San Marino, Seychelles, Singapore, and St. Kitts and Nevis are included in most of these tables. The common feature of these five countries is their relatively small geographic area which may explain that the distinction GL3 (general government) and GL2 is not very important. The data suggest some evidence that the opposite also holds. The top five observations, with the lowest GL2/GL3 ratios, include countries with large geographic areas: Canada, P.R. of China (mainland), India, and the

United States. The exceptions to this pattern are Switzerland (a country with a relatively small area but highly decentralized) and Russia, a large geographic area but not among the most decentralized as measured by GL2/GL3 ratios.

It is interesting to note that while perfect centralization, a ratio of GL2/GL3 equal to one, is a relatively common occurrence, there is not a single country with perfect decentralization, a ratio of GL2/GL3 equal to zero. This may suggest that some public goods are at least partially provided most effectively at the level of GL3 and a full transfer to the lower levels may not be feasible or desirable (e.g., national defense which is centralized in most countries).

Table 1. GL2/GL3 Ratios for Revenue:* Highest and Lowest
(in percent unless otherwise noted)

Country	GL2/GL3 Ratio	Most recent year	Time period (years)	Change over time period
Canada	47	2007	8	0
China, P.R.: Mainland	48	2007	3	11
Switzerland	49	2007	10	-9
United States	54	2008	10	-5
Argentina	62	2004	3	3
Kuwait	100	2009	8	0
Maldives	100	2008	19	0
Seychelles	100	2008	7	0
Singapore	100	2008	8	0
St. Kitts and Nevis	100	2006	2	0

Consolidation and intragovernment grants adjusted
GL2 = Central Government
GL3 = General Government
Source: *IMF Government Finance Statistics Yearbook* database

Table 2. Countries with Largest Changes of GL2/GL3 Ratios (Revenue)*
(percent unless otherwise noted)

Country	GL2/GL3 Ratio	Most recent year	Time period (years)	Change over time period
San Marino	78	2006	5	-22
Spain	67	2008	14	-17
Bolivia	69	2007	9	-11
Switzerland	49	2007	10	-9
Italy	81	2008	14	-8
Mongolia	92	2008	5	13
Bulgaria	94	2008	19	13
Romania	95	2008	7	15
Georgia	94	2008	6	25
Kazakhstan	81	2008	9	28

Consolidation and intra government grants adjusted
GL2 = Central Government
GL3 = General Government
Source: *IMF Government Finance Statistics Yearbook* database

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Figure 3. Distribution of GL2/GL3 Ratios (Revenue)
74 countries, 2008 in percent

Source: *IMF Government Finance Statistics Yearbook* database

Figure 4. Changes in GL2/GL3 for Revenue over Time for 74 Countries (1990-2010)

Source: *IMF Government Finance Statistics Yearbook* database

**Table 3. GL2/GL3 Ratio of Revenue: Tax Effort[*]
as Percentage of General Government**

Country	CG/GG Ratio	Most Recent Year	Obser-vations (years)	Change over time
China, P.R.: Mainland	48	2007	3	1
Canada	51	2009	27	-2
Switzerland	58	2007	10	-8
India	62	2006	8	-1
United States	64	2008	10	-5
Malta	100	2008	12	0
San Marino	100	2006	5	0
Seychelles	100	2008	7	0
Singapore	100	2008	8	0
St. Kitts and Nevis	100	2006	2	0

Consolidation and intra government grants adjusted
GL2 = Central Government
GL3 = General Government
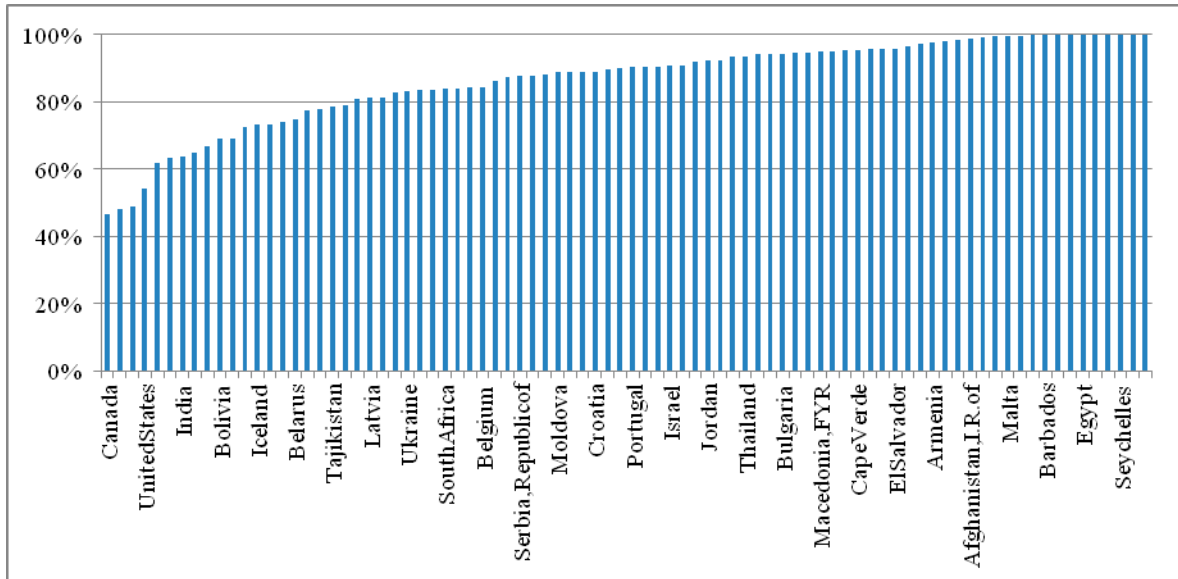Source: *IMF Government Finance Statistics Yearbook* database

**Table 4. Extreme Observations in the Trend of Central Government Tax Effort[*]
as Percentage of General Government**

Country	CG/GG Ratio	Year	Obs.	Change in Sample
Spain	69	2008	14	-17
Switzerland	58	2007	10	-8
Bolivia	71	2007	9	-8
Italy	85	2008	14	-8
Slovak Republic	88	2008	9	-8
Romania	97	2008	7	17
Mongolia	94	2008	5	17
Bulgaria	95	2008	19	18
Kazakhstan	73	2008	9	23
Georgia	96	2008	6	28

Consolidation and intra government grants adjusted
GL2 = Central Government
GL3 = General Government
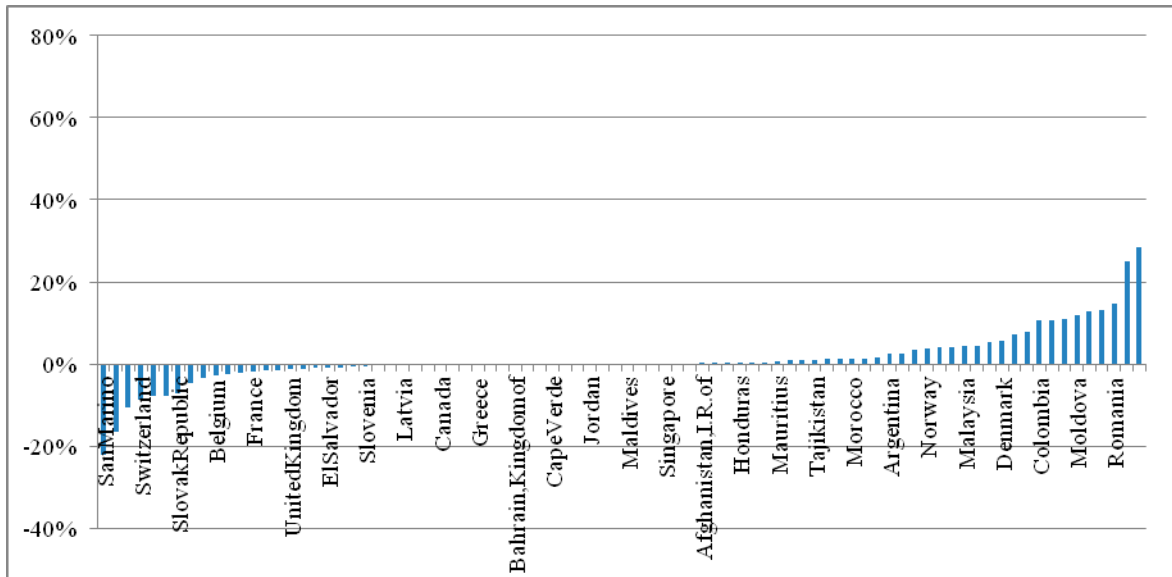Source: *IMF Government Finance Statistics Yearbook* database

Figure 5. Sample Distribution for GL2/GL3 (Tax Effort) (in percent)

Source: *IMF Government Finance Statistics Yearbook* database

Figure 6. Sample Distribution for the Trend in GL2/GL3 (Tax Effort) (in percent)

Source: *IMF Government Finance Statistics Yearbook* database

Table 5. Extreme Observations in the Level of Central Government Expenditure[*]
as Percentage of General Government

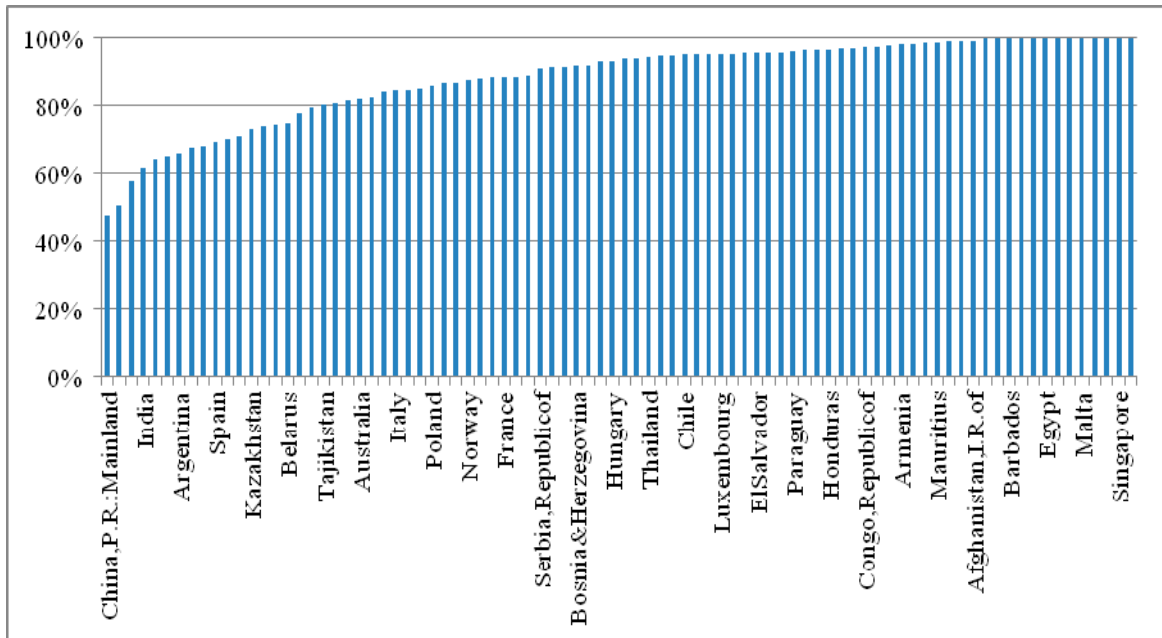| Country	CG/GG Ratio	Year	Obs.	Change in Sample
Canada	35	2007	8	-4
Denmark	36	2008	14	-11
Switzerland	43	2007	10	-9
India	48	2006	5	-5
South Africa	48	2008	13	1
Kuwait	100	2009	5	0
Maldives	100	2008	19	0
Seychelles	100	2008	7	0
Singapore	100	2008	8	0
St. Kitts and Nevis	100	2006	1	0

Consolidation and intra government grants adjusted
GL2 = Central Government
GL3 = General Government
Source: *IMF Government Finance Statistics Yearbook* database

Table 6. Extreme Observations in the Trend of Central Government Expenditure[*]
as Percentage of General Government

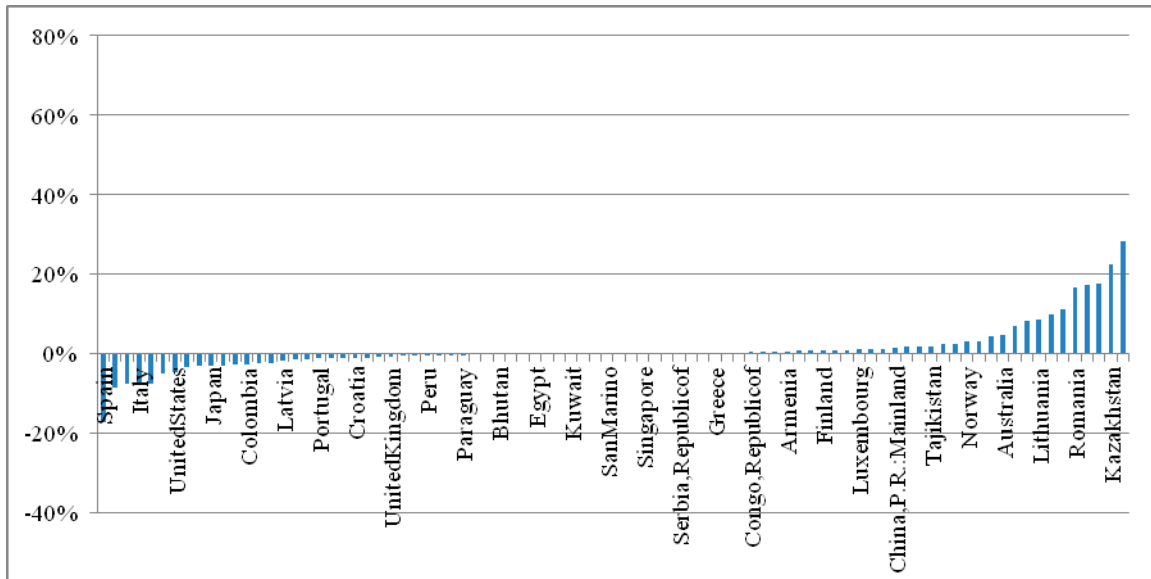| Country	CG/GG Ratio	Year	Obs.	Change in Sample
Spain	50	2008	14	-17
Peru	62	2008	14	-14
Bolivia	55	2007	9	-12
Slovak Republic	83	2008	9	-12
Thailand	82	2008	14	-11
Moldova	75	2008	6	7
Colombia	72	2003	4	12
Ireland	81	2008	14	12
Georgia	81	2008	6	15
Mongolia	93	2008	5	24
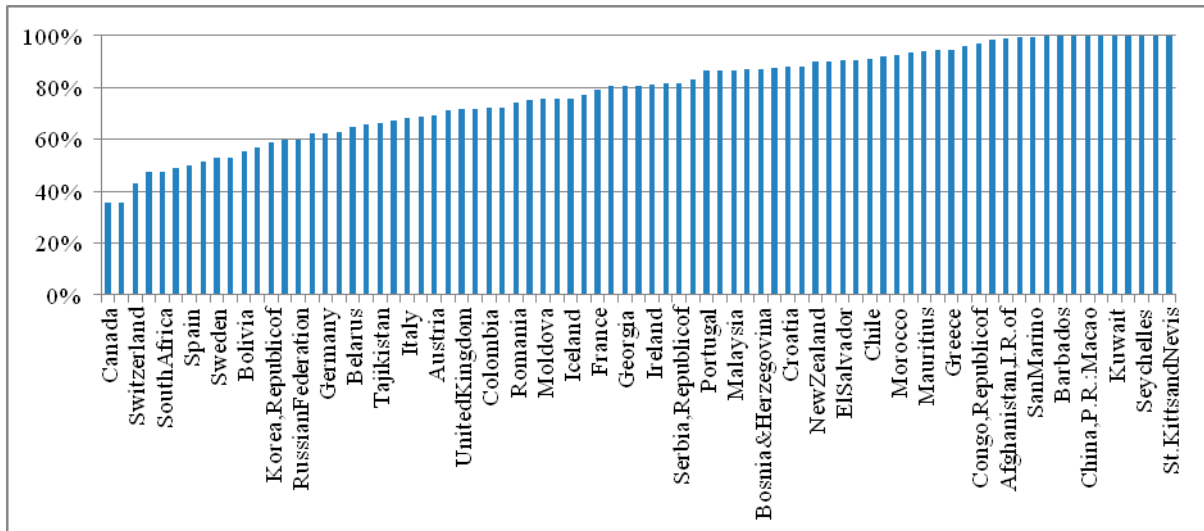
Consolidation and intra government grants adjusted
GL2 = Central Government
GL3 = General Government
Source: *IMF Government Finance Statistics Yearbook* database

Table 7. Highest and Lowest Levels of GL2/GL3 (Compensation of Employees)[*]
(in percent unless otherwise noted)

Country	CG/GG Ratio	Year	Obs.	Change in Sample
Switzerland	12	2007	10	-3
Canada	18	2008	26	0
Spain	22	2008	14	-24
Sweden	23	2008	14	0
Germany	23	2008	14	1
Maldives	100	2008	19	0
San Marino	100	2006	5	0
Seychelles	100	2008	7	0
Singapore	100	2008	8	0
St. Kitts and Nevis	100	2006	2	0

Consolidation and intra government grants adjusted
GL2 = Central Government
GL3 = General Government
Source: *IMF Government Finance Statistics Yearbook* database

Table 8. Extreme Observations in the Trend of Central Government's Compensation of Employees[*] as Percentage of General Government

| Country	CG/GG Ratio	Year	Obs.	Change in Sample
Slovak Republic	61	2008	9	-29
Macedonia, FYR	71	2008	3	-24
Spain	22	2008	14	-24
Thailand	84	2008	9	-11
Russian Federation	44	2008	12	-8
Armenia	91	2008	6	24
Ireland	85	2008	14	29
Bulgaria	70	2008	19	43
Georgia	91	2008	6	45
Mongolia	92	2008	5	63

Consolidation and intra government grants adjusted
GL2 = Central Government
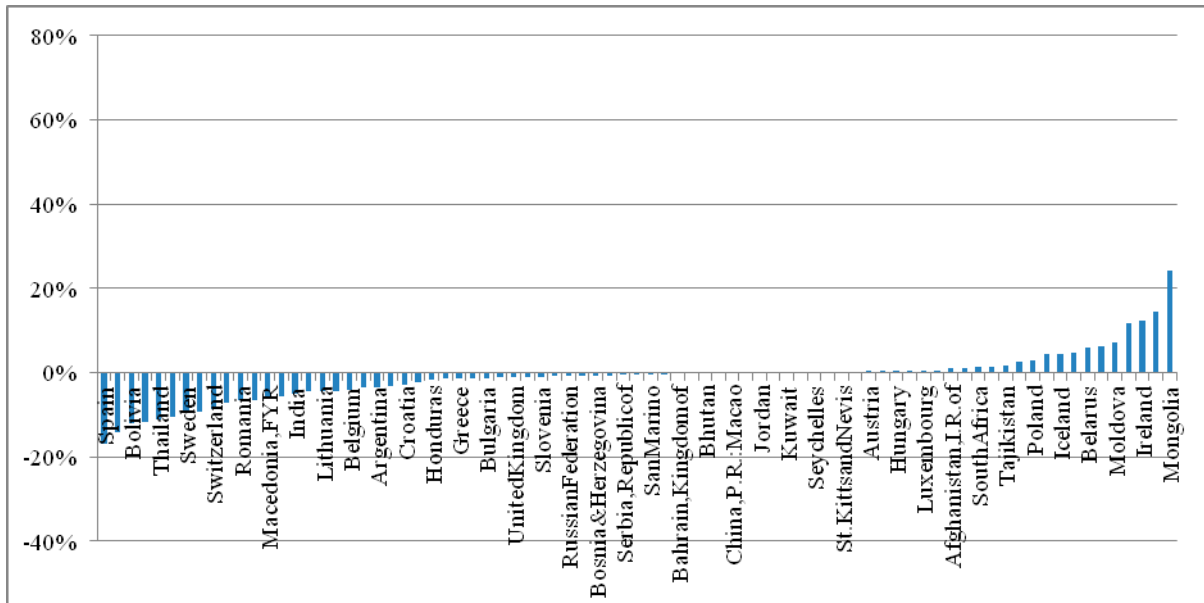GL3 = General Government
Source: *IMF Government Finance Statistics Yearbook* database

Figure 9. Sample Distribution for GL2/GL3 Compensation of Employees (percent)
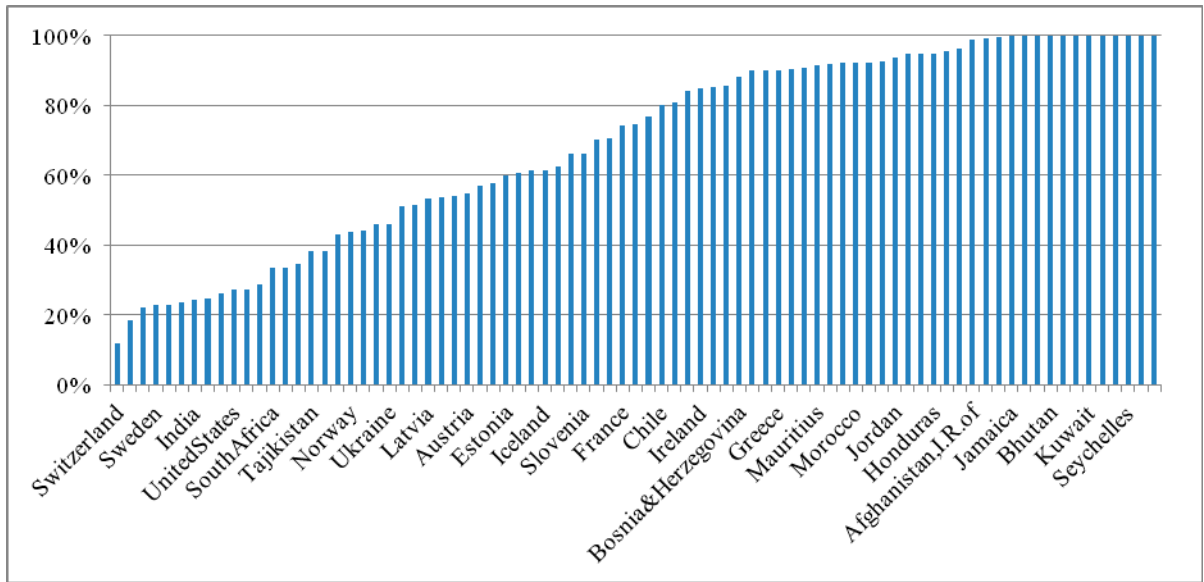
Source: *IMF Government Finance Statistics Yearbook* database

Figure 10. Sample Distribution for the Trend in GL2/GL3 Compensation of Employees (percent)
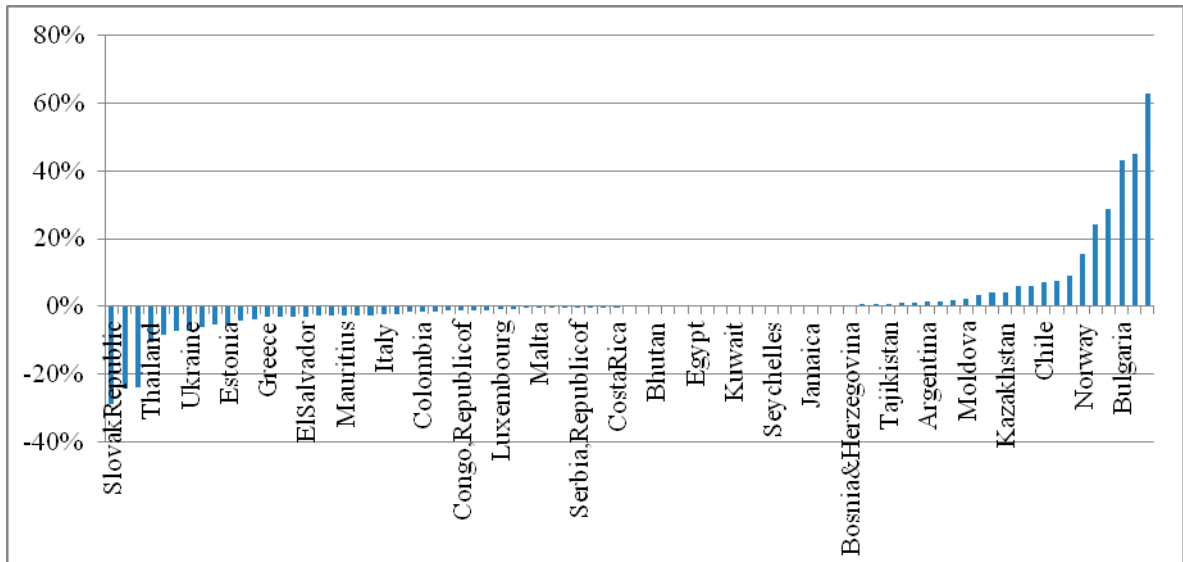
Source: *IMF Government Finance Statistics Yearbook* database

III. FINANCIAL DECENTRALIZATION APPEARS TO BE STABLE OVER THE 20 YEAR PERIOD

The data show that the level of decentralization is relatively stable over the time period analyzed although for some countries decentralization occurs in recent years. Figure 11 shows the evolution (for the years in which we have data available) of the ratio of GL2/GL3 for revenue. This group includes both advanced, developing, and emerging as well as small and large countries. During the decade of 1998-2008, governments have devolved some activities. This is, however, a very small move towards a more decentralized government.

Exceptions are countries that underwent a transition to a market economy where the data show significant changes in the level of decentralization.[3] The main examples are Armenia, Bulgaria, Georgia, Kazakhstan, the Islamic Republic of Macedonia, Romania, the Russian Federation, and the Slovak Republic. The absolute value of the change of every fiscal aggregate with the exception of compensation of employees ranges from 7 to 28 percent. Compensation of employees has the widest range, 8 to 63 percent.

Additional data supporting these findings are presented in the next section. The 10-year percent changes shown in Table 9 are mostly zero or show small negative numbers (decrease in the share of the central government). These results are consistent for whether a country's political structure is characterized as federal or unitary and whether the country is advanced or emerging. The composition of revenue collected by the various levels of government shows little or no change. However, this paper does not investigate the extent to which this stability is the result of deliberate policy.

These results have important implications for the operational work for the IMF. In both program and surveillance activities, annual forecasts for the general government (GL3) are updated on the basis of partial (monthly or quarterly) outcomes, for which timely data are often available only at the central government (GL2) level. If the ratio of central to general fiscal variables is known and can be studied over time and over the course of the business cycle, it may be possible to use this information to supplement available data. At a minimum, this information is useful to be aware of the order of magnitude of information not available. The information on a country's relative stability of the GL2/GL3 ratio can be incorporated in a model to estimate local government data but analysts would need to be aware of policy changes or turning points and the potential for forecasting errors to be magnified as the economic cycle reaches a peak or a trough.

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[3] A transition to a market economy is a plausible hypothesis. However, we thank Linda Kezbere for pointing out that changes in the ratio can also be "nominal changes," e.g., that the amount of revenue of central government can increase because of a nominal change in the taxation policy, e.g., changes in particular tax rates collected by GL2. This type of change would not be a genuine transfer of revenue collection rights to lower levels of government.

Figure 11. The Share of Central Government is Broadly Stable Over Time: Four Country Examples
(In percent of GL3 revenue)

Proportion collected by the Central Government

Proportion collected by the State and Local Governments
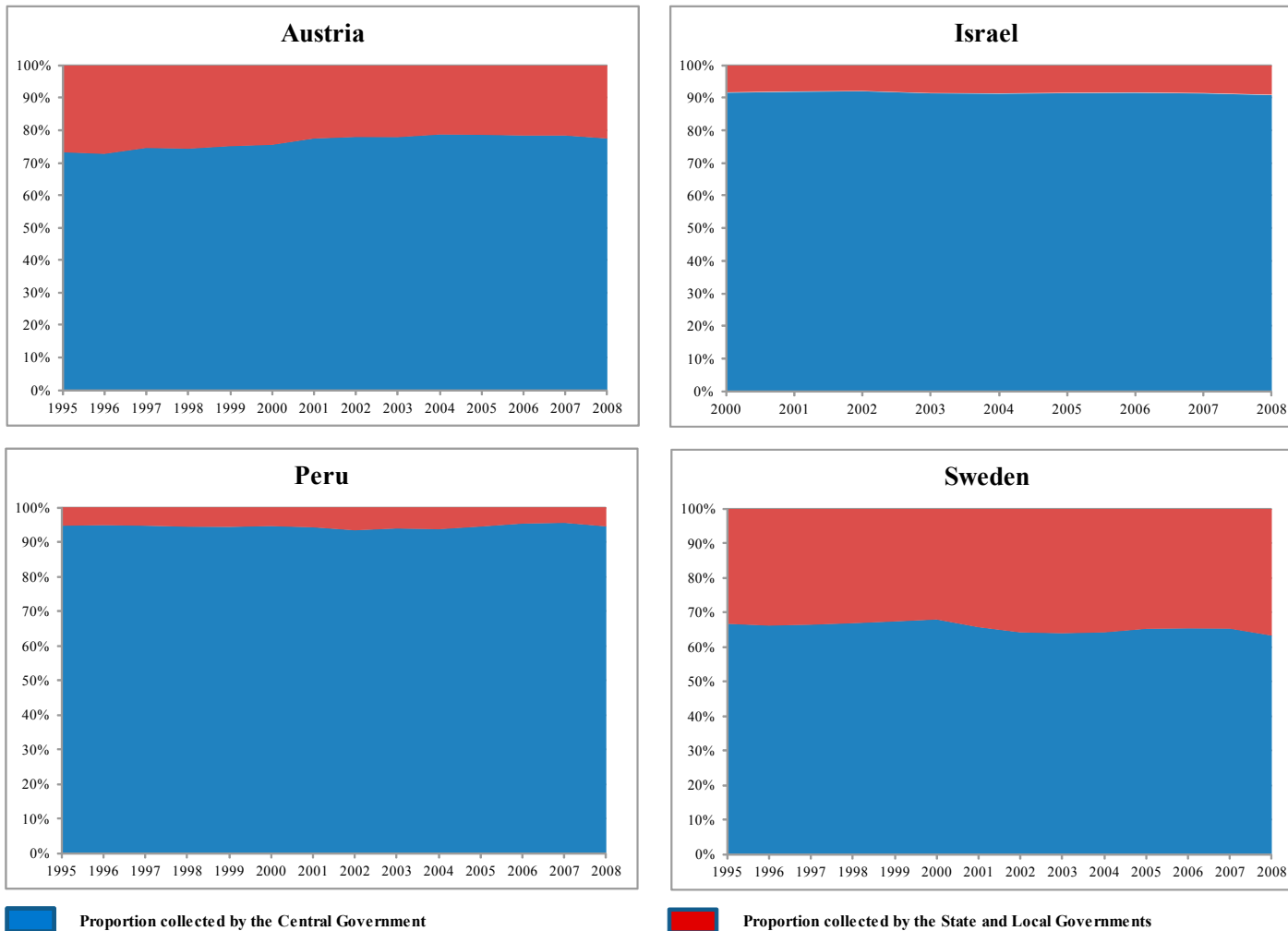
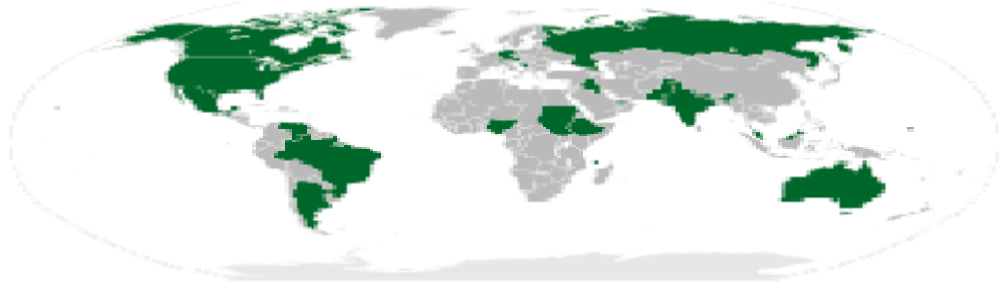# IV. DATA ON FISCAL DECENTRALIZATION BY COUNTRY GROUPS

In this section, we present the main findings by country groups: the entire sample of countries (labeled as "All"), the countries grouped by geographic region as defined in the IMF's *World Economic Outlook (WEO)*, two groups defined by whether countries export fuel or primary materials (also *WEO's* definition), two groups defined by the constitutional power arrangement, unitary and federal, as defined in the political science literature (Box 1), and two groups based on the accounting basis of recording, accrual and cash, (*GFSY* definition). The empirical results are summarized in Table 9. This table presents the cross-country mean, standard deviation, the number of countries, and the 10-year change for each fiscal aggregate for fiscal year 2008. The data indicate that the central government (GL2) is responsible for revenue collection (overall average of 88 percent) in contrast to the execution of expenditures (overall average of 79 percent) (Table 9). It appears that central governments retain control on the collection of taxes and mandatory social contributions (tax effort). Among the four fiscal aggregates dispersion is lowest for tax effort (a standard deviation of only 10 percent) followed by revenue (11 percent), expenditures (16 percent), and compensation of employees (26 percent). These findings appear to be consistent with the literature on fiscal federalism which poses that decentralization of taxation is only desirable for a limited share of total revenues, namely property taxes and user fees.

Box 1. Classifying Governments in Terms of Constitution Power Arrangement

Governments can have different ways of distributing responsibilities as defined in the constitutional division of powers across levels of government. The literature differentiates between two extremes:

- *A Unitary government* is based on a constitution, which sets supreme authority to the central government. The central government can delegate power through decentralization to local governing institutional units, serving as an administrative arm of the central government to provide uniform and equal access to public services. Unitary government can be single (e.g. Monaco, Singapore, Sweden) or multitiered (the central government, state government, and local government).

- *A Federal government* is based on a constitution that defines how power is shared between the government institutional units (the central government, state government, and local government). The constitution allocates duties, rights, and privileges to each level of government. It has a multiordered government, with somewhat independent governments that share decision-making responsibilities for the supply of public services.

Unitary Governments in light shade and Federal Governments in dark shade

Source: Wikipedia http://en.wikipedia.org/wiki/

Table 9. Summary Statistics on Fiscal Decentralization (GL2/GL3) by Country Groups, 2008

GROUP	REVENUE in percent unless otherwise noted					EXPENDITURE in percent unless otherwise noted				
	Average[a]	Std. Dev.	Countries[c]		10-year Change[b]	Average[a]	Std. Dev.	Countries[c]		10-year Change[b]
All	88	11	63	22	0	79	16	62	19	-2
Advanced Economies	**82**	12	24	15	-1	**72**	16	24	15	-2
Developing and Emerging Economies	**91**	7	39	7	1	**83**	14	38	4	-4
t-Statistic ($\mu_1 - \mu_2$)	(-3.35)					(-2.69)				
Subsaharan Africa	95	6	5	1	0	86	20	5	0	
Asia Pacific	93	9	6	2	0	88	17	6	0	
European	84	9	36	18	0	73	13	36	18	-1
Middle Eastern and Central Asia	94	5	9	0		87	15	8	0	
Western Hemisphere	89	14	7	1	0	81	16	7	1	-16
Fuel and Primary Materials Exporter	88	10	6	1	0	71	18	5	1	-16
Nonexporter of fuel and primary materials	88	10	57	21	0	79	15	57	18	-1
t-Statistic ($\mu_1 - \mu_2$)	(-0.10)					(-0.97)				
Unitary Government	**90**	8	55	18	0	**81**	15	54	15	-2
Federal Government	**72**	10	8	4	-3	**62**	11	8	4	-4
t-Statistic ($\mu_1 - \mu_2$)	(4.59)					(4.23)				
Cash basis system	**92**	8	30			**85**	14	27		
Accrual basis system	**84**	11	36			**73**	16	36		
t-Statistic ($\mu_1 - \mu_2$)	(3.18)					(2.92)				

(a) Mean for the indicated number countries counted, in 2008, (b) Difference of mean in 1998 from 2008, (c) Number on the left column is the number of countries reporting GFS in 2008, and the number on the right column indicates the number of countries in this subset with data for the last 10 years.
GL2/GL3 refers to the share of central government (GL2) in relation to general government (GL3).

**Table 9. *(continued)*. Summary Statistics on Fiscal Decentralization by Country Groups, Fiscal Year 2008
(The Share of Central Government (GL2) in Relation to General Government (GL3))**

GROUP	TAX EFFORT in percent unless otherwise noted					COMPENSATION OF EMPLOYEES in percent unless otherwise noted				
	Average[a]	Std. Dev.	Countries[c]		10-year Change[b]	Average[a]	Std. Dev.	Countries[c]		10-year Change[b]
All	90	10	65	24	0	68	26	65	23	0
Advanced Economies	**85**	11	26	17	-1	**55**	28	26	17	0
Developing and Emerging Economies	**92**	8	39	7	1	**76**	22	39	6	1
t-Statistic $(\mu_1 - \mu_2)$	(-2.75)					(-3.27)				
Sub-Saharan Africa	98	2	5	1	0	83	25	5	1	-1
Asia Pacific	92	11	7	2	0	84	26	6	1	0
European	87	10	37	19	-1	59	22	37	19	1
Middle Eastern and Central Asia	93	8	9	0		87	19	9	0	
Western Hemisphere	92	11	7	2	0	70	30	8	2	-6
Fuel and Primary Materials Exporter	86	12	6	1	0	67	23	6	1	-14
Nonexporter of fuel and primary materials	90	10	59	23	0	68	27	59	22	1
t-Statistic $(\mu_1 - \mu_2)$	(-0.74)					(-0.07)				
Unitary Government	**91**	9	57	19	0	**73**	23	56	18	1
Federal Government	**76**	10	8	5	-4	**37**	21	9	5	-3
t-Statistic $(\mu_1 - \mu_2)$	(4.23)					(4.72)				
Cash basis system	**93**	9	30			**80**	22	29		
Accrual basis system	**86**	12	39			**59**	27	38		
t-Statistic $(\mu_1 - \mu_2)$	(2.55)					(3.45)				

(a) Mean for the indicated number countries counted, in 2008, (b) Difference of mean in 1998 from 2008, (c) Number on the left column is the number of countries reporting GFS in 2008, and the number on the right column indicates the number of countries in this subset with data for the last 10 years.
GL2/GL3 refers to the share of central government (GL2) in relation to general government (GL3).

There are some patterns that emerge when the data are examined based on peer groups (e.g., economic development, region, fuel and primary materials exporter, and constitutional power arrangement). To assess whether these patterns are caused by noise in the sample selection, we compute for those peer groups with two categories (e.g., advanced versus developing and emerging) a Difference-in-Means t-statistic.[4] The Difference-in-Means parameter is t = $(\mu_1 - \mu_2)/\sqrt{((\sigma^2_1/n_1) + (\sigma^2_2/n_2))}$ which we calculate using the sample equivalents. μ_1 is the mean of one of the pair groups (e.g., advanced economies) and μ_2 is the mean of the other group (e.g. developing and emerging economies). σ^2_i describes of the variance of the group i, and n_i is the number of countries in group i. This statistic can tell us when a difference in the mean for two groups given their respective standard deviations cannot be explained by randomness. Thus the main conclusions of the peer-group analysis are:

- Advanced economies tend to be more decentralized than developing and emerging economies. This statement appears to be valid for each of the four fiscal aggregates. The central government execution of tax effort is 85 percent (with standard deviation of 11 percent) in advanced economies compared to 92 percent (with standard deviation of 8 percent) in developing and emerging economies. These results are significant at 95 percent level of confidence (the Difference-in-Means statistic is minus 2.75, rejecting the null hypothesis that the mean tax effort of the central government in advanced economies is equal to that of developing and emerging economies).

- Economies with a federal constitution tend to be more decentralized than economies with a unitary constitution. Of the different groups, this exhibits the largest statistical difference as measured by the Difference-in-Means statistic. Notice that the observation is interesting because a constitutional arrangement does not automatically imply the degree of economic centralization; not always unitary countries have a centralized government or, inversely, federal countries have a decentralized one. For example Sweden has a unitary constitution but is a decentralized economy in each one of the fiscal aggregates, the GL2/GL3 ratios for revenue and compensation of employees are 60 and 20 percent respectively which suggests that the subsectors (state and local government sector) control a large portion of the government's finances.

- Governments tend to decentralize expenditure execution more than revenue collection. The degree of decentralization varies considerably by the different fiscal aggregates. These findings suggest that revenues (mostly taxes) are centralized reflecting the investment costs for establishing tax collection units, and economies of scale in processing tax collections (Figure 12 and 13).
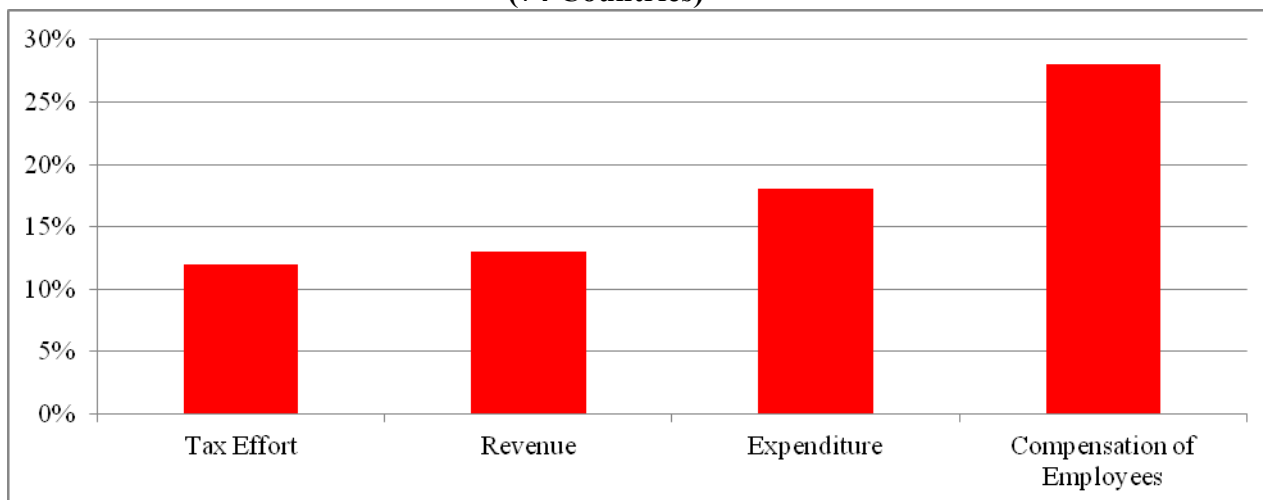
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[4] To get a simple description on the assumptions for this statistic please refer to http://stattrek.com/AP-Statistics-3/Difference-Between-Means.aspx?Tutorial=Stat

**Figure 12. Cross-Country Average of GL2/GL3 Ratios
For Four Fiscal Indicators in 2008**
(74 countries, in percent)
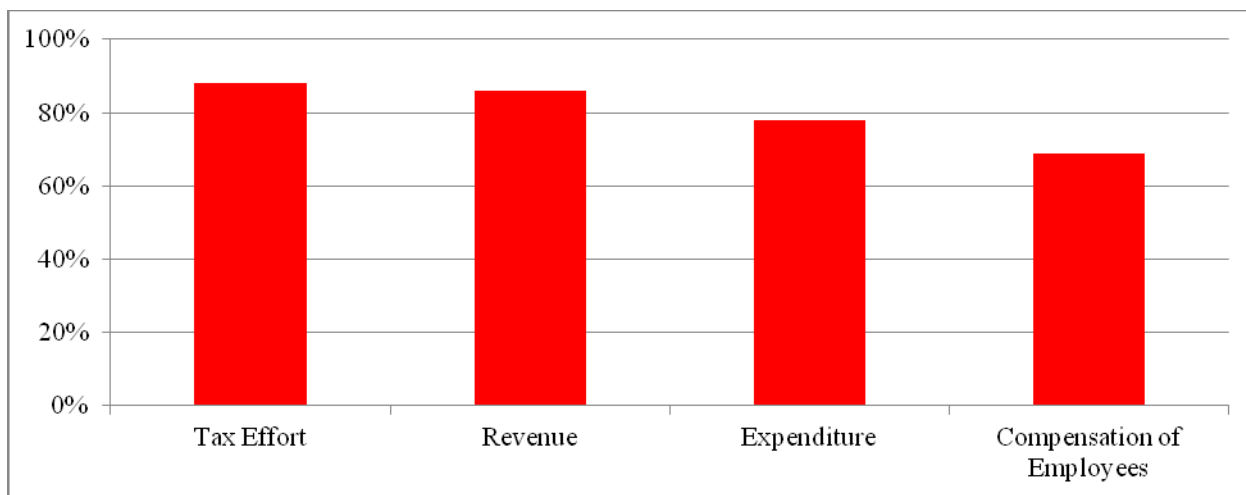
**Figure 13. GL2/GL3 Ratios, Standard Deviation of Four Fiscal Indicators, 2008
(74 Countries)**

GL2=Central Government; GL3=General Government as defined in Government Finance Statistics Manual 2001

Source: Government Finance Statistics Yearbook (2009)

Economies with large geographic areas tend to be more decentralized than economies with a small geographic area. Most of the decentralized economies have relatively large geographic areas. Switzerland appears to be an exception although the mountainous topography may argue for the equivalent of a country with a larger geographic area. The most centralized countries are Malta, San Marino, Seychelles, Singapore, and St. Kitts and Nevis, all of them with small geographic areas.

A. Accrual versus Cash

The *GFSM 2001* recommends that government finance statistics should be prepared on an accrual basis in addition to preparing cash flow statements. The idea is that cash-recorded data are needed to manage government liquidity while accrual data are needed to match the time of recording to actual resource flows and to accomplish consistency with other macroeconomic datasets (e.g. national accounts data are prepared on an accrual basis in many countries). In practice, many countries implement accruals-based accounting for key areas (e.g. by including grants-in-kind, accounts payable including arrears, which would not be included in a pure cash accounting system).

The *GFSY* database includes metadata on countries' basis for recording. Countries using accruals data tend to be more decentralized than cash recording economies (see last two rows in Table 9). For example, the revenue GL2 to GL3 ratio in those countries with a cash basis of recording is 92 percent while the same figure for countries with an accrual basis of recording is around 84 percent. This contrast is more pronounced when comparing compensation of employees. In this indicator, the ratio GL2 to GL3 is 80 percent for countries using only a cash basis but only 59 percent for countries with an accrual basis. The difference in the sample mean between accrual and cash for each one of these indicators is statistically significant as measured by the t-statistic with over a 95 percent confidence level.

This does not prove causality between decentralization and sophisticated formats for recording transactions. However it suggests that the developments of the accounting system allows or supports the devolvement of activities. In two fiscal aggregates (compensation of employees and expenditures), there is also a significant difference in the mean for countries with a cash recording basis and countries with a noncash recording basis. One may also think of a scenario where economic development provides the resources necessary to modernize the public administration, and the reform of the public sector brings greater autonomy to local governments and a more developed accounting system with an accrual recording basis. Hence the relation of causality goes from economic development to both fiscal federalism and a more developed accounting system.

V. Conclusion and Further work

This paper presents data on fiscal decentralization for about 80 countries from the *Government Finance Statistics Yearbook (GFSY)* over a period up to 20 years starting in 1990. While the number of countries included in this study is sufficient to yield some robust results, the authors wish to emphasize that for a number of countries, the data cover a shorter time period. The authors sought to include all of the countries in the database with data for the two main levels of government analyzed in this paper (GL2 and GL3), respectively referring to the statistical concepts of central and general government as defined in the *Government Finance Statistics Manual (GFSM 2001)*.

We used four fiscal indicators to study decentralization, revenue and tax effort, expenditures, and compensation of government employees. The data show that levels of and trends for decentralization differ across indicators. This suggests that decentralization can be implemented in different categories of government activity. Most countries tend to

decentralize the execution of expenditures to lower level governments, while tax policies are centralized at the central government level.

Except for countries that underwent systemic reforms, the levels of decentralization are relatively stable over the time period. The relative stability of the level of decentralization has an important application for statistical purposes particularly for the timeliness of data. It provides a basis to develop estimates of data for state and local governments, where data are often available with long delays.

The findings are shown by country groups in terms of degree of economic development, constitutional power arrangements, geographic area and size of countries, the key factors identified in the literature as determining the extent of fiscal decentralization.

The data support the conventional wisdom that larger, more developed countries tend to put in place more decentralized government finance systems than smaller countries or emerging and developing countries. Some of the more decentralized countries have invested in sophisticated accounting systems that produce timely data.

A. Further Research

Timely fiscal data with appropriately broad institutional coverage (GL3) are important for policy analysis. Statistical dissemination standards recommend that countries disseminate data on the general government (GL3) on an annual basis but increasingly, policy makers are seeking information on quarterly general government data published in a timely manner of about three months after the reference period. This is viewed as important to provide early warning on the direction of the fiscal stance or effectiveness of the fiscal policy.

However, compiling fiscal data for local governments present challenges for timely general government data in many countries and economists therefore often base their analysis on less comprehensive data. The empirical evidence in this paper points to a relatively high level of stability in the economic structure of government for most countries. This suggests that estimation could be developed for the data of the lower level government to supplement more timely data available only for GL1 or GL2.

However, the data also show that the degree of decentralization varies across fiscal aggregates. This also suggests that data compilers can develop strategies to improve the communication among the different levels of government for those functions in which the central government has devolved most of the execution to local governments; this would be the case for the data on compensation of employees.

Future research could explore the differences between the GL2/GL3 ratios of revenues and expenditure and explore the possibility of a composite indicator of decentralization. A further scrutiny of highly centralized economies (a ratio GL2/GL3 equal or close to one) would also be a worthwhile area of research to determine whether there may be other indicators of decentralization that may not be captured by the data. Finally, this research highlights significant gaps in the database which should be addressed.

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