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Tax Capacity and Tax Effort

Extended Cross-Country Analysis from 1994 to 2009

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Abstract

One of the important factors for economic development is the existence of an effective tax system. This paper deals with the concept and empirical estimation of countries' taxable capacity and tax effort. It employs a cross-country study from a sample of 110 developing and developed countries during 1994–2009. *Taxable capacity* refers to the predicted tax-to-gross domestic product ratio that can be estimated empirically, taking into account a country's specific macroeconomic, demographic, and institutional features, which all change through time.

Tax effort is defined as an index of the ratio between the share of the actual tax collection in gross domestic product and taxable capacity. The use of tax effort and actual tax collection benchmarks allows the ranking of countries into four different groups: low tax collection, low tax effort; high tax collection, high tax effort; low tax collection, high tax effort; and high tax collection, low tax effort. The analysis provides broad guidance for tax reforms in countries with various levels of taxable capacity and revenue intake.

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Tax Capacity and Tax Effort: Extended Cross-Country Analysis from 1994 to 2009[*]

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I. INTRODUCTION

The international development community is increasingly recognizing the centrality of effective taxation to development.[3] The G-20, multilateral institutions, and the donor community want to ensure that their assistance to developing countries to reinforce their tax systems is effective, coherent, and well harmonized (OECD, 2011).

Tax systems exert a significant impact on investment decisions. On the other hand, higher tax revenues are important to lower the aid dependency in low-income countries. They also encourage good governance, strengthen state building and promote government accountability.

Effective tax systems are essential for both developing and developed countries. Given that budget deficits have been dramatically increasing in many countries following the introduction of large stimulus packages to promote economic growth in the face of the financial and economic crisis of 2008-2009, governments have been searching for possible ways of increasing tax revenues to finance public expenditures and narrow the deficit without much distorting economic activities.

The first step to understand public revenue systems is to establish some commonly agreed performance measurements and benchmarks. In this regard the paper deals with the concept and empirical estimation of countries' taxable capacity and tax effort. This paper is the second part of Le, Moreno-Dodson, and Rojchaichaninthorn (2008) and intends to develop further country tax effort typologies and policy implications for fiscal revenue reforms.

Measuring taxation performance of countries is both theoretically and practically challenging. The actual tax collection-to-gross domestic product (GDP) ratio is generally interpreted as a measure of tax effort and used as the basis for cross country tax comparison. The use of such ratio is reasonable if one attempts to establish trends or to compare tax revenue performance across countries with similar economic structure and the same level of income. However, when used to compare the effectiveness in revenue mobilization across countries in different income groups, the tax-to-GDP ratio could provide a "completely distorted" picture due to different economic structures, institutional arrangements, and demographic trends. A number of tax economists have attempted to deal with this problem by applying an empirical approach to estimate the determinants of tax collection and identify the impact of such variables on each country's taxable capacity. The development of a tax effort index, relating the actual tax revenues of a country to its estimated taxable capacity, provides us with a tempting measure which considers country specific fiscal, demographic, and institutional characteristics.

[3] See World Development Report (1997), World Bank Global Monitoring Report (2005), The United Nations report on Financing for Development (2002), The UN Secretary-General's Report to the Preparatory Committee for Financing for Development (2002).

This paper employs a cross-country study to estimate *tax capacity* from a sample of 110 developing and developed countries during 1994-2009 and the two sub-periods of 1994-2001 and 2002-09. In this study, we extend the empirical methodology applied by Tanzi and Davoodi (1997), and Bird, Vazquez, and Torgler (2004). The estimation results are used as benchmarks to compare taxable capacity and tax effort in different countries. *Taxable capacity* refers to the predicted tax-to-GDP ratio that can be estimated with regression analyses, taking into account a country's specific macroeconomic, demographic, and institutional features. *Tax effort* is defined as an index of the ratio between the share of the actual tax collection in GDP and the taxable capacity. The concepts of taxable capacity and tax effort are also extended to measure total fiscal revenue capacity and revenue effort.

Calculating tax effort and actual tax collection benchmarks allows us to rank countries into four different groups: (i) low tax collection, low tax effort; (ii) high tax collection, high tax effort; (iii) low tax collection, high tax effort; and (iv) high tax collection, low tax effort. This classification is based on the global average of tax collection and a tax effort index of 1, corresponding to the case when tax collection is exactly the same as estimated taxable capacity.

The analysis provides guidance for countries with various levels of tax collection and tax effort. The authors argue that taxation is always a critical dimension of fiscal policy for all countries, while countries at various stages of development and with different initial levels of tax collection and effort should rely on different strategies for tax reforms. Our analysis focuses on tax performance and provides broad directions for reforms in developing countries.

Section II provides an overview of the worldwide trend in tax revenue collection across income-groups and geographic regions, using the tax-to-GDP ratio as a measure of tax collection. Section III highlights alternative measures of the tax performance of countries and extends the existing literature to the empirical estimation of a country's taxable capacity and tax effort. This section also investigates the trends in taxable capacity and tax effort across regions. Based on the level of tax collection and the tax effort index, countries are classified into different groups. This section also compares the new results with the ones reported in Le, Moreno-Dodson, and Rojchaichaninthorn (2008), which was covering a shorter time period. Some policy implications for fiscal revenue reforms follow. Section IV concludes.

II. TRENDS IN TAXATION

Data

The simplest definition of tax effort, which is commonly used in the literature, is the share of tax revenue in percentage of GDP. It does not give detailed information on tax collection relative to taxable capacity, but still it provides us with a simple measure to see the trends across countries, income groups, as well as regions.

Our dataset includes 110 developing and developed countries and covers the period of 1994-2009.[4] Countries are selected based on data availability.[5] For the purpose of consistency, all series are extracted from World Bank's World Development Indicator (WDI) Database and they are all for central government only. The average values of the tax rate for each country are reported in column (2) of Table A1 in the Annex.[6]

Given that differences in income levels and across regions can be important factors in determining tax revenues of countries, tax rates are investigated across income groups and regions. Simple averages are calculated for each group. The data points for the years of 1994, 1998, 2003, and 2009 are reported in the following figures. The results confirm the ones presented in Bird (2007), Fox, et al. (2005), and Le, Moreno-Dodson, and Rojchaichaninthorn (2008).

Income Classification and Taxation

One important factor determining tax revenue of countries is their income levels. When countries are classified based on the share of tax revenues in percentage of GDP across income groups, it can be seen that differences across groups are sharp (see Figure 1).[7] The low-income group has the lowest tax-to-GDP ratio, but it has been improving since 1998. The improvement is clearer especially in recent years. For this group of countries, the average share of taxes in GDP increased to 13.6 percent of GDP in 2009 from 10.5 percent in 2003 and 10 percent in 1998. Throughout the years, each group managed to increase their average tax-to-GDP ratio, but this increase is much higher in the low-income group. Even there is still a large room for further improvement, recent developments are very promising, given the fact that this group of countries always finds it difficult to raise enough public funds to finance enormous development needs.

The share of taxes in percentage of GDP is almost 6 percentage points higher for the middle-income group when compared to the average share in the low-income group. This share in the middle-income group has been consistently rising since 1998; it was 17.1 percent in 1998, and 19.3 percent in 2009.

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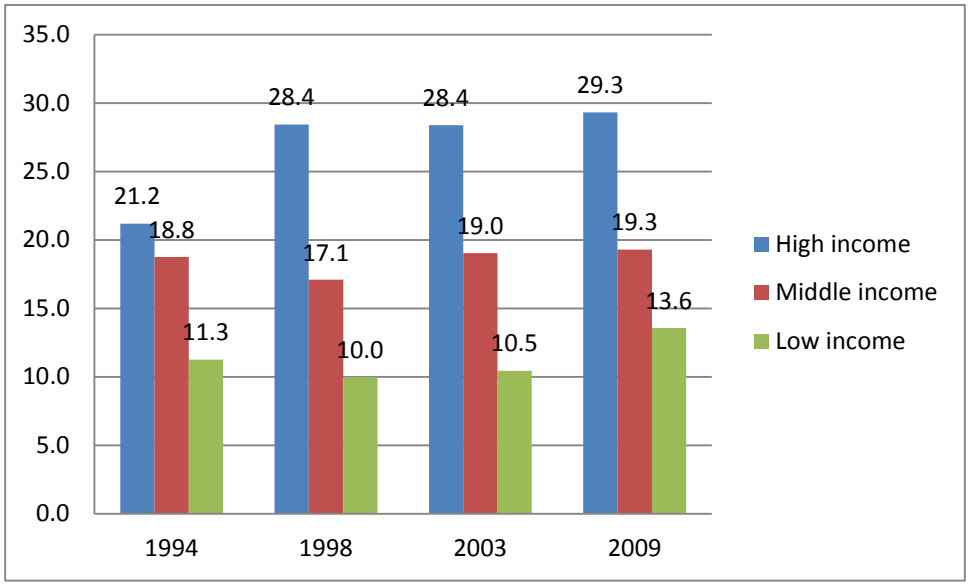
[4] Since this paper is the second part of Le, Moreno-Dodson, and Rojchaichaninthorn (2008), changes in data need to be emphasized. In the new dataset, new countries have been added and the time period has been extended from 2003 to 2009. The following new countries are added: Bahamas, Benin, Burkina Faso, Cape Verde, Honduras, Hong Kong SAR (China), Israel, Lao PDR, Macao (China), Macedonia, Maldives, Mali, Myanmar, Niger, Singapore, and Togo.

[5] Since their taxation policies are mainly outliers, the following oil-exporting countries are excluded in the paper: Algeria, Angola, Ecuador, Equatorial Guinea, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela.

[6] The detailed variable definitions are given in Table A2 in the Annex.

[7] The income groups are defined based on the World Bank definition. High-income economies are those in which 2009 GNI per capita was $12,196 or more. Low-income economies are those in which 2009 GNI per capita was $995 or less. Middle-income economies are those in which 2009 GNI per capita was between $996 and $12,195. The list of included countries is given in Table A3 in the Annex.

Figure 1 – Tax Revenue (in % of GDP) by Income Groups, 1994-2009



Source: The World Bank classification and WDI.
Note: See Table A3 for details.

The highest tax share belongs to the high-income group. They collect almost 2-3 times higher taxes in percentage of GDP when compared to the low-income group and almost 10 percentage points higher taxes when compared to the middle-income group. Tax collection in this group further increased by 1 percentage point between 2003 and 2009, a rise from 28.4 percent to 29.3 percent.

After initial drops in tax collection rates mainly due to the global financial and economic crisis of 2008, the increasing trend in tax collection is expected to continue given that public spending and budget deficit increased enormously in recent years.

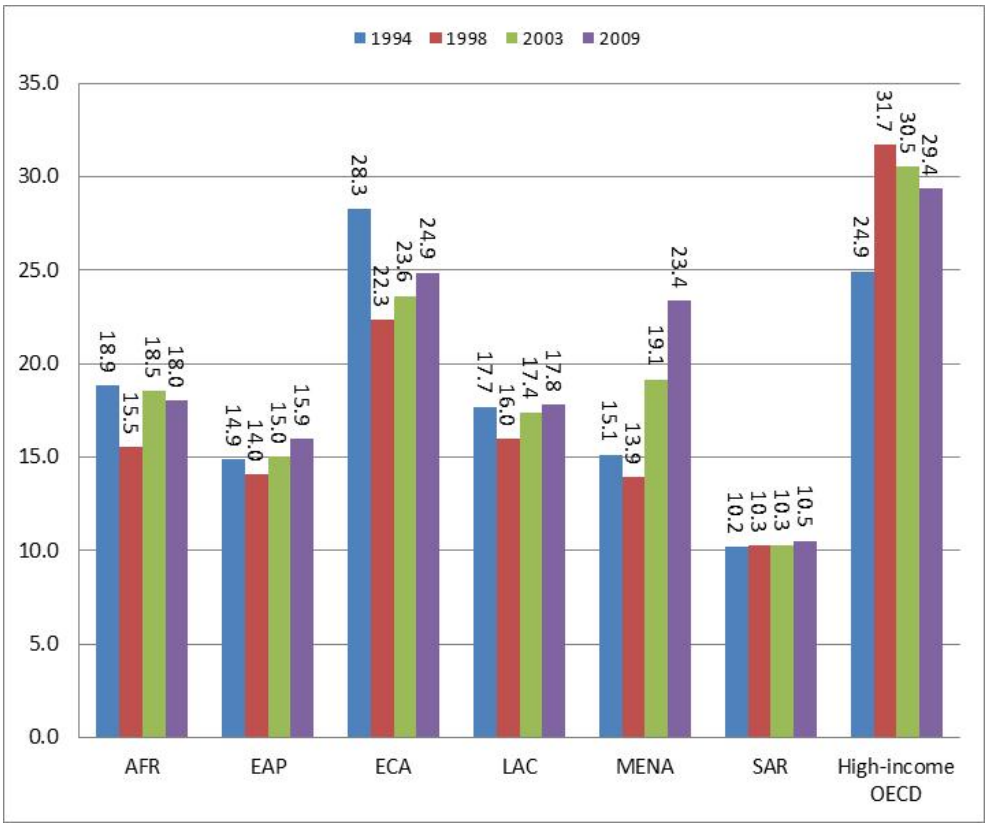
Geographical Regions and Taxation

Another factor determining tax rates is the geographic region of countries. Figure 2 presents the share of tax revenues in percentage of GDP across regions.[8] The lowest tax rate belongs to the South Asia region (SAR); they collect 10.2 to 10.5 percent taxes as a share of GDP.[9] The East Asia and Pacific (EAP) region has the second lowest tax collection rate in the world. Taxes in

[8] The countries in each region are listed in Table A4 in the Annex.
[9] It should be noted that one reason for why we observe such a low tax ratio in SAR is that these numbers are for central government only and the tax collection in SAR may be more decentralized than the ones in any other regions.

EAP are around 4 percentage points higher than the one observed for SAR. The tax share in the Latin America and Caribbean (LAC) region, the Sub-Saharan Africa (AFR) region, and the Middle East and North Africa region (MENA) present similar tax collection, which is around 18 percent of GDP. But the shares have been consistently rising in the LAC and MENA regions in recent years.

Figure 2 – Tax Revenues (as % of GDP) by Regions, 1994-2009



Source: The World Bank classification and WDI.
Note: AFR is Sub-Saharan Africa, EAP is East Asia and Pacific, ECA is Eastern European and Central Asia, LAC is Latin America and Caribbean, MENA is Middle East and North Africa, SAR is South Asia. See Table A4 for details.

After a sharp drop in taxes in percentage of GDP in the Eastern European and Central Asia (ECA) region in 1994, the rate has been rising consistently from 22.3 percent in 1998 to 23.6 percent and 24.9 percent in 2003 and 2009, respectively.

OECD high-income countries have the highest tax collection as percentage of GDP, but they are the only group of countries which have dropping tax on average throughout the period. It declined from 31.7 percent of GDP in 1998 to 30.5 percent in 2003 and to 29.4 percent in

2009.[10]

III. TAXABLE CAPACITY AND TAX EFFORT: EMPIRICAL EVIDENCE AND POLICY IMPLICATIONS

Definitions of Taxable Capacity and Tax Effort

Actual tax revenues as a share of GDP is one of the most commonly used measures of tax effort for cross-country tax comparison. The biggest advantages of this measure are that it is easy to obtain and gives a quick overview of tax trends across countries. But, as indicated in and endorsed by Musgrave (1987) and Le, Moreno-Dodson, and Rojchaichaninthorn (2008), this measure is more suitable for studies focusing on countries with similar economic structures and at the same level of income. Such trends in the tax-to-GDP ratio across income groups and regions are already discussed in Section II.

The taxable capacity and/or the tax effort of countries can be more accurately measured if different country characteristics are taken into account.[11] For example, the income level of a country can be an important factor determining the tax-to-GDP ratio, as investigated in Section II. Higher-income countries can collect more taxes, while governments in low-income countries have only a limited ability in doing so. Similarly, different economic structures, institutional arrangements, and demographic trends can introduce differences in the taxable capacity of governments (Prest, 1979). Overall, it is not accurate to determine the taxable capacity of countries only by checking their actual tax collection.

In the literature the taxable capacity and the tax effort of countries have been estimated using regression analysis, focusing on possible determinants of taxes.[12] As defined in Le, Moreno-Dodson, and Rojchaichaninthorn (2008), *Taxable capacity* is the predicted tax-to-GDP ratio calculated using the estimated coefficients of a regression specification, taking into account the country specific characteristics. *Tax effort* is the index of the ratio between the share of actual collection to GDP and taxable capacity. A "high tax effort" is defined as the case when a tax effort index is above 1, implying that the country well utilizes its tax base to increase tax revenues (Stotsky, et al., 1997). A "low tax effort" is the case when a tax effort index is below 1,

[10] Changes in EU countries' fiscal revenues are studied by Morris et al. (2009). They determine possible factors affecting taxes in the region. The listed factors are mostly not macroeconomic variables.

[11] Improvements in revenue forecasting is important for governments to better evaluate fiscal balances and financing needs, especially during business cycles. In this regard, it is important to evaluate the response of revenue to output gap. Sancak, Velloso, and Xing (2010) find that as the output gap improves, the efficiency of taxes improves as well, where tax efficiency is defined as [tax revenue/tax base]/standard tax rate.

[12] See Lotz and Mross (1967); Bahl (1971); Chelliah et al. (1975); Tait et al. (1979), Tanzi (1987); Stotsky and WoldeMariam (1997); Bird et al. (2004); Le, Moreno-Dodson, and Rojchaichaninthorn (2008).

indicating that the country may have a relatively substantial scope or potential to raise tax revenues.[13]

In addition to taxes, total fiscal revenues can be also analyzed in a similar way. As was the case in Le, Moreno-Dodson, and Rojchaichaninthorn (2008), the same estimation techniques are used to calculate the capacity of countries in total fiscal revenue (tax plus non-tax collection) generation, which is named as *fiscal revenue capacity,* and their effort in revenue generation, named as *fiscal revenue effort*.

In this section, the estimation results are produced using the regression specifications of Le, Moreno-Dodson, and Rojchaichaninthorn (2008). The main difference is that the new dataset covers a longer time period (instead of 1994-2003, it is now 1994-2009) and more countries. The study includes 110 developing and developed countries. We also focus on sub-periods to understand how the tax effort of countries has changed overtime. The first sub-sample is 1994-2001 and the second one is 2002-09.

Empirical Specification, Variables, and Methodology

The empirical specifications used in the paper consist of possible determinants of tax revenues and total fiscal revenues as a share of GDP:[14]

$$TAX/GDP_{it} = \alpha_0 + \alpha_1.GDPPC_{it} + \alpha_2.DEMOG_{it} + \alpha_3.TRADE_{it} + \alpha_4.AGR_{it} + \alpha_5.GOVERNANCE\ QUALITY_{it} + regional\ dummies + time\ dummies + \epsilon, \quad (1)$$

$$REV/GDP_{it} = \beta_0 + \beta_1.GDPPC_{it} + \beta_2.DEMOG_{it} + \beta_3.TRADE_{it} + \beta_4.AGR_{it} + \beta_5.GOVERNANCE\ QUALITY_{it} + regional\ dummies + time\ dummies + \varepsilon, \quad (2)$$

TAX/GDP is total tax revenues in percentage of GDP;

REV/GDP is total fiscal revenues in percentage of GDP;

[13] It should be noted that cross-country tax effort calculations presented in the paper cannot substitute for a comprehensive study of taxation, focusing on a particular country. There are potential problems related to this methodology such as the sensitivity of the calculation of the tax-effort index to the predicted results of a country's taxable capacity; systematic errors in measurement of independent variables; regression specifications can calculate the tax collection performance of a country in comparison with the average effort exercised by an average country in the selected sample, and this average may not be the actual tax collection performance. Given these potential problems, the results should be used to assess the feasibility of raising additional revenues, given the tax mix policy and collection effort attained at the average level, rather not the measure of actual performance (Ahmad, et al., 1986; Chelliah et al., 1975; Le, Moreno-Dodson, and Rojchaichaninthorn, 2008).

[14] See Tanzi and Davoodi (1997), Bird, et al. (2004), and Le, et al. (2008) for details. Since tax revenue is in percent of GDP, it controls for fluctuations in the tax base, which can be approximated by GDP.

GDPPC is constant GDP per capita (2000 US$);

DEMOG stands for a demographic variable; it is either the growth rate of population between 15-64 years old, or the age dependency rate;

TRADE measures trade openness (exports plus imports in percentage of GDP);

AGR is agriculture value added in percentage of GDP;

GOVERNANCE QUALITY stands for bureaucracy quality index or corruption index; it is excluded in the basic specification.

We also include both regional and time dummies. The regions are defined in Table A4. The time dummies are annual.

World Bank's World Development Indicators Database and the International Country Risk Guide (ICRG) Database are the main data sources.[15]

The income level of a country is expected to be one of the significant factors determining actual tax collection.[16] As presented in Section II, higher-income countries tend to collect more taxes in percentage of GDP. Thus, it is expected that *GDP per capita* to have a positive and significant impact on tax collection, as well as on fiscal revenue (Bahl, 1971; Fox et. al., 2005; Piancastelli, 2001).

Higher age dependency and *higher population growth* are expected to distort tax collection capacity of countries and lower the share of productive population (Bird et al., 2004). Thus, these two variables are expected to have a negative impact on taxes and total fiscal revenues.

Trade openness is one of the variables commonly considered as an important determinant of taxation (Rodrik, 1998; Piancastelli, 2001; Norregaard and Khan, 2007; Aizenman and JinJarak, 2009). The changing size of international trade has expected to have two opposite effects on taxes. On the one hand, higher trade openness is expected to lower taxes collected on imports and exports; thus, it may have a negative impact on taxes and fiscal revenue. On the other hand, given that because higher trade openness is associated with higher economic growth rates, we expect open economies to grow faster; and as a result, more taxes can be collected with the increasing tax base. It is expected that the second effect dominates and trade openness has a positive impact on taxes and total fiscal revenue.[17]

[15] See Table A2 in the Annex for detailed definitions.

[16] See Le, Moreno-Dodson, and Rojchaichaninthorn (2008) for detailed information on variables and their expected effects on taxes.

[17] Financial pressures on governments increased with globalization due to a higher demand for government spending and costly tax collection (Hines and Summers, 2009). Being an open market economy can affect tax policies such that higher international involvement increases the economic distortions created by taxation, but at the same time can increase the level of taxes due to higher economic growth rates as it is observed in open economies.

Given that it is relatively harder to tax the agricultural sector, it is expected that as the share of *agriculture value added* in percentage of GDP increases, collected taxes in percentage of GDP drop due to a smaller tax base (Leuthold, 1991; Tanzi, 1992; Piancastelli, 2001). Thus, the expected sign of the agriculture value added ratio is negative.

Institutional and governance quality is considered as one of the most essential factors determining the adequacy of tax collection (Tanzi and Davoodi, 1997; Ghura, 1998; Bird, et al., 2004; Gupta, 2007). Countries can collect higher taxes only if the tax collection process is efficient. In this regard, *bureaucracy quality* index and *corruption* index, which are two possible measures of institutional and governance quality, are expected to have a significant impact on tax collection. The ICRG reports several indicators of institutional and governance quality. In the original database, bureaucracy quality index and corruption index are reported as index numbers from 1 to 6. While "1" indicates the lowest bureaucracy quality or highest corruption, "6" corresponds to the highest bureaucracy quality or lowest corruption. Similar to the case in Le, Moreno-Dodson, and Rojchaichaninthorn (2008), we re-index each of these measures in this paper such that lower numbers indicate a higher bureaucracy quality or lower corruption. Rescaling consists of defining a new range where -10 (least corrupt or best bureaucratic quality) and -1 (most corrupt or worst bureaucratic quality). With this new definition, we expect tax revenues to drop with increasing index values, meaning negative estimated coefficients of these variables.

A simple correlation matrix among these variables indicates the expected signs (see Table A5 in the Annex). Tax revenue is positively correlated with GDP per capita, and trade openness; and negatively correlated with age dependency ratio, population growth, agriculture value added, as well as bureaucracy quality index and corruption index as defined above. When we compare these results with the correlation values reported in Le, Moreno-Dodson, and Rojchaichaninthorn (2008), which covered a shorter time period and a smaller sample of countries, it can be seen that the correlation between tax revenues and all other variables drops; it is especially true for GDP per capita. Given that the ratio of tax revenues as a share of GDP has been increasing, especially in the low-income and middle-income groups (see Figure 1), this lower correlation is expected. The only exceptions are bureaucracy quality index and corruption index; their correlation with tax revenues and total fiscal revenue gets higher. Such changes in the link between actual taxes and macroeconomic variables through time are also expected to change the predicted value of taxes.

Average values of the variables for each country are reported in Table A1 in the Annex, while overall averages and other descriptive statistics are reported in Table A6 in the Annex. When we compare the descriptive statistics reported in Le, Moreno-Dodson, and Rojchaichaninthorn (2008) to the new results obtained with an extended dataset from 1994 to 2009, it can be seen that tax revenues increased by 1.5 percentage points on average; total fiscal revenues increased by 1 percentage point; trade openness increased by 4 percentage points; population grew 0.4 percentage point higher; agriculture values added became lower by 3 percentage points; and both

bureaucracy quality index and corruption index improved by 1 index point. With the new dataset, the total number of observations for tax revenue increases from 982 to 1,437, corresponding to almost 50 percent improvement.

The regression methodology is an ordinary least square for panel datasets. One potential problem in using this methodology would be the possible endogeneity and/or dual causality problem associated with institutional variables (bureaucracy index and corruption index in this paper) and tax revenues. Higher taxes improve governance and improved governance can further increase taxes. Bird et al. (2006), who use a similar specification, test the presence of an endogeneity problem by applying a 2-Stage Least Squares (2SLS) approach and calculating Hausman Chi-square test statistics.[18] They include ethnic fractionalization, language, and latitude as instrumental variables. They show that the Hausman Chi-square tests fail to detect any simultaneity of tax revenues and institutional variables.

Tax Capacity: Estimation Results

The estimation results for the specifications given in Equations (1) and (2) are presented in Tables 1 and 2 for tax revenues and total fiscal revenues, respectively. The tax capacity of countries is defined as the fitted values calculated using the estimated coefficients reported in Table 1, Panel A, column (2). The definition of the revenue capacity is similar (the predicted value of fiscal revenues, calculated using the estimated coefficients reported in Table 2, Panel A, column (2)).

Panel A in each table presents the results obtained from the specifications with population growth as a proxy for the demographic characteristics of countries, while Panel B includes age-dependency ratios instead of population growth. The regressions capture the entire period of 1994-2009, as well as the two sub-periods of 1994-2001 and 2002-2009 to better understand the dynamics of the tax and total fiscal revenue capacity. In each panel, columns (1), (4) and (7) represents the regression on traditional tax (includes only demographic and macroeconomic indicators). Columns (2), (3), (5), (6), (8), and (9) show the results when the institutional variables (corruption index or bureaucratic quality indicator) are added one at a time as possible determinants of taxes or fiscal revenue.

As reported in Table 1, the estimated coefficients have the expected signs and they are mostly statistically significant. The exception is that in some regression specifications, where institutional variables are included, GDP per capita loses its statistical significance, and even its sign becomes unexpectedly negative. It can be interpreted as follows: when the institutional

[18] Neither Gupta (2007) could find any endogeneity problem in a regression specification similar to the one presented in this paper.

Table 1 – Determinants of Tax Revenues and Taxable Capacity

Panel A: Population growth used as proxy for demographic characteristic

Dependent Variable: Tax Revenue in % of GDP									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1994-2009			**1994-2001**			**2002-2009**		
Constant	22.891	14.423	11.133	21.581	12.894	9.289	23.807	12.43	11.935
	(26.96)***	(13.235)**	(9.218)***	(16.48)***	(7.306)***	(5.061)***	(21.051)**	(8.054)***	(7.059)***
GDP per capita (constant)	1.11	0.503	0.002	1.23	0.635	-0.238	0.993	-0.113	0.199
	(5.126)***	(2.103)**	(0.008)	(3.112)***	(1.614)*	(-0.557)	(3.716)***	(-0.341)	(0.627)
Population Growth	-0.883	-0.672	-0.854	-0.362	0.375	0.029	-0.961	-1.053	-1.289
	(-4.283)**	(-3.044)**	(-3.896)***	(-1.26)	(1.191)	(0.092)	(-2.967)**	(-3.168)**	(-3.796)***
Trade openness	0.036	0.024	0.025	0.029	0.011	0.015	0.04	0.029	0.028
(% of GDP)	(8.099)***	(5.242)***	(5.609)***	(4.056)***	(1.562)	(2.084)**	(6.979)***	(5.182)***	(4.97)***
Agriculture value added	-0.243	-0.154	-0.067	-0.233	-0.162	-0.089	-0.276	-0.133	-0.029
(% of GDP)	(-11.855)*	(-7.13)***	(-2.794)***	(-8.477)**	(-5.818)**	(-2.896)***	(-7.962)**	(-3.577)**	(-0.685)
CORRUPTION INDEX		-0.824			-0.666			-1.385	
		(-6.739)***			(-3.559)***			(-7.091)***	
BUREAUCRACY INDEX			-1.273			-1.275			-1.252
			(-9.056)***			(-5.906)***			(-6.34)***
OBS	1322	1125	1125	589	483	483	733	642	642
Adjusted R2	0.58	0.65	0.66	6.48	0.69	0.70	0.58	0.64	0.64

Panel B: Age dependency used as proxy for demographic characteristic

Dependent Variable: Tax Revenue in % of GDP									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1994-2009			**1994-2001**			**2002-2009**		
Constant	24.483	18.864	15.314	21.724	14.233	10.005	25.628	17.145	16.766
	(16.979)**	(12.486)**	(9.41)***	(9.467)***	(5.546)***	(3.816)***	(12.414)**	(7.943)***	(7.3)***
GDP per capita (constant)	1.01	0.422	0.004	1.19	0.63	-0.251	0.843	-0.223	0.154
	(4.665)***	(1.78)*	(0.016)	(2.997)***	(1.596)	(-0.588)	(3.224)***	(-0.681)	(0.483)
Age dependency ratio	-0.045	-0.089	-0.08	-0.011	-0.009	-0.01	-0.046	-0.096	-0.091
	(-2.438)**	(-4.892)**	(-4.503)***	(-0.396)	(-0.343)	(-0.363)	(-1.642)*	(-3.68)***	(-3.461)***
Trade openness	0.033	0.021	0.021	0.027	0.014	0.015	0.036	0.026	0.024
(% of GDP)	(7.445)***	(4.794)***	(4.92)***	(3.871)***	(1.972)**	(2.214)**	(6.49)***	(4.75)***	(4.391)***
Agriculture value added	-0.235	-0.113	-0.04	-0.231	-0.152	-0.083	-0.29	-0.118	-0.038
(% of GDP)	(-10.038)*	(-4.712)**	(-1.557)	(-7.316)**	(-4.827)**	(-2.482)**	(-7.885)**	(-3.122)**	(-0.886)
CORRUPTION INDEX		-0.882			-0.675			-1.41	
		(-7.209)***			(-3.607)***			(-7.227)***	
BUREAUCRACY INDEX			-1.232			-1.28			-1.171
			(-8.868)***			(-6.064)***			(-5.994)***
OBS	1322	1125	1125	589	483	483	733	642	642
Adjusted R2	0.58	0.65	0.66	6.49	0.68	0.70	0.58	0.65	0.64

Note: The estimation technique is panel OLS with regional and time dummies. t-statistics are reported in parenthesis. The estimated coefficients of GDP per capita are multiplied by 10,000. The dependent variable is the share of tax revenue in percentage of GDP. GDP per capita is in constant 2000 US$; population growth is the growth rate of population between 15 and 64 ages; trade openness is the sum of imports and exports in percentage of GDP; corruption index is recalculated such that lower values indicate lower corruption; bureaucracy index is recalculated such that lower values indicate higher bureaucracy quality. We also include both regional and time dummies. The regions are defined in Table A4. The time dummies are annual.

variables are included together with income, income losses its significance because the institutional quality variables can already capture the impact of income. The age dependency ratio has the correct sign, but its estimated coefficients are not significant for the sub period of 1994-2001.

When we compare these new results with the ones reported in Table 1 of Le, Moreno-Dodson, and Rojchaichaninthorn (2008), it can be seen that the number of observations increased from 884 (covering the period of 1994-2003) to 1322 (covering the period of 1994-2009); corresponding to an almost 50 percent increase. The R-squared are almost 0.15-0.20 points higher in the new results, indicating a better fit of empirical specifications. One interesting difference between these two sets of results is that the significance and the magnitude of the income variable (GDP per capita) drop in the new set of results. It is true especially in the specifications where institutional variables are included as determinants of taxes. While the estimated coefficient of income was around 2.2 in Table 1 of Le, Moreno-Dodson, and Rojchaichaninthorn (2008), it is only 1.11 in the traditional tax specification; and it gets even lower and insignificant (0.503 and 0.002 with bureaucracy index and corruption index, respectively) when the institutional variables are included in the specifications. It means that with the recent improvements in taxation in developing countries and on-going effort by high-income countries to rationalize their tax systems toward greater efficiency and lower tax burden, particularly in direct income taxes, the income level becomes less important now in determining their tax revenues. On the other hand, the institutional quality of countries is more important (even more than income levels) in determining their tax revenues. The higher significance and magnitude of the estimated coefficients of the institutional variables in the new results support this argument. For example, while the estimated coefficient of the corruption index was only -0.560 in Table 1 of Le, Moreno-Dodson, and Rojchaichaninthorn (2008), it is now -1.273 and statistically more significant. This observation is also true for the bureaucracy quality index. Another difference between the old and new estimation results is that the population growth rate has almost 2/3 lower estimated coefficients now, indicating a lower impact of population growth on tax collection.

Table 2 presents similar results: for total fiscal revenues, all estimation results are as expected, except GDP per capita and population growth rates in some specifications. When we compare these new results with the ones reported in Table 2 of Le, Moreno-Dodson, and Rojchaichaninthorn (2008), it can be seen again that GDP per capita is less significant and has lower estimated coefficients now. It is also true for the population growth rate. On the other hand, the institutional quality indicators have higher estimated coefficients, as well as higher statistical significance.

Table 2 – Determinants of Fiscal Revenue

Panel A: Population growth used as proxy for demographic characteristic

Dependent Variable: Fiscal Revenue in % of GDP									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1994-2009			**1994-2001**			**2002-2009**		
Constant	26.234	17.798	17.997	25.496	16.519	16.677	26.992	16.932	19.338
	(28.464)**	(15.369)**	(13.694)***	(18.179)**	(8.98)***	(8.477)***	(21.484)**	(9.903)***	(10.354)***
GDP per capita (constant)	0.811	0.192	0.305	0.916	0.139	-0.098	0.686	0.116	0.877
	(3.394)***	(0.746)	(1.109)	(2.163)**	(0.342)	(-0.214)	(2.249)**	(0.304)	(2.418)**
Population Growth	-0.687	-0.447	-0.519	-0.349	0.623	0.45	-0.77	-1.331	-1.506
	(-2.972)**	(-1.85)*	(-2.117)**	(-1.097)	(1.816)*	(1.286)	(-2.043)**	(-3.486)**	(-3.856)***
Trade openness	0.054	0.031	0.031	0.055	0.028	0.029	0.053	0.031	0.029
(% of GDP)	(11.135)**	(6.626)***	(6.47)***	(7.111)***	(3.739)***	(3.944)***	(8.442)***	(5.152)***	(4.737)***
Agriculture value added	-0.317	-0.219	-0.174	-0.299	-0.236	-0.206	-0.365	-0.158	-0.109
(% of GDP)	(-14.229)*	(-9.695)**	(-6.799)***	(-10.179)*	(-8.232)**	(-6.295)***	(-9.381)**	(-3.871)**	(-2.344)**
CORRUPTION INDEX		-0.87			-0.736			-1.172	
		(-6.749)***			(-3.806)***			(-5.42)***	
BUREAUCRACY INDEX			-0.757			-0.743			-0.626
			(-4.986)***			(-3.236)***			(-2.883)***
OBS	1306	1108	1108	582	475	475	724	633	633
Adjusted R2	0.55	0.64	0.64	0.56	0.68	0.68	0.55	0.63	0.61

Panel B: Age dependency used as proxy for demographic characteristic

Dependent Variable: Fiscal Revenue in % of GDP									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1994-2009			**1994-2001**			**2002-2009**		
Constant	24.248	19.033	18.529	21.592	14.604	14.125	27.365	19.693	22.071
	(15.576)**	(11.983)**	(10.573)***	(8.832)***	(5.514)***	(5.074)***	(12.02)***	(8.382)***	(8.759)***
GDP per capita (constant)	0.695	0.12	0.268	0.93	0.204	-0.095	0.518	-0.191	0.665
	(2.935)***	(0.469)	(0.978)	(2.199)**	(0.499)	(-0.208)	(1.765)*	(-0.513)	(1.846)*
Age dependency ratio	0.014	-0.032	-0.018	0.048	0.043	0.043	-0.019	-0.073	-0.064
	(0.725)	(-1.666)*	(-0.966)	(1.593)	(1.528)	(1.523)	(-0.635)	(-2.585)**	(-2.206)**
Trade openness	0.051	0.029	0.029	0.051	0.031	0.032	0.051	0.029	0.026
(% of GDP)	(10.615)**	(6.409)***	(6.164)***	(6.733)***	(4.367)***	(4.461)***	(8.189)***	(4.749)***	(4.226)***
Agriculture value added	-0.344	-0.21	-0.178	-0.331	-0.252	-0.221	-0.388	-0.174	-0.148
(% of GDP)	(-13.61)**	(-8.386)**	(-6.411)***	(-9.841)**	(-7.778)**	(-6.205)***	(-9.565)**	(-4.249)**	(-3.184)***
CORRUPTION INDEX		-0.896			-0.744			-1.243	
		(-6.866)***			(-3.844)***			(-5.7)***	
BUREAUCRACY INDEX			-0.735			-0.796			-0.569
			(-4.844)***			(-3.525)***			(-2.608)***
OBS	1306	1108	1108	582	475	475	724	633	633
Adjusted R2	0.55	0.64	0.64	0.56	0.68	0.68	0.54	0.62	0.61

Note: The estimation technique is panel OLS with regional and time dummies. t-statistics are reported in parenthesis. The estimated coefficients of GDP per capita are multiplied by 10,000. The dependent variable is the share of fiscal revenue in percentage of GDP. See Table A2 for the definitions of the variables. We also include both regional and time dummies. The regions are defined in Table A4. The time dummies are annual.

In general, the results support the previous papers' findings, determining the factors affecting of tax and fiscal revenues.[19] Countries with higher income levels, a lower population growth rate, more trade openness, lower agriculture value added in GDP, and higher institutional quality tend to collect higher tax revenues and fiscal revenues as a whole.

Robustness Check

For the robustness check of the empirical results, we also run alternative specifications.

The size of shadow economy can be another important variable determining the tax base of countries. The shadow economy measure used in this paper includes all market-based legal production of goods and services that are deliberately concealed from public authorities for any of the following reasons: (1) to avoid payment of income, value added or other taxes, (2) to avoid payment of social security contributions, (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms (see Schneider, Buehn, Montenegro, 2010).

As the size of shadow economy increases, governments may not be able to collect taxes efficiently due to the fact that it gets harder to track profit, income and sales etc. Thus, it is expected to have a negative impact on tax collection (Bird, et al., 2004; Davoodi and Grigorian, 2007). The estimation results are reported in Table 3 Panel A. Since the data for the size of shadow economy are limited, the total number of observations drops to 840 from 1322. But the signs and significance of coefficients are robust to the inclusion of this new variable. The size of the shadow economy is a statistically significant and negative determinant of taxes. The main exception is the case where the bureaucracy quality index is included in the regression specification. In this case, the significance of the size of the shadow economy on taxes disappears. This may indicate that the bureaucracy quality index can already well capture the impacts of shadow economy. As the bureaucracy quality drops, it gets harder to monitor the economy efficiently; thus, the size of the shadow economy tends to increase.

Total consumption is also included as an alternative factor determining tax revenues. Higher consumption in percentage of GDP has a positive effect on tax collection. Higher consumption improves tax revenues mainly through higher indirect taxes (Bird, 2008). Thus, the sign is as expected and the other results are robust to the inclusion of this new variable.

Overall, the results are robust to the alternative empirical specifications.

[19] See for example Tanzi and Davoodi (1997), Bird et al. (2007), Gupta (2007), Le, Moreno-Dodson, and Rojchaichaninthorn (2008).

Table 3 – Robustness Check Alternative Determinants of Tax Revenues

Panel A: Size of shadow economy (in % of GDP) used instead of agriculture value added

Dependent Variable: Tax Revenue in % of GDP									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1994-2009			**1994-2001**			**2002-2009**		
Constant	27.452	14.226	7.916	24.83	9.943	1.974	28.211	13.471	10.229
	(18.692)**	(7.958)***	(4.359)***	(8.708)***	(2.844)***	(0.59)	(16.484)**	(6.308)***	(4.719)***
GDP per capita (constant)	0.669	0.485	-0.267	1.76	1.57	0.175	0.395	-0.219	-0.325
	(2.049)**	(1.377)	(-0.796)	(2.61)***	(2.31)**	(0.263)	(1.056)	(-0.525)	(-0.839)
Population Growth	-1.35	-0.759	-0.611	-1.011	0.503	0.513	-1.499	-1.156	-0.971
	(-4.947)**	(-2.806)**	(-2.363)**	(-1.801)*	(0.878)	(0.969)	(-4.798)**	(-3.811)**	(-3.261)***
Trade openness	0.011	-0.006	-0.003	0.02	-0.005	-0.005	0.009	-0.006	-0.003
(% of GDP)	(2.343)**	(-1.394)	(-0.768)	(1.958)*	(-0.491)	(-0.528)	(1.697)*	(-1.331)	(-0.733)
Size of shadow economy	-0.2	-0.062	0.022	-0.195	-0.048	0.045	-0.196	-0.054	0.013
(% of GDP)	(-6.927)**	(-2.153)**	(0.761)	(-3.632)**	(-0.902)	(0.864)	(-5.71)***	(-1.586)	(0.381)
CORRUPTION INDEX		-0.982			-0.782			-1.414	
		(-5.498)***			(-2.495)**			(-6.049)***	
BUREAUCRACY INDEX			-1.783			-2.037			-1.643
			(-10.223)***			(-6.282)***			(-7.898)***
OBS	840	742	742	244	215	215	596	527	527
Adjusted R2	0.515	0.604	0.639	0.550	0.642	0.691	0.508	0.606	0.624

Panel B: Share total consumption in GDP is added

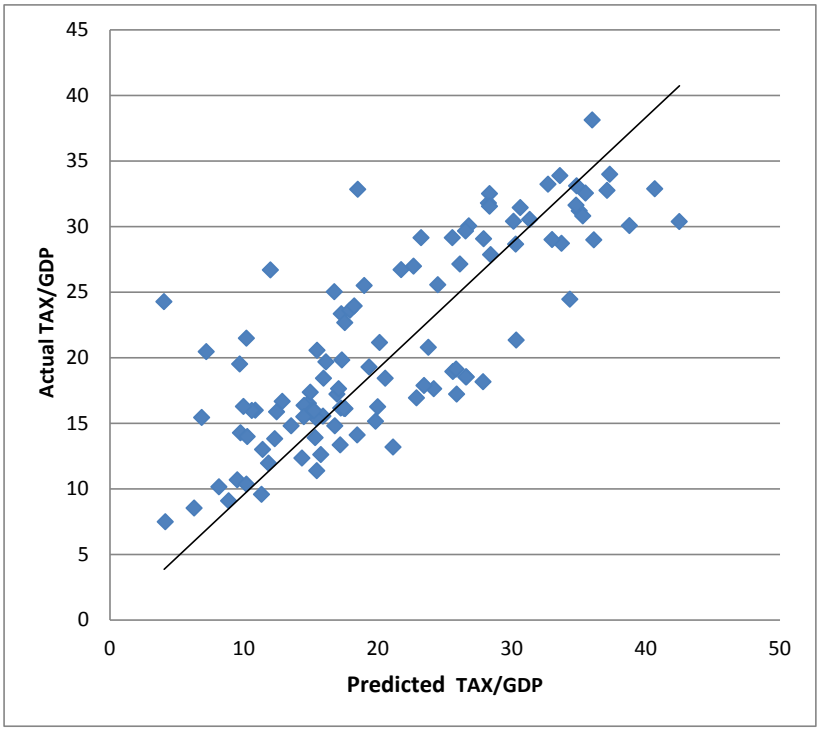
Dependent Variable: Tax Revenue in % of GDP									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1994-2009			**1994-2001**			**2002-2009**		
Constant	6.159	6.13	3.41	-2.026	1.872	-3.598	10.957	7.299	7.953
	(3.813)***	(3.143)***	(1.724)*	(-0.797)	(0.576)	(-1.082)	(5.271)***	(2.984)***	(3.2)***
GDP per capita (constant)	1.67	0.663	0.176	2.11	1	0.087	1.35	-0.024	0.306
	(7.878)***	(2.782)***	(0.705)	(5.669)***	(2.523)**	(0.205)	(5.127)***	(-0.072)	(0.954)
Population Growth	-0.616	-0.622	-0.801	-0.147	0.405	0.049	-0.622	-1.027	-1.254
	(-3.123)**	(-2.845)**	(-3.688)***	(-0.555)	(1.308)	(0.158)	(-1.956)*	(-3.102)**	(-3.7)***
Trade openness	0.042	0.03	0.031	0.039	0.021	0.026	0.044	0.033	0.031
(% of GDP)	(9.765)***	(6.488)***	(6.776)***	(5.841)***	(2.8)***	(3.509)***	(7.82)***	(5.726)***	(5.376)***
Agriculture value added	-0.312	-0.192	-0.105	-0.321	-0.211	-0.14	-0.348	-0.162	-0.058
(% of GDP)	(-15.311)*	(-8.49)***	(-4.206)***	(-12.102)*	(-7.034)**	(-4.339)***	(-9.861)**	(-4.211)**	(-1.306)
Total consumtion	0.191	0.101	0.095	0.272	0.139	0.154	0.146	0.064	0.052
(in % of GDP)	(11.969)**	(5.103)***	(4.9)***	(10.534)**	(4.017)***	(4.607)***	(7.283)***	(2.695)***	(2.181)**
CORRUPTION INDEX		-0.818			-0.606			-1.369	
		(-6.769)***			(-3.281)***			(-7.043)***	
BUREAUCRACY INDEX			-1.247			-1.306			-1.204
			(-8.959)***			(-6.174)***			(-6.075)***
OBS	1318	1125	1125	589	483	483	729	642	642
Adjusted R2	0.621	0.656	0.666	0.652	0.695	0.712	0.608	0.647	0.640

Note: The estimation technique is panel OLS with regional and time dummies. t-statistics are reported in parenthesis. The estimated coefficients of GDP per capita are multiplied by 10,000. As in Table 1, the dependent variable in each panel is the share of tax revenue in percentage of GDP. See Table A2 for the definitions of the variables. We also include both regional and time dummies. The regions are defined in Table A4. The time dummies are annual.

Tax Effort: Estimation Results

The predicted value of tax collection (tax capacity) is the estimated value of tax revenues, calculated using the estimated coefficients given in column (2) of Panel A in Table 1. The specification takes tax revenues as a function of GDP per capita, population growth, trade openness, agriculture value added (in percentage of GDP), corruption index, as well as regional and time dummies. Tax effort is the ratio of actual taxes to the tax capacity of the country, both in % of GDP. Table A7 in the Annex shows the actual and predicted taxes (i.e. taxable capacity), as well as the tax effort for each country included in the study. The averages between 1994 and 2009 are reported in the first columns, while the averages belonging to 1994 to 2001 and 2002 to 2009 are presented in the following columns. The same exercise is repeated for total fiscal revenue in Table A8 in the Annex. The predicted value of total fiscal revenue is calculated, based on the second estimation results reported in Panel A of Table 2.

Figure 3 – Actual Tax Collection and Taxable Capacity, averages over 1994-2009

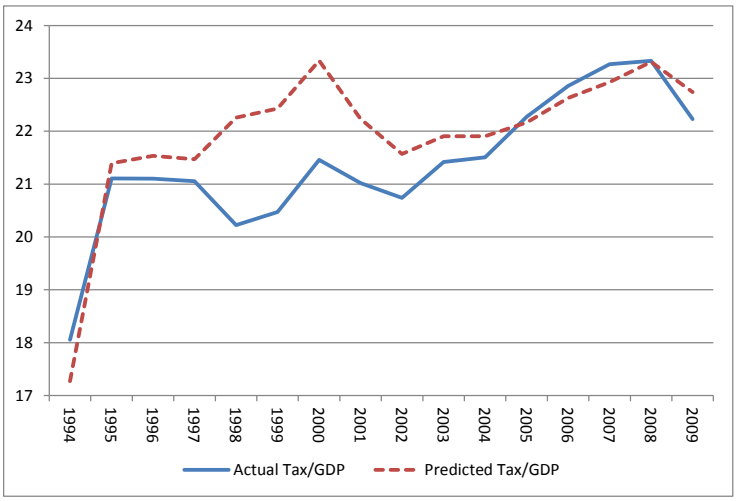


Note: Predicted tax/GDP is taxable capacity, calculated based on the estimation results given in column (2) of the results in Table 1 Panel A. Actual TAX/GDP is actual tax revenue in % of GDP. The line is the 45^{o} line, which represents the points where the tax effort index is 1.

Most countries' tax effort indexes are relatively stable over the two sub-periods 1994-2001 and 2002-2009. Exceptions are: Albania, Brazil, Bulgaria, China, Democratic Republic of Congo, Cyprus, Guatemala, Kazakhstan, Korea, Lebanon, Mongolia, Nicaragua, Papua New Guinea, Paraguay, Sierra Leona, Trinidad and Tobago, Ukraine and Vietnam (all increased their tax efforts after 2001); Egypt, Ethiopia, Indonesia, Pakistan, Philippines, Sri Lanka, and United States (all lowered their tax efforts after 2001). Similar to tax predictions, average fiscal revenue predictions are reported for the period of 1994 to 2009, as well as for the two sub-samples in Table A8 in the Annex.

Figure 3 reports the average values of actual and predicted tax collection (tax capacity) in percentage of GDP. Each dot in the figure indicates the position of a country, corresponding to their average tax revenues versus predicted tax revenues. The 45 degree line represents countries with the unitary tax effort. Along this line, tax collection exactly equals predicted tax capacity. The predicted tax revenues are positively correlated with the actual collection, meaning that higher collection tends to be associated with higher tax capacity.[20] The countries taking place above the 45^{o} line are the ones with a high tax effort (actual taxes are higher than predicted taxes).Given the values of their macroeconomic and demographic indicators, they seem doing well in terms of tax collection. On the other hand, the countries located below 45^{o} line are the ones collecting taxes below their tax capacity (low effort) and they have a room to improve their tax collection effort.

Figure 4 – Average Actual Tax Collection and Taxable Capacity over 1994-2009



Note: Predicted tax/GDP is taxable capacity, calculated based on the estimation results given in column (2) of the results in Table 1 Panel A. Actual TAX/GDP is actual tax revenue in % of GDP.

[20] Similar findings are reported in Chelliah et al. (1975) and Stosky and WoldeMariam (1997).

Figure 4 presents the actual tax ratio and tax capacity on average across countries through 1994 and 2009. Between 1996 and 2004, the taxable capacity was above actual tax collection, while the actual tax collection was above the taxable capacity between 2005 and 2008. With the financial crisis in 2008, the actual tax collection again fell below the taxable capacity. The gap between two series was the largest between 1998 and 2000, corresponding to the period following the Asian financial crisis in 1997.

The ranking of countries based on their tax effort is reported in Table 4.[21] According to this ranking, Papua New Guinea has the highest tax effort (1.66), while Bahrain has the lowest (only 0.16). Most developed countries are located around the value of 1. In the sub-Saharan Africa region, Namibia (1.54) and South Africa (1.44) have the highest tax effort indexes. In the MENA region, Morocco has the highest tax effort score (1.44). In Europe, Malta and Cyprus have the highest scores at 1.40 each. While Vietnam (1.31) has the highest index in East Asia, France (1.29) and Brazil (1.26) also take place in the top 20 list. China has one of the lowest tax effort scores with the value equal to only 0.48. Japan and Switzerland are other two countries with a low tax effort index with the values of 0.47 and 0.56, successively.

The average values give us the general picture of tax efforts across countries, but a detailed analysis of countries across regions and overtime can give a better idea on the trends in taxes. Figure 5 present this information across 7 regions.

After 1998, actual taxes in Sub-Saharan Africa increased almost continuously, even if the predicted value of taxes did not increase that dramatically. Since actual taxes have been increasing faster than predicted taxes, the tax effort of the region has improved significantly.[22] It increased from 0.85 in 1998 to almost 1.2 in 2006, indicating the countries on average were collecting almost 20 percent higher actual taxes relative to predicted taxes. It is not surprising that this period corresponds to higher growth rates in Sub-Saharan Africa. In the region, actual taxes have been always above the predicted values of tax revenues.

In East Asia, the tax effort reaches to 1.15 in 2001 (indicating that actual taxes higher than predicted taxes), but it declines quickly after this peak point in 2001 and stays below 1 after 2003. Given that actual taxes are below predicted values, countries in this region are expected to spend more effort to increase tax revenues.

In Eastern Europe and Central Asia, the gap between actual and predicted taxes was big, in favor of predicted values, between 1996 and 2001. Following this period, predicted taxes dropped with declining economic activities in the region; thus the tax effort index increased. At the same time, these countries started collecting almost 5 percentage point higher taxes on average. This also helped to close the gap between actual and predicted taxes for this group of countries.

[21] See the country classification section of the paper for the list of countries, which have changed their tax-effort and tax-collection locations with the extended time period analysis (1994-2003 versus 1994-2008).
[22] This fact has been also emphasized in Stotsky and WoldeMariam (1997) and Gupta (2007).

Table 4 – Ranking of Countries by Tax Effort Index, Averages 1994-2009

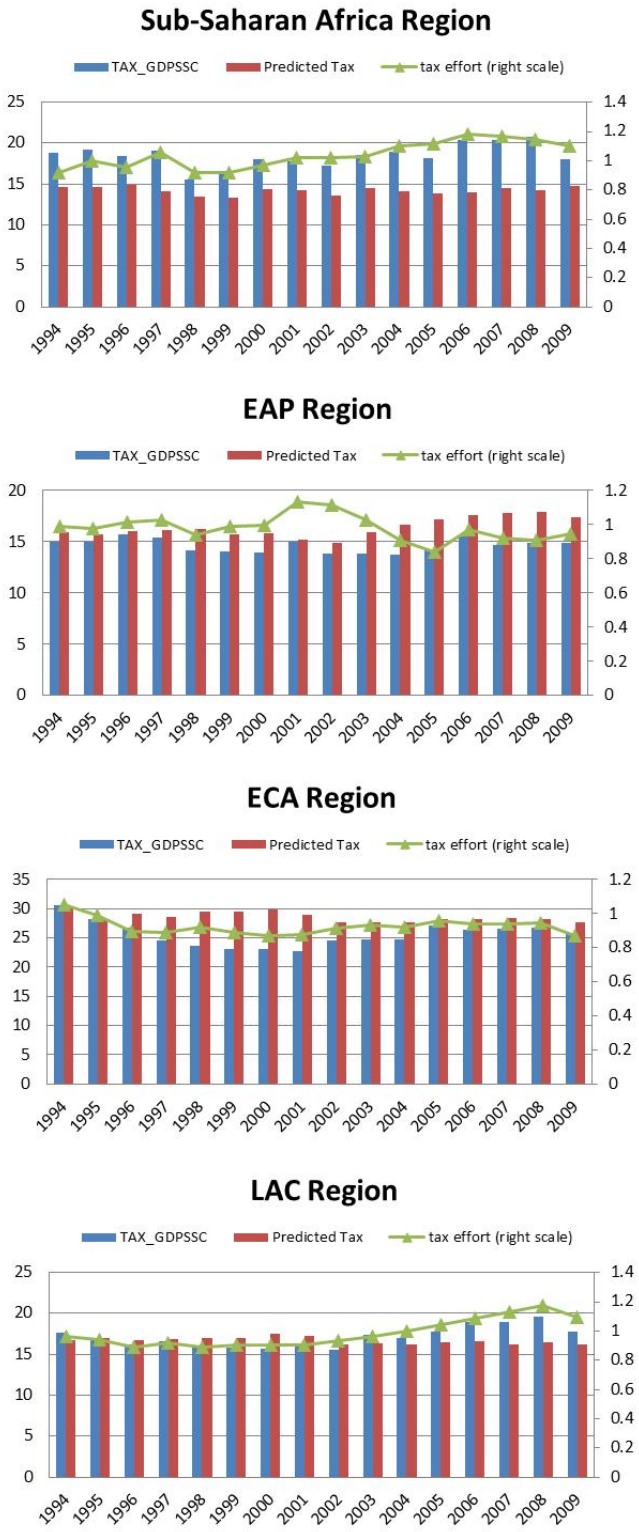
	Tax Effort		Tax Effort		Tax Effort		Tax Effort
Papua New Guinea	1.66	Bolivia	1.13	Ukraine	0.96	Russia	0.81
Namibia	1.54	Norway	1.13	Moldova	0.96	Bangladesh	0.80
Jamaica	1.50	Slovenia	1.13	Senegal	0.96	Latvia	0.80
Morocco	1.44	Hungary	1.12	Peru	0.95	Colombia	0.78
South Africa	1.43	UK	1.10	Egypt	0.95	United States	0.77
New Zealand	1.42	Netherlands	1.10	Argentina	0.95	Canada	0.76
Malta	1.40	Zambia	1.09	Luxembourg	0.94	Armenia	0.76
Cyprus	1.40	Austria	1.09	Jordan	0.93	Mexico	0.75
Trinidad and Tob.	1.36	Honduras	1.07	Botswana	0.93	Turkey	0.74
Togo	1.36	Sri Lanka	1.06	Philippines	0.91	Guatemala	0.74
Zimbabwe	1.36	Finland	1.05	Paraguay	0.91	Albania	0.74
Tunisia	1.36	Belarus	1.04	Indonesia	0.90	Sudan	0.74
Costa Rica	1.35	Syria	1.03	Iceland	0.90	Bahamas	0.74
Uruguay	1.35	Portugal	1.03	Dominican Repu	0.90	Cameroon	0.70
Mongolia	1.35	Cote d'Ivoire	1.02	Spain	0.90	Guinea	0.68
Vietnam	1.31	Poland	1.02	Korea, Rep.	0.89	Azerbaijan	0.67
Ghana	1.30	Chile	1.00	Slovak Rep.	0.89	Madagascar	0.66
Kenya	1.29	Sierra Leone	1.00	Estonia	0.89	Yemen, Rep.	0.61
France	1.29	Denmark	0.99	El Salvador	0.89	Switzerland	0.56
Brazil	1.26	Burkina Faso	0.99	India	0.88	Congo, DRC	0.55
Italy	1.25	Sweden	0.98	Uganda	0.88	China	0.48
Belgium	1.24	Czech Rep.	0.98	Lithuania	0.88	Japan	0.47
Croatia	1.18	Ethiopia	0.98	Germany	0.87	Congo, Rep.	0.46
Pakistan	1.17	Bulgaria	0.98	Lebanon	0.86	Kazakhstan	0.45
Mali	1.16	Ireland	0.97	Panama	0.84	Oman	0.35
Australia	1.14	Nicaragua	0.97	Romania	0.84	Bahrain	0.16
Greece	1.14	Thailand	0.97	Malaysia	0.82		

Note: See Table A7 in the annex for details. Tax effort is the ratio of actual tax revenues in percentage of GDP to predicted tax revenues in percentage of GDP (taxable capacity). For Zimbabwe, the data is for the period of 1994-1997.

Latin American countries show a clearly rising trend in the tax effort after 1998, except the recent years. The tax effort index rose from 0.85 to 1.2 in 2008, at which point the region reached to the peak. This increasing tax effort is as a result of increasing actual taxes. Throughout the years the ratio of actual taxes to GDP increased by almost 5 percentage points from 15 percent to 20 percent. The more stable economic environment is one of the main factors behind these increasing tax revenues (Fricke and Sussmuth, 2011).

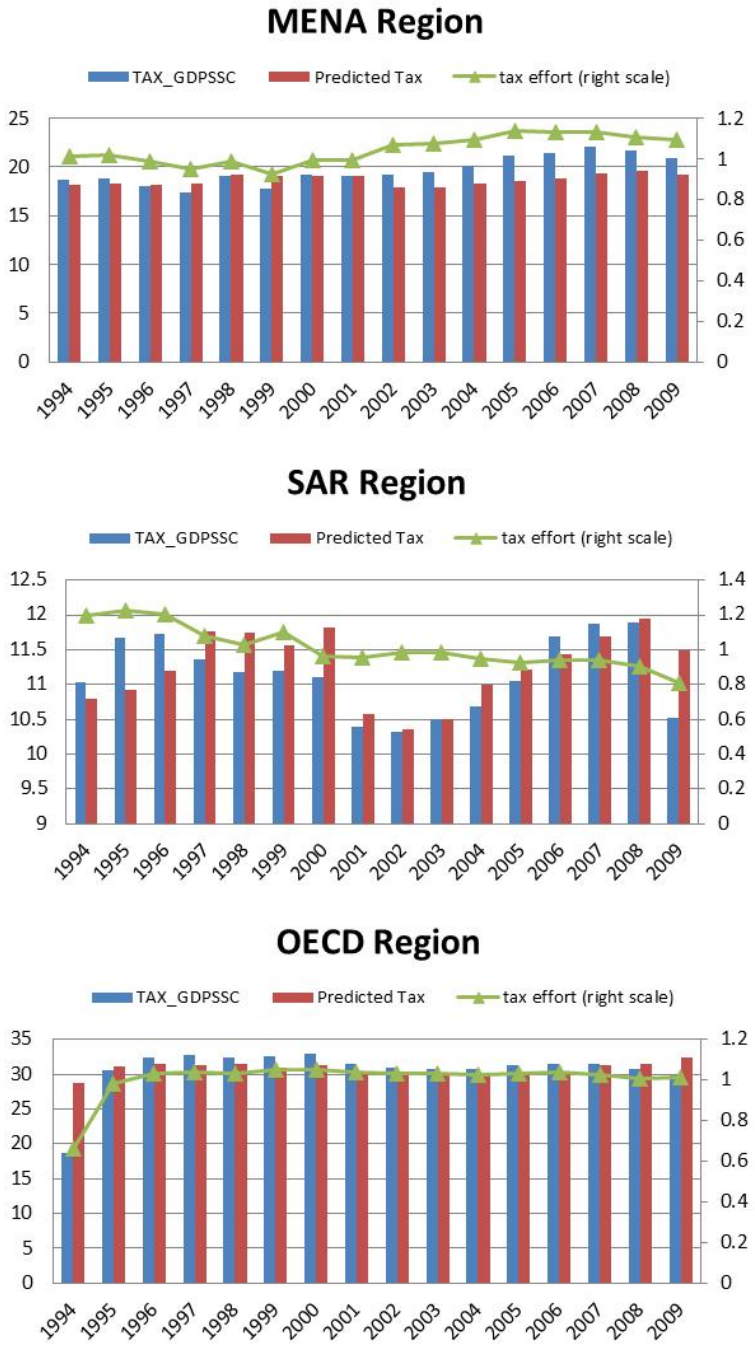
Similar to the case of Latin America, the Middle Eastern and North Africa region presents a clearly increasing trend in the tax effort from 1999 to 2007. The index increased from 0.95 to 1.15 thanks to increasing actual taxes from 17 percent of GDP in 1999 to 22 percent on average in 2007.

Figure 5 – Actual Tax Collection, Taxable Capacity and Tax Effort by Regions, 1994-2009



Note: TAX_GDPSSC is actual tax collection in % of GDP; predicted tax is the taxable capacity calculated based on the estimation results given in column (2) of the results in Table 1 Panel A. Tax effort is the ratio of actual tax to taxable capacity. Regions are defined in Table A4.

Figure 5 (cont'd) – Actual Tax Collection, Taxable Capacity and Tax Effort by Regions, 1994-2009



Note: TAX_GDPSSC is actual tax collection in % of GDP; predicted tax is the taxable capacity calculated based on the estimation results given in column (2) of the results in Table 1 Panel A. Tax effort is the ratio of actual tax to taxable capacity. Regions are defined in Table A4.

South Asia has the lowest actual and predicted taxes in the world. The rates are even lower than the ones that are observed in Sub-Saharan Africa, which is the poorest region in the world. After hitting the bottom in 2002 with actual taxes only 10.3 percent of GDP, both actual and predicted taxes increased significantly. Since the magnitude of increasing predicted taxes dominates the magnitude of increasing actual taxes, the tax effort index declined throughout the years from 1.2 in 1994 to 0.8 in 2009. The countries in this region are expected to do more to improve the level of tax collection.

When we focus on OECD countries (high-income countries are included), the tax effort is almost flat at the value of 1 in the years following the initial increase. It means that for this group of countries actual and predicted taxes are very similar. Since tax revenues fluctuate only slightly from year to year in these countries, it gives a big advantage to their governments in terms of raising consistent revenues to finance expenditures.

When we focus on recent years, the declining trend in tax collection and the tax effort is clear and persistent. Due to financial and economic crisis of 2008-2009, economic activities declined significantly in almost each country. The expected effect of this change on tax revenues has been overall negative, despite signs of recovery in some parts of the world more than in others. Thus, it can be said that one reason for the declining trend of tax revenues is slower economic activity. At the same time, many governments introduced stimulus packages including measures to lower taxes, which put additional downward pressure on tax intake.

Country Classification Based on Tax Collection and Tax Effort

Countries are classified into different groups, based on their tax efforts and actual tax collection. The value of 1 is used as the benchmark for the tax effort and 18.31 percent (median of the tax-to-GDP ratio in the sample) for actual tax revenues. A country is regarded as a low-collection country if its actual collection is lower than 18.31 percent, and regarded as a high-collection country if its collection is above this level. Similarly, countries with a tax effort index less than 1 are included in the low tax effort group, while the ones with a tax effort index more than 1 are placed into the high tax effort group. Based on these definitions, the countries are ranked into four different categories: (i) low tax collection, low tax effort; (ii) high tax collection, high tax effort; (iii) low tax collection, high tax effort; and (iv) high tax collection, low tax effort.

Table 5 gives the list of countries in each group. Given that actual and predicted taxes are positively correlated as indicated in Figure 3, the tax effort is also positively linked to the actual tax collection. Thus, most countries take place in the low tax collection and low tax effort or high tax collection and high tax effort groups.

When we compare the country classification reported in Table 3 of Le, Moreno-Dodson, and Rojchaichaninthorn (2008), focusing on 1994-2003, to Table 5 below (extended period from

1994 to 2009), it can be seen that the classification of most countries is stable. But there are some interesting changes.

Group 1: Low Collection and Low Effort

This group includes the highest number of countries from all geographic regions. They are mostly low-income countries. The exceptions are Canada, Japan, Korea, and United States.[23] Given low levels of actual tax collection, most Asian countries, not surprisingly, take place in this group.

When we compare the findings of Le, Moreno-Dodson, and Rojchaichaninthorn (2008) and the ones reported in Table 5, it can be seen that Canada is a new developed country in the low-effort, low-collection group. It was initially in low effort, but high collection group. In the developing country group, Egypt, Ethiopia, Senegal, and Uganda are new members. In the original table, Egypt was in the high effort and high collection group. All other remaining new countries in the group were initially in the high effort but low collection group.

The collection of taxes in this group of countries is currently low and lies below their respective taxable capacity. These countries have potential to succeed in deepening comprehensive tax policy and administration reforms focusing on revenue enhancement. Given the importance of the governance quality as a determinant of tax revenues, any improvements in this dimension can help this group of countries have higher efficiency in terms of lower administrative and compliance costs, encourage investment and mitigate evasion.

Group 2: High Collection and High Effort

Mainly, middle- and high-income countries are included in this group. When we compare the findings of the previous paper with the ones reported in Table 5, it can be seen that Australia appears as a (new) developed country in the high-effort, high-collection group. Initially, this country was collecting high taxes, but its tax effort index was low. Now both collection and effort are high in Australia. When we check the developing countries, Botswana, Chile, Trinidad and Tobago, and Vietnam are also new countries in the group. Both Botswana and Chile were originally in the low-effort, low-collection group, but they made it to the high-effort, high-collection group after recent improvements in revenue performance. Trinidad and Tobago was initially classified in the group of high collection-low tax effort, while Vietnam moved from the group of low collection-high tax effort.

[23] It should be noted that these countries have a relatively higher share of sub-national tax revenues (Thornton, 2007; OECD, 2003; Joumard, and Kongsrud (2003); and Blöchliger and Petzold, 2009). In the United States, tax expenditures are high as well (Eissa and Hoynes, 2008).

Table 5 – Classification of Countries Based on Tax Efforts and Tax Collection, 1994-2009

TAX COLLECTION	TAX EFFORT: LOW			TAX EFFORT: HIGH	
	Developing Countries		***Developed Countries***	***Developing Countries***	***Developed Countries***
LOW	Albania	Dominican Rep.	Canada	Bolivia	
	Argentina	Egypt, Arab Rep.	Japan	Cote d'Ivoire	
	Armenia	El Salvador	Korea, Rep.	Ghana	
	Azerbaijan	Ethiopia	United States	Honduras	
	Bahamas, The	Guatemala		Kenya	
	Bahrain	Guinea		Mali	
	Bangladesh	India		Nicaragua	
	Burkina Faso	Indonesia		Pakistan	
	Cameroon	Kazakhstan		Sri Lanka	
	China	Lebanon		Syrian Arab Republic	
	Colombia	Madagascar		Togo	
	Congo, Dem. Rep.	Malaysia		Zambia	
	Congo, Rep.	Mexico			
HIGH	***Developing Countries***		***Developed Countries***	***Developing Countries***	***Developed Countries***
	Bulgaria		Czech Republic	Belarus	New Zealand
	Estonia		Denmark	Botswana	Papua New Guinea
	Jordan		Germany	Brazil	Poland
	Latvia		Iceland	Chile	Slovenia
	Lithuania		Ireland	Costa Rica	South Africa
	Moldova		Luxembourg	Croatia	Trinidad and Tobago
	Romania		Spain	Hungary	Tunisia
	Russian Federation		Sweden	Jamaica	Uruguay
	Slovak Republic		Switzerland	Mongolia	Vietnam
	Turkey			Morocco	Zimbabwe
	Ukraine			Namibia	
					Norway
					Portugal
					United Kingdom

Note: Taxable capacity is calculated based on the estimation results given in column (2) of Table 1 Panel A.

Given that the level of tax intake in this group of countries is already high and stays above their respective taxable capacity, a further increase in tax revenue collection may lead to unintended economic distortions. Tax reforms should not focus exclusively on revenue. They should rather aim at raising the efficiency of tax collection, including reducing tax-induced distortions and improving the business climate through further rationalizing the tax regimes, rebalancing the tax mix, and simplifying administration procedures. Any further improvements in the quality of governance (lower corruption or higher bureaucracy quality) can increase the efficiency of the tax system of this group of countries.

Group 3: Low Collection and High Effort

All countries in this group are either low-income or lower-middle income countries. There is no single developed country reported in this group. The number of countries in this group is also the lowest when compared to other groups. Nicaragua and Sri Lanka are the two new countries in this group. As presented in Le, Moreno-Dodson, and Rojchaichaninthorn (2008), both of these countries were classified in the low-effort and low-tax-collection group. With recent improvement in revenue performance, they have moved to high effort, but remain in low-collection category.

Countries in this group seem to fall into a 'trap' where the existing level of tax intake is low due to rampant evasion, skewed and narrow bases, inefficient revenue administration, high compliance costs, yet they are with high tax effort index. More likely explanation for this trap is the net over exploitation of some revenue sources through high tax rates used as a tool to overcome tax erosion resulted from a widespread preferential treatment to economic sectors and activities. A sustained approach to break this trap is to conduct important parallel reforms—creating favorable legal and regulatory environment to attract private investment and at the same time revamping the tax systems to cut collection costs and minimize tax-induced economic distortions and hurdle to investment; and most importantly focusing on reforms to improve the quality of governance. Le, Moreno-Dodson, and Rojchaichaninthorn (2008) provide broad guidance for revenue reforms: Short-term tax reform measures aim to streamline tax policy and tax administration procedures to reduce compliance costs, encourage formality, and lower tax barriers to firms' entry and operations. Medium- to long-term reforms may expand the scope for raising revenue by broadening the effective tax base and enhancing the functioning of the tax administration.

Group 4: High Collection, Low Effort

Almost each country in this group comes from either the middle-income group or high-income. Most developing countries in the group are located in ECA. These countries collect high taxes

relative to the world average, but given their macroeconomic and demographic features, their tax effort remains low.

The new developing countries in the group are Bulgaria, Jordan, and Russia, while the new developed countries are Czech Republic, Denmark, Spain, and Sweden. When we compare the findings of Le, Moreno-Dodson, and Rojchaichaninthorn (2008) to the ones reported in Table 5, it can be seen that all new countries come from the high-effort, high-collection group.

Although countries in this group have already achieved a high tax collection, fiscally they still have the potential to implement reforms to reduce distortions and reach a higher level of efficiency of tax collection, since their tax effort index is low. For example, a number of ECA countries – which impose high factor income taxes, especially taxation on labor (Rutkowski, et al., 2005) – may need to consider restructuring their tax mix, which shifts the burden from production to consumption. Similar to other groups of countries, they are also advised to take required actions to improve the quality of governance to be able to have a more efficient tax system.

IV. CONCLUSION

Taxation is considered the most reliable way to finance public expenditures. However, many developing countries experience a chronic gap between the actual and desirable levels of tax revenues. Taxation reforms are needed to close this gap, but such reforms cannot be the same for all countries.

The development of a tax effort index, relating the actual tax revenues of a country to its estimated taxable capacity, provides us with a tempting measure which considers country specific fiscal, demographic, and institutional characteristics.

Taxable capacity and tax efforts present significant deviations across countries, income groups and regions, as well as overtime. But overall, developing countries seem to have more limitations to expand the scope for taxation, which is determined by their taxable capacity. On the one hand, countries with a low level of actual tax collection and low tax effort may have more room to increase tax revenues in order to reach their taxable capacity without causing major economic distortions or costs. On the other hand, low-income countries with a low level of tax collection but high tax effort have less opportunity to increase tax revenues without possibly creating distortions or high compliance costs.

Measuring taxation performance of countries is useful but theoretically and practically challenging. As presented in the empirical analysis, several variables are important in determining the level of taxes in a country. It is worth noting that in recent years both the significance and the magnitude of the impact of institutional quality indexes on tax collection

have increased strongly. This finding indicates that countries with better institutional quality (e.g., bureaucracy quality or corruption) can potentially raise tax collection without undue extra burden on the economy.

It should be noted that the results in this paper need to be interpreted with care due to potential caveats in the modeling of tax capacity and effort, as well as in the measurement of the actual tax-to-GDP ratio. This study can be complimentary to but not substitute detailed analysis of a country's tax system, which can consider the country's overall fiscal policy taking into account public expenditure needs and the overall level of development. It is recognized that making fundamental changes in a tax structure is a challenge due to possible public resistance and political weakness. The design of tax revenue reforms must be country specific and constructed after comprehensive analysis of the country's taxable capacity, revenue performance, and its top leadership's political commitment.

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Table A1 – Variables by country, averages over 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
ORIGINAL COUNTRIES									
Albania	17.28	20.77	1308	57.09	0.50	62.19	29.69	-4.94	-5.00
Argentina	15.03	16.46	8000	59.51	1.38	31.89	7.47	-7.56	-5.31
Armenia	17.92	20.12	850	54.51	-0.01	72.99	27.98	-4.00	-4.25
Australia	23.77	26.18	22073	49.22	1.47	39.32	3.44	-10.00	-8.63
Austria	35.50	37.96	23832	47.99	0.38	91.50	2.04	-10.00	-8.69
Azerbaijan	16.74	27.29	1019	52.94	2.17	87.86	16.26	-4.00	-4.58
Bahrain	3.86	27.18	13139	42.66	6.18	155.11	0.86	-6.25	-5.75
Bangladesh	8.15	10.32	362	68.39	2.61	35.85	22.94	-5.56	-4.50
Belarus	29.89	31.97	1546	46.25	0.04	126.56	12.50	-4.00	-5.75
Belgium	40.67	41.86	22585	51.46	0.35	145.39	1.20	-10.00	-7.50
Belize	19.38	21.66	3331	80.20	4.03	115.22	15.86	..	..
Bhutan	8.36	19.92	866	72.99	3.17	87.31	27.12	..	..
Bolivia	16.79	21.14	1037	76.53	2.38	56.86	15.07	-5.56	-5.50
Bosnia and Herzegovina	34.09	38.21	1513	43.36	0.26	106.04	14.87	..	..
Botswana	17.08	41.01	3448	68.27	2.69	86.00	2.80	-6.00	-6.19
Brazil	20.35	21.94	3855	53.77	1.86	22.43	6.17	-6.44	-5.63
Bulgaria	28.10	34.26	1869	46.76	-0.48	113.05	12.58	-6.00	-6.19
Burundi	15.18	16.94	113	88.14	2.88	34.90	43.90	..	..
Cambodia	8.72	10.46	349	78.00	3.29	108.64	38.60	..	..
Cameroon	9.86	12.60	643	85.52	2.84	43.85	22.36	-5.00	-5.50
Canada	18.23	19.75	23429	45.74	1.16	73.74	2.36	-10.00	-9.31
Chile	19.34	22.99	5149	52.21	1.69	65.95	5.55	-7.69	-7.38
China	7.38	8.28	1205	45.58	1.30	50.44	14.77	-6.19	-4.88
Colombia	12.45	18.07	2712	58.98	2.19	35.84	10.65	-6.38	-5.31
Congo, Dem. Rep.	4.37	5.14	95	101.25	2.98	53.90	48.23	-1.69	-2.69
Congo, Rep.	9.10	29.17	1097	82.89	2.95	134.11	6.78	-4.00	-6.06
Costa Rica	22.88	25.01	4227	56.39	2.93	92.18	10.08	-6.00	-6.94
Cote d'Ivoire	15.90	17.28	578	82.75	2.35	80.03	24.14	-3.38	-5.44
Croatia	33.84	36.15	5260	48.17	-0.31	86.38	6.55	-7.67	-5.50
Cyprus	42.50	64.61	13552	47.30	2.33	101.92	3.59	-9.81	-8.31

Table A1 (cont'd) – Variables by country, averages over 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
Czech Republic	29.77	31.49	6026	43.09	0.48	126.53	3.61	-8.00	-6.50
Denmark	33.59	37.28	29720	50.24	0.23	85.36	2.23	-10.00	-10.00
Dominican Rep.	14.81	16.05	2798	66.01	2.03	73.79	7.77	-4.44	-6.13
Egypt, Arab Rep.	16.15	27.91	1465	66.14	2.54	50.86	15.84	-6.00	-4.94
El Salvador	14.50	17.05	2274	75.23	1.22	66.03	11.77	-5.44	-6.00
Estonia	28.27	32.41	4874	49.12	-0.50	153.57	4.74	-7.33	-6.92
Ethiopia	9.40	12.75	140	92.48	3.01	37.26	49.66	-3.88	-5.00
Fiji	21.94	24.89	2148	58.93	1.40	121.63	16.31	..	..
Finland	34.83	39.49	23847	49.76	0.29	74.18	3.39	-10.00	-10.00
France	38.77	42.56	21660	53.46	0.52	50.77	2.69	-8.94	-7.38
Georgia	14.16	15.98	824	51.14	-0.31	77.15	24.86	..	..
Germany	28.33	29.48	23067	48.24	-0.16	66.49	1.11	-10.00	-8.81
Ghana	16.59	18.17	272	79.14	2.92	83.17	38.22	-6.69	-5.00
Greece	33.00	38.05	12341	47.85	0.41	52.71	5.99	-8.00	-7.00
Guatemala	10.50	10.77	1724.83	91.19	2.73	56.31	17.20	-5.50	-5.50
Guinea	10.86	11.59	377	89.79	2.40	57.00	21.93	-5.56	-6.06
Hungary	35.03	38.29	4937	46.44	-0.04	127.35	5.25	-9.06	-7.31
Iceland	28.33	32.71	31847	52.62	1.45	76.40	8.78	-10.00	-9.69
India	9.54	12.19	514	62.36	2.12	32.32	22.35	-8.00	-5.31
Indonesia	13.32	17.06	901	54.32	1.87	60.40	15.75	-6.31	-4.56
Ireland	30.63	32.90	25319	49.64	1.83	156.42	3.35	-10.00	-6.88
Italy	36.12	37.94	18902	49.07	0.10	50.24	2.66	-7.75	-5.75
Jamaica	25.89	30.78	3658	65.67	1.06	101.22	6.89	-8.00	-4.94
Japan	10.18	..	37413	48.26	-0.34	23.29	1.72	-10.00	-6.88
Jordan	19.90	26.12	1961	73.78	3.19	122.74	3.07	-6.38	-6.63
Kazakhstan	11.99	13.34	1582	51.50	0.42	86.92	9.14	-6.00	-4.50
Kenya	17.25	19.14	420	88.31	3.31	59.55	28.58	-6.44	-5.00
Korea, Rep.	17.63	21.04	12202	49.45	0.79	73.86	4.37	-8.25	-6.50
Kyrgyz Republic	14.00	16.88	297	64.95	1.86	97.69	37.56	..	..
Latvia	23.22	26.62	3964	48.62	-0.62	97.51	4.91	-6.75	-5.33

Table A1 (cont'd) – Variables by country, averages over 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
Lebanon	14.97	19.75	4954	56.71	2.29	62.36	6.78	-5.56	-3.69
Lesotho	46.48	55.02	411	82.49	2.04	158.39	13.15	..	..
Lithuania	25.55	27.76	3953	49.25	-0.35	111.23	6.96	-6.75	-5.33
Luxembourg	35.99	38.59	46581	48.40	1.40	261.61	0.66	-10.00	-9.19
Madagascar	10.60	11.25	248	91.52	3.22	63.31	28.25	-4.00	-7.94
Malaysia	16.13	21.43	4232	59.45	2.69	198.19	10.30	-7.75	-6.13
Malta	34.32	38.29	9649	45.93	1.12	169.82	2.63	-7.94	-7.25
Mauritius	20.15	23.47	3941	46.24	1.33	123.42	7.11	..	..
Mexico	12.66	14.52	5828	61.80	2.03	57.26	4.54	-7.56	-5.38
Moldova	24.48	28.63	439	48.04	0.50	125.81	23.39	-5.08	-4.25
Mongolia	20.06	26.79	547	59.80	2.33	122.78	30.65	-6.00	-6.13
Morocco	26.60	31.90	1412	60.72	2.10	64.55	16.58	-6.00	-5.94
Namibia	27.53	30.37	2293	76.41	2.91	97.33	10.87	-6.69	-5.69
Nepal	9.12	11.07	227	78.21	2.78	51.17	38.42	..	..
Netherlands	37.30	40.40	23931	47.48	0.35	125.93	2.59	-10.00	-9.50
New Zealand	30.32	35.55	13841	51.70	1.29	59.25	7.08	-10.00	-9.69
Nicaragua	14.92	16.08	779	78.17	2.57	78.04	20.79	-4.00	-6.63
Norway	37.11	48.64	37699	53.26	0.90	72.50	1.99	-10.00	-9.19
Oman	7.36	26.66	8640	60.59	3.06	87.06	2.35	-6.44	-5.50
Pakistan	11.13	14.79	565	79.29	3.00	34.02	23.83	-6.00	-4.69
Panama	15.44	23.67	4222	58.97	2.22	152.16	7.24	-5.94	-5.00
Papua New Guinea	21.56	23.62	681	74.57	2.72	119.78	36.32	-6.44	-4.44
Paraguay	12.56	17.30	1404	72.45	2.74	102.64	19.65	-4.44	-3.94
Peru	15.23	17.66	2242	62.74	1.91	37.74	8.05	-5.56	-5.56
Philippines	14.34	16.14	1108	70.53	2.51	94.09	16.58	-7.31	-5.38
Poland	28.42	31.48	4693	45.42	0.51	64.17	5.30	-8.19	-6.50
Portugal	31.32	35.27	11037	48.42	0.43	65.50	3.67	-8.00	-8.13
Romania	22.66	25.68	2022	45.64	-0.08	68.92	14.11	-4.00	-5.75
Russian Federation	21.75	30.75	2090	43.71	0.24	55.97	5.91	-4.44	-4.50
Rwanda	..	..	247	90.33	4.31	37.07	39.94	..	..

Table A1 (cont'd) – Variables by country, averages over 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
Senegal	15.25	16.05	485	90.84	3.03	67.10	17.60	-4.44	-5.50
Seychelles	34.01	42.78	7203	..	..	174.46	2.97	..	..
Sierra Leone	10.10	10.80	208	80.86	2.37	49.73	50.69	-1.25	-4.75
Slovak Republic	26.78	30.86	6050	44.03	0.78	146.86	4.51	-8.19	-6.13
Slovenia	34.91	37.55	10577	43.02	0.33	114.87	3.31	-8.00	-6.58
South Africa	26.56	28.69	3226	58.96	2.31	54.45	3.54	-6.75	-6.31
Spain	26.54	28.48	14420	46.22	1.07	54.12	3.95	-8.69	-7.75
Sri Lanka	14.99	16.90	916	49.97	1.24	75.26	17.10	-6.00	-6.31
St. Kitts and Nevis	24.87	32.74	7492	..	..	116.43	3.67	..	..
St. Vincent and the Gren.	22.32	28.93	3370	60.53	0.95	113.59	9.69	..	..
Sudan	6.29	7.58	389	82.77	2.81	31.43	37.70	-4.00	-3.31
Swaziland	25.45	26.79	1383	88.35	2.48	162.19	10.65	..	..
Sweden	32.71	38.36	28259	54.70	0.56	83.40	2.13	-10.00	-9.63
Switzerland	18.51	20.60	34791	47.77	0.70	83.72	1.52	-10.00	-8.69
Syrian Arab Republic	17.08	22.78	1239	78.61	3.35	69.49	24.97	-4.56	-6.19
Tajikistan	10.31	11.33	178	82.00	1.93	123.40	27.29	..	..
Thailand	17.08	19.79	2182	45.07	1.36	118.64	10.06	-6.63	-4.75
Trinidad and Tobago	25.77	29.22	7508	46.52	1.50	98.81	1.36	-7.56	-5.50
Tunisia	26.05	29.80	2165	55.09	2.23	97.40	11.57	-6.00	-5.50
Turkey	18.98	23.80	4197	54.95	2.08	47.33	12.00	-6.44	-5.38
Uganda	11.40	11.72	276	105.32	3.19	38.53	32.71	-5.56	-5.13
Ukraine	26.13	31.13	807	46.37	-0.37	98.59	12.72	-4.00	-4.50
United Kingdom	34.79	36.35	25413	52.75	0.56	56.20	1.08	-10.00	-8.50
United States	17.53	18.13	34864	50.51	1.19	25.04	1.33	-10.00	-8.25
Uruguay	23.85	26.34	6970	59.47	0.42	46.46	9.06	-5.75	-6.00
Vanuatu	18.38	21.14	1241	79.58	2.96	92.10	22.71	..	..
Vietnam	18.46	22.09	457	57.49	2.56	120.63	23.71	-5.94	-5.19
Yemen, Rep.	10.14	25.05	521	102.76	4.28	85.08	15.99	-4.44	-5.44
Zambia	17.57	18.49	344	94.47	2.44	70.45	20.97	-4.00	-5.88
Zimbabwe	23.57	25.94	454	82.35	1.22	80.82	19.03	-6.13	-3.19

Table A1 (cont'd) – Variables by country, averages over 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
NEW COUNTRIES									
Bahamas, The	15.48	17.15	17198	50.38	2.02	98.03	2.26	-8.00	-8.00
Benin	16.10	17.06	337	92.63	3.34	43.60	35.07	..	..
Burkina Faso	11.83	12.87	232	94.74	3.19	35.86	34.94	-4.00	-5.19
Cape Verde	25.68	30.12	1290	83.42	3.01	81.66	10.31	..	..
Honduras	17.23	21.14	1215	83.06	2.91	114.49	16.37	-5.56	-4.94
Hong Kong SAR, China	12.05	19.11	27533	37.76	1.52	320.42	..	-8.25	-7.63
Israel	33.15	38.51	19401	61.61	2.40	74.04	..	-9.94	-6.75
Lao PDR	11.57	13.06	356	80.39	2.76	72.56	47.79	..	..
Macao SAR, China	20.72	24.17	19534	38.56	3.12	149.65	0.00	..	..
Macedonia, FYR	29.67	33.95	1795	46.63	0.70	100.24	12.49	..	..
Maldives	15.57	32.53	2542	73.50	3.61	168.08	8.80	..	..
Mali	14.34	16.07	228	98.71	3.12	65.09	41.78	-1.00	-5.31
Myanmar	3.21	6.05	..	53.56	1.71	1.40	57.16	-4.00	-3.50
Niger	10.75	12.38	169	103.01	3.44	41.25	39.92	-4.13	-3.25
Singapore	14.37	23.58	24086	39.39	2.71	406.46	..	-9.81	-8.00
Togo	15.44	16.36	252	84.83	3.22	81.73	38.61	-1.69	-4.50

Table A2 – Variable Definitions and Sources

Variables	Description	Source
Tax revenue in % of GDP	Series : Tax revenue (% of GDP) (GC.TAX.TOTL.GD.ZS) PLUS Social contributions (% of revenue) (GC.REV.SOCL.ZS) when available. Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. Social contributions include social security contributions by employees, employers, and self-employed individuals, and other contributions whose source cannot be determined. They also include actual or imputed contributions to social insurance schemes operated by governments.	WDI (2011)
Fiscal revenue in % of GDP	Series: Revenue, excluding grants (% of GDP) (GC.REV.XGRT.GD.ZS).Revenue is cash receipts from taxes, social contributions, and other revenues such as fines, fees, rent, and income from property or sales. Grants are also considered as revenue but are excluded here.	WDI (2011)
GDP per capita		WDI (2011)
Age dependency ratio	Age dependency ratio (in %) is the ratio of dependents--people younger than 15 or older than 64-- to the working-age population--those ages 15-64.	WDI (2011)
Population growth	Total population between the ages 15 to 64 is the number of people who could potentially be economically active.	WDI (2011)
Trade openness	Series: Trade (% of GDP) (NE.TRD.GNFS.ZS). Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI (2011)
Agriculture value added (in % of GDP)	Series: Agriculture, value added (% of GDP) (NV.AGR.TOTL.ZS). Cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.	WDI (2011)
Bureaucracy Quality Index	The institutional strength and quality of the bureaucracy is a shock absorber that tends to minimize revisions of policy when governments change. The original score ranges from 1 to 4. High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. The score is recalculated to -10 to -1 where low points are countries with strength bureaucracy and high points are countries with weak bureaucracy.	ICRG (2011)
Corruption index	The assessment of corruption refers to the political system. Corruption index ranges from 1 to 6. High points are given to low corruption countries and low points are given to high corruption countries. The scores are recalculated to -10 to -1 where low points mean low corruption and high points mean high corruption.	ICRG (2011)
Size of shadow economy	The shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities for any of the following reasons: (1) to avoid payment of income, value added or other taxes, (2) to avoid payment of social security contributions, (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.	Schneider, Buehn, Montenegro (2010)
Total consumption	Series: Final consumption expenditure, etc. (% of GDP) (NE.CON.TETC.ZS). Final consumption expenditure (formerly total consumption) is the sum of household final consumption expenditure (private consumption) and general government final consumption expenditure (general government consumption). This estimate includes any statistical discrepancy in the use of resources relative to the supply of resources.	WDI (2011)

Table A3 – Income groups

High-income countries	Middle-income countries		Low-income countries
Australia	Albania	Mauritius	Bangladesh
Austria	Argentina	Mexico	Benin
Bahamas, The	Armenia	Moldova	Burkina Faso
Bahrain	Azerbaijan	Mongolia	Burundi
Belgium	Belarus	Morocco	Cambodia
Canada	Belize	Namibia	Congo, Dem. Rep.
Croatia	Bhutan	Nicaragua	Ethiopia
Cyprus	Bolivia	Pakistan	Guinea
Czech Republic	Bosnia and Herzegovina	Panama	Kenya
Denmark	Botswana	Papua New Guinea	Kyrgyz Republic
Estonia	Brazil	Paraguay	Madagascar
Finland	Bulgaria	Peru	Mali
France	Cameroon	Philippines	Myanmar
Germany	Cape Verde	Romania	Nepal
Greece	Chile	Russian Federation	Niger
Hong Kong SAR, China	China	Senegal	Rwanda
Hungary	Colombia	Seychelles	Sierra Leone
Iceland	Congo, Rep.	South Africa	Tajikistan
Ireland	Costa Rica	Sri Lanka	Togo
Israel	Cote d'Ivoire	St. Kitts and Nevis	Uganda
Italy	Dominican Republic	St. Vincent and the Grenadines	Zimbabwe
Japan	Egypt, Arab Rep.	Sudan	
Korea, Rep.	El Salvador	Swaziland	
Luxembourg	Fiji	Syrian Arab Republic	
Macao SAR, China	Georgia	Thailand	
Malta	Ghana	Tunisia	
Netherlands	Guatemala	Turkey	
New Zealand	Honduras	Ukraine	
Norway	India	Uruguay	
Oman	Indonesia	Vanuatu	
Poland	Jamaica	Vietnam	
Portugal	Jordan	Yemen, Rep.	
Singapore	Kazakhstan	Zambia	
Slovak Republic	Lao PDR		
Slovenia	Latvia		
Spain	Lebanon		
Sweden	Lesotho		
Switzerland	Lithuania		
Trinidad and Tobago	Macedonia, FYR		
United Kingdom	Malaysia		
United States	Maldives		

Source: The World Bank classification.
Note: High-income economies are those in which 2009 GNI per capita was $12,196 or more. Low-income economies are those in which 2009 GNI per capita was $995 or less. Middle-income economies are those in which 2009 GNI per capita was between $996 and $12,195.

Table A4 – Regional Classification

AFR	EAP	ECA	LAC	MENA	SAR	High Income OECD
Botswana	Cambodia	Albania	Argentina	Egypt, Arab Rep.	Bangladesh	Australia
Burundi	China	Armenia	Bahamas, The	Jordan	Bhutan	Austria
Cameroon	Fiji	Azerbaijan	Belize	Lebanon	India	Belgium
Congo, Dem. Rep.	Indonesia	Belarus	Bolivia	Morocco	Maldives	Canada
Congo, Rep.	Lao PDR	Bosnia and Herzegovina	Brazil	Syrian Arab Rep.	Nepal	Czech Republic
Cote d'Ivoire	Malaysia	Bulgaria	Chile	Tunisia	Pakistan	Denmark
Ethiopia	Mongolia	Croatia	Colombia	Yemen, Rep.	Sri Lanka	Finland
Ghana	Myanmar	Estonia	Costa Rica			France
Guinea	Papua New Guinea	Georgia	Dominican Republic			Germany
Kenya	Philippines	Kazakhstan	El Salvador			Greece
Lesotho	Singapore	Kyrgyz Republic	Guatemala			Hungary
Madagascar	Thailand	Latvia	Honduras			Iceland
Mauritius	Vanuatu	Lithuania	Jamaica			Ireland
Namibia	Vietnam	Macedonia, FYR	Mexico			Israel
Rwanda		Moldova	Nicaragua			Italy
Senegal		Romania	Panama			Japan
Seychelles		Russian Federation	Paraguay			Korea, Rep.
Sierra Leone		Tajikistan	Peru			Luxembourg
South Africa		Turkey	St. Kitts and Nevis			Netherlands
Sudan		Ukraine	St. Vincent and the Grenadines			New Zealand
Swaziland			Trinidad and Tobago			Norway
Uganda			Uruguay			Poland
Zambia						Portugal
Zimbabwe						Slovak Republic
						Slovenia
						Spain
						Sweden
						Switzerland
						United Kingdom
						United States

Source: The World Bank classification.
Note: AFR is Sub-Saharan Africa, EAP is East Asia and Pacific, ECA is Eastern European and Central Asia, LAC is Latin America and Caribbean, MENA is Middle East and North Africa, SAR is South Asia. High-income OECD includes only high-income OECD members.

Table A5 – Correlation Matrix, 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
Tax revane in % of GDP	1.00								
Fiscal revenue in % of GDP	0.91	1.00							
GDP per capita	0.45	0.44	1.00						
Age dependency ratio	-0.45	-0.44	-0.49	1.00					
Population growth	-0.48	-0.36	-0.28	0.52	1.00				
Trade openness	0.21	0.31	0.22	-0.29	-0.02	1.00			
Agriculture value added (in % of GDP)	-0.59	-0.61	-0.54	0.66	0.40	-0.30	1.00		
Bureaucracy Quality Index	-0.58	-0.56	-0.75	0.58	0.37	-0.21	0.68	1.00	
Corruption index	-0.47	-0.46	-0.64	0.32	0.24	-0.15	0.45	0.64	1.00

Note: GDP per capita is in constant 2000 US$; population growth is the growth rate of population between 15 and 64 ages; trade openness is the sum of imports and exports in percentage of GDP; corruption index is recalculated such that lower values indicate lower corruption; bureaucracy index is recalculated such that lower values indicate higher bureaucracy quality. 110 countries are included and the number of observations is 1,322.

Table A6 – Descriptive statistics, averages over 1994-2009

	Tax revane in % of GDP	*Fiscal revenue in % of GDP*	*GDP per capita*	*Age dependency ratio*	*Population growth*	*Trade openness*	*Agriculture value added (in % of GDP)*	*Bureaucracy Quality Index*	*Corruption index*
Mean	21.53	25.50	7185.32	63.23	1.80	88.67	14.98	-6.68	-6.17
Standard Deviation	10.10	10.51	10205.22	17.99	1.52	51.39	13.57	2.34	1.92
Minimum	1.35	3.00	80.62	25.63	-5.85	0.31	0.00	-10.00	-10.00
Maximum	68.56	78.47	56389.21	117.77	17.45	438.09	65.86	-1.00	-1.00
Count	1437	1421	2157	2144	2144	2121	2046	1748	1748

Table A7 – Actual Taxation, Taxable Capacity (Predicted Tax) and Tax Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort
Albania	17.28	23.34	0.74	14.60	23.11	0.63	20.86	23.63	0.88
Argentina	15.03	15.85	0.95	..	..	..	15.03	15.85	0.95
Armenia	17.92	23.61	0.76	..	..	..	17.92	23.61	0.76
Australia	23.77	20.77	1.14	23.35	21.19	1.10	23.92	20.59	1.16
Austria	35.50	32.54	1.09	35.55	31.91	1.11	35.46	33.09	1.07
Azerbaijan	16.74	25.01	0.67	..	..	..	16.74	25.01	0.67
Bahamas, The	15.48	21.02	0.74	15.84	21.11	0.75	14.99	20.88	0.72
Bahrain	3.86	24.05	0.16	4.96	24.05	0.21	2.61	..	..
Bangladesh	8.15	10.15	0.80	7.60	9.13	0.83	8.22	10.28	0.80
Belarus	29.89	28.65	1.04	28.47	29.37	0.97	31.31	28.29	1.11
Belgium	40.67	32.86	1.24	41.50	32.39	1.28	39.95	33.27	1.20
Belize	19.38	..	..	19.38	..	..	..	..	..
Benin	16.10	..	..	15.47	..	..	16.19	..	..
Bhutan	8.36	..	..	7.92	..	..	8.80	..	..
Bolivia	16.79	14.80	1.13	..	..	..	16.79	14.80	1.13
Bosnia and Herz.	34.09	..	..	..	..	..	34.09	..	..
Botswana	17.08	18.39	0.93	17.08	18.39	0.93	..	..	..
Brazil	20.35	16.13	1.26	18.75	16.11	1.16	21.55	16.15	1.33
Bulgaria	28.10	28.82	0.98	26.68	29.16	0.91	29.53	28.48	1.04
Burkina Faso	11.83	11.95	0.99	..	..	..	11.83	11.95	0.99
Burundi	15.18	..	..	15.18	..	..	..	..	..
Cambodia	8.72	..	..	..	..	..	8.72	..	..
Cameroon	9.86	14.14	0.70	9.86	14.14	0.70	..	..	..
Canada	18.23	23.94	0.76	18.88	24.42	0.77	17.58	23.17	0.76
Cape Verde	25.68	..	..	..	..	..	25.68	..	..
Chile	19.34	19.29	1.00	18.09	19.20	0.94	19.65	19.31	1.02
China	7.38	15.27	0.48	5.83	14.94	0.39	9.14	15.64	0.58
Colombia	12.45	15.87	0.78	11.03	15.17	0.73	12.62	15.96	0.79
Congo, Dem. Rep.	4.37	7.92	0.55	4.13	7.89	0.52	6.32	8.09	0.78
Congo, Rep.	9.10	19.81	0.46	9.28	19.93	0.47	8.74	19.58	0.45
Costa Rica	22.88	16.93	1.35	..	..	..	22.88	16.93	1.35
Cote d'Ivoire	15.90	15.53	1.02	..	..	..	15.90	15.53	1.02
Croatia	33.84	28.72	1.18	35.55	29.10	1.22	32.13	28.53	1.13
Cyprus	42.50	30.38	1.40	35.44	30.38	1.17	48.68	30.38	1.60
Czech Republic	29.77	30.34	0.98	30.16	31.07	0.97	29.38	29.61	0.99
Denmark	33.59	33.88	0.99	33.26	33.48	0.99	33.89	34.23	0.99
Dominican Republic	14.81	16.52	0.90	..	..	..	14.81	16.52	0.90
Egypt, Arab Rep.	16.15	17.00	0.95	19.24	17.63	1.09	14.61	16.68	0.88
El Salvador	14.50	16.36	0.89	..	..	..	14.50	16.36	0.89
Estonia	28.27	31.79	0.89	29.26	33.15	0.88	27.40	31.01	0.88

Table A7 (cont'd) – Actual Taxation, Taxable Capacity (Predicted Tax) and Tax Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort
Ethiopia	9.40	9.63	0.98	9.41	8.99	1.05	9.38	10.75	0.87
Fiji	21.94	..	..	21.63	..	..	22.24	..	..
Finland	34.83	33.09	1.05	35.49	32.77	1.08	34.17	33.41	1.02
France	38.77	30.05	1.29	37.53	29.93	1.25	39.86	30.16	1.32
Georgia	14.16	..	..	9.61	..	..	17.00	..	..
Germany	28.33	32.50	0.87	28.83	32.25	0.89	27.89	32.72	0.85
Ghana	16.59	12.79	1.30	17.19	13.95	1.23	16.52	12.65	1.31
Greece	33.00	28.99	1.14	32.67	30.15	1.08	33.29	27.99	1.19
Guatemala	10.50	14.15	0.74	9.24	14.37	0.64	11.76	13.98	0.84
Guinea	10.86	15.98	0.68	10.86	15.98	0.68	..	..	..
Honduras	17.23	16.15	1.07	..	..	..	17.23	16.15	1.07
Hong Kong (China)	12.05	..	..	..	..	..	12.05	..	..
Hungary	35.03	31.19	1.12	36.01	31.84	1.13	34.18	30.54	1.12
Iceland	28.33	31.55	0.90	28.08	31.64	0.89	28.46	31.49	0.90
India	9.54	10.83	0.88	8.89	10.47	0.85	10.18	11.18	0.91
Indonesia	13.32	14.78	0.90	14.52	14.41	1.01	12.27	15.10	0.81
Ireland	30.63	31.43	0.97	31.36	30.84	1.02	30.00	31.94	0.94
Israel	33.15	..	..	34.73	..	..	32.75	..	..
Italy	36.12	28.98	1.25	37.18	29.76	1.25	35.20	28.30	1.24
Jamaica	25.89	17.21	1.50	..	..	..	25.89	17.21	1.50
Japan	10.18	21.47	0.47	..	..	..	10.18	21.47	0.47
Jordan	19.90	21.40	0.93	19.41	21.29	0.91	20.38	21.52	0.95
Kazakhstan	11.99	26.67	0.45	10.34	27.73	0.37	13.02	26.15	0.50
Kenya	17.25	13.34	1.29	16.66	13.02	1.28	17.84	13.66	1.31
Korea, Rep.	17.63	19.72	0.89	16.52	20.26	0.82	18.74	19.18	0.98
Kyrgyz Republic	14.00	..	..	13.18	..	..	15.63	..	..
Lao PDR	11.57	..	..	..	..	..	11.57	..	..
Latvia	23.22	29.14	0.80	23.99	29.58	0.81	22.45	28.93	0.78
Lebanon	14.97	17.36	0.86	12.18	17.05	0.71	15.67	17.44	0.90
Lesotho	46.48	..	..	42.89	..	..	50.59	..	..
Lithuania	25.55	29.14	0.88	23.57	29.39	0.80	26.05	29.06	0.90
Luxembourg	35.99	38.11	0.94	36.89	37.70	0.98	35.66	38.26	0.93
Macao SAR, China	20.72	..	..	16.56	..	..	23.84	..	..
Macedonia, FYR	29.67	..	..	..	..	..	29.67	..	..
Madagascar	10.60	15.96	0.66	10.53	16.09	0.65	10.62	15.92	0.67
Malaysia	16.13	19.68	0.82	16.90	20.08	0.84	15.55	19.38	0.80
Maldives	15.57	..	..	13.78	..	..	17.36	..	..
Mali	14.34	12.34	1.16	13.55	12.08	1.12	14.53	12.43	1.17
Malta	34.32	24.44	1.40	..	..	..	34.32	24.44	1.40
Mauritius	20.15	..	..	..	..	..	20.15	..	..

Table A7 (cont'd) – Actual Taxation, Taxable Capacity (Predicted Tax) and Tax Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort
Mexico	12.66	16.78	0.75	12.66	16.78	0.75	..	..	..
Moldova	24.48	25.55	0.96	22.20	24.64	0.90	26.19	26.00	1.01
Mongolia	20.06	14.91	1.35	15.63	14.68	1.06	25.98	15.21	1.71
Morocco	26.60	18.53	1.44	..	..	..	26.60	18.53	1.44
Myanmar	3.21	..	..	3.48	..	..	2.49	..	..
Namibia	27.53	17.87	1.54	28.61	18.72	1.53	26.10	16.72	1.56
Nepal	9.12	..	..	8.68	..	..	9.56	..	..
Netherlands	37.30	33.97	1.10	38.00	34.07	1.12	36.69	33.89	1.08
New Zealand	30.32	21.34	1.42	29.29	20.94	1.40	30.49	21.42	1.42
Nicaragua	14.92	15.37	0.97	13.09	15.99	0.82	16.75	14.75	1.14
Niger	10.75	..	..	..	..	..	10.75	..	..
Norway	37.11	32.75	1.13	36.21	32.86	1.10	37.34	32.72	1.14
Oman	7.36	21.04	0.35	7.36	21.04	0.35	..	..	..
Pakistan	11.13	9.54	1.17	12.34	9.45	1.31	9.92	9.63	1.03
Panama	15.44	18.35	0.84	15.44	18.35	0.84	..	..	..
Papua New Guinea	21.56	12.97	1.66	21.62	13.26	1.63	21.05	10.63	1.98
Paraguay	12.56	13.83	0.91	12.43	14.68	0.85	12.69	12.98	0.98
Peru	15.23	16.02	0.95	14.98	16.03	0.93	15.47	16.01	0.97
Philippines	14.34	15.68	0.91	15.45	15.84	0.98	13.24	15.51	0.85
Poland	28.42	27.85	1.02	27.25	28.26	0.96	28.56	27.80	1.03
Portugal	31.32	30.53	1.03	30.31	30.66	0.99	32.22	30.41	1.06
Romania	22.66	26.97	0.84	..	..	..	22.66	26.97	0.84
Russian Federation	21.75	26.69	0.81	..	..	..	21.75	26.69	0.81
Rwanda	..	..	..	..	..	..	..	..	..
Senegal	15.25	15.95	0.96	15.25	15.95	0.96	..	..	..
Seychelles	34.01	..	..	33.59	..	..	34.43	..	..
Sierra Leone	10.10	10.13	1.00	9.30	10.82	0.86	10.90	9.44	1.15
Singapore	14.37	..	..	15.84	..	..	12.89	..	..
Slovak Republic	26.78	30.04	0.89	..	..	..	26.78	30.04	0.89
Slovenia	34.91	30.81	1.13	35.05	31.27	1.12	34.76	30.54	1.14
South Africa	26.56	18.52	1.43	24.91	18.34	1.36	26.97	18.56	1.45
Spain	26.54	29.65	0.90	28.64	29.83	0.96	24.70	29.49	0.84
Sri Lanka	14.99	14.12	1.06	16.01	14.16	1.13	13.83	14.07	0.98
St. Kitts and Nevis	24.87	..	..	23.52	..	..	25.55	..	..
St. Vincent and the Gren.	22.32	..	..	23.13	..	..	20.17	..	..
Sudan	6.29	8.53	0.74	6.29	8.53	0.74	..	..	..
Swaziland	25.45	..	..	25.07	..	..	26.03	..	..
Sweden	32.71	33.22	0.98	35.00	33.34	1.05	30.70	33.12	0.93
Switzerland	18.51	32.79	0.56	19.77	33.23	0.59	17.07	32.29	0.53
Syrian Arab Republic	17.08	16.62	1.03	17.08	16.62	1.03	..	..	..

Table A7 (cont'd) – Actual Taxation, Taxable Capacity (Predicted Tax) and Tax Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort	Tax/GDP	Predicted tax/GDP	Tax Effort
Tajikistan	10.31	..	..	9.75	..	..	11.42	..	..
Thailand	17.08	17.62	0.97	..	..	..	17.08	17.62	0.97
Togo	15.44	11.37	1.36	..	..	..	15.44	11.37	1.36
Trinidad and Tobago	25.77	18.97	1.36	22.96	18.75	1.22	26.97	19.06	1.42
Tunisia	26.05	19.23	1.36	25.59	19.10	1.34	26.52	19.35	1.37
Turkey	18.98	25.49	0.74	..	..	..	18.98	25.49	0.74
Uganda	11.40	12.99	0.88	10.59	11.94	0.89	11.81	13.52	0.87
Ukraine	26.13	27.13	0.96	21.79	27.11	0.80	27.76	27.14	1.02
United Kingdom	34.79	31.63	1.10	34.54	32.01	1.08	35.02	31.29	1.12
United States	17.53	22.66	0.77	19.52	22.24	0.88	17.28	22.72	0.76
Uruguay	23.85	17.67	1.35	24.19	17.63	1.37	23.51	17.71	1.33
Vanuatu	18.38	..	..	18.38	..	..	..	..	..
Vietnam	18.46	14.10	1.31	17.63	14.00	1.26	20.67	14.35	1.44
Yemen, Rep.	10.14	16.65	0.61	10.14	16.65	0.61	..	..	..
Zambia	17.57	16.07	1.09	18.02	16.19	1.11	17.06	15.92	1.07
Zimbabwe	23.57	17.36	1.36	23.57	17.36	1.36	..	..	..

Table A8– Actual Fiscal Revenue, Revenue Capacity (Predicted Revenue) and Revenue Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort
Albania	20.77	23.80	0.87	18.57	23.92	0.78	23.71	23.63	1.00
Argentina	16.46	15.85	1.04	..	..	..	16.46	15.85	1.04
Armenia	20.12	23.61	0.85	..	..	..	20.12	23.61	0.85
Australia	26.18	20.77	1.26	25.94	21.19	1.22	26.28	20.59	1.28
Austria	37.96	32.54	1.17	38.06	31.91	1.19	37.86	33.09	1.14
Azerbaijan	27.29	25.01	1.09	..	..	..	27.29	25.01	1.09
Bahamas, The	17.15	21.02	0.82	17.53	21.11	0.83	16.65	20.88	0.80
Bahrain	27.18	24.05	1.13	24.46	24.05	1.02	30.28	..	..
Bangladesh	10.32	10.15	1.02	9.83	9.13	1.08	10.38	10.28	1.01
Belarus	31.97	28.65	1.12	30.09	29.37	1.02	33.85	28.29	1.20
Belgium	41.86	32.86	1.27	42.53	32.39	1.31	41.28	33.27	1.24
Belize	21.66	..	..	21.66	..	..	..	..	..
Benin	17.06	..	..	16.47	..	..	17.15	..	..
Bhutan	19.92	..	..	20.64	..	..	19.20	..	..
Bolivia	21.14	14.80	1.43	..	..	..	21.14	14.80	1.43
Bosnia and Herz.	38.21	..	..	..	..	..	38.21	..	..
Botswana	41.01	18.39	2.23	41.01	18.39	2.23	..	..	..
Brazil	21.94	16.13	1.36	21.28	16.11	1.32	22.44	16.15	1.39
Bulgaria	34.26	28.82	1.19	34.05	29.16	1.17	34.47	28.48	1.21
Burkina Faso	12.87	11.95	1.08	..	..	..	12.87	11.95	1.08
Burundi	16.94	..	..	16.94	..	..	..	..	..
Cambodia	10.46	..	..	..	..	..	10.46	..	..
Cameroon	12.60	14.14	0.89	12.60	14.14	0.89	..	..	..
Canada	19.75	23.94	0.82	20.56	24.42	0.84	18.94	23.17	0.82
Cape Verde	30.12	..	..	..	..	..	30.12	..	..
Chile	22.99	19.29	1.19	21.68	19.20	1.13	23.32	19.31	1.21
China	8.28	15.27	0.54	6.22	14.94	0.42	10.63	15.64	0.68
Colombia	18.07	15.87	1.14	15.11	15.17	1.00	18.44	15.96	1.16
Congo, Dem. Rep.	5.14	7.92	0.65	4.79	7.89	0.61	7.93	8.09	0.98
Congo, Rep.	29.17	19.81	1.47	26.71	19.93	1.34	34.10	19.58	1.74
Costa Rica	25.01	16.93	1.48	..	..	..	25.01	16.93	1.48
Cote d'Ivoire	17.28	15.53	1.11	..	..	..	17.28	15.53	1.11
Croatia	36.15	28.72	1.26	37.30	29.10	1.28	35.00	28.53	1.23
Cyprus	64.61	30.38	2.13	..	30.38	..	64.61	30.38	2.13
Czech Republic	31.49	30.34	1.04	31.74	31.07	1.02	31.24	29.61	1.06
Denmark	37.28	33.88	1.10	36.80	33.48	1.10	37.70	34.23	1.10
Dominican Republic	16.05	16.52	0.97	..	..	..	16.05	16.52	0.97
Egypt, Arab Rep.	27.91	17.00	1.64	31.59	17.63	1.79	26.08	16.68	1.56
El Salvador	17.05	16.36	1.04	..	..	..	17.05	16.36	1.04
Estonia	32.41	31.79	1.02	33.13	33.15	1.00	31.78	31.01	1.02

Table A8 (cont'd)– Actual Fiscal Revenue, Revenue Capacity (Predicted Revenue) and Revenue Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort
Ethiopia	12.75	9.63	1.32	13.03	8.99	1.45	12.26	10.75	1.14
Fiji	24.89	..	..	25.20	..	..	24.59	..	..
Finland	39.49	33.09	1.19	40.11	32.77	1.22	38.86	33.41	1.16
France	42.56	30.05	1.42	43.25	29.93	1.44	42.04	30.16	1.39
Georgia	15.98	..	..	11.06	..	..	19.05	..	..
Germany	29.48	32.50	0.91	30.10	32.25	0.93	28.93	32.72	0.88
Ghana	18.17	12.79	1.42	18.11	13.95	1.30	18.18	12.65	1.44
Greece	38.05	28.99	1.31	38.39	30.15	1.27	37.74	27.99	1.35
Guatemala	10.77	14.15	0.76	9.47	14.37	0.66	12.08	13.98	0.86
Guinea	11.59	15.98	0.73	11.59	15.98	0.73	..	..	..
Honduras	21.14	16.15	1.31	..	..	..	21.14	16.15	1.31
Hong Kong (China)	19.11	..	..	..	..	..	19.11	..	..
Hungary	38.29	31.19	1.23	39.46	31.84	1.24	37.27	30.54	1.22
Iceland	32.71	31.55	1.04	32.46	31.64	1.03	32.83	31.49	1.04
India	12.19	10.83	1.13	11.87	10.47	1.13	12.51	11.18	1.12
Indonesia	17.06	14.78	1.15	16.65	14.41	1.16	17.42	15.10	1.15
Ireland	32.90	31.43	1.05	33.93	30.84	1.10	32.00	31.94	1.00
Israel	38.51	..	..	39.84	..	..	38.18	..	..
Italy	37.94	28.98	1.31	39.29	29.76	1.32	36.76	28.30	1.30
Jamaica	30.78	17.21	1.79	..	..	..	30.78	17.21	1.79
Japan	..	21.47	..	..	..	..	..	21.47	..
Jordan	26.12	21.40	1.22	26.21	21.29	1.23	26.03	21.52	1.21
Kazakhstan	13.34	26.67	0.50	11.30	27.73	0.41	14.62	26.15	0.56
Kenya	19.14	13.34	1.43	18.75	13.02	1.44	19.52	13.66	1.43
Korea, Rep.	21.04	19.72	1.07	19.51	20.26	0.96	22.56	19.18	1.18
Kyrgyz Republic	16.88	..	..	15.75	..	..	19.14	..	..
Lao PDR	13.06	..	..	..	..	..	13.06	..	..
Latvia	26.62	29.14	0.91	27.16	29.58	0.92	26.07	28.93	0.90
Lebanon	19.75	17.36	1.14	16.02	17.05	0.94	20.69	17.44	1.19
Lesotho	55.02	..	..	53.11	..	..	57.21	..	..
Lithuania	27.76	29.14	0.95	25.65	29.39	0.87	28.28	29.06	0.97
Luxembourg	38.59	38.11	1.01	39.72	37.70	1.05	38.16	38.26	1.00
Macao SAR, China	24.17	..	..	20.48	..	..	26.94	..	..
Macedonia, FYR	33.95	..	..	..	..	..	33.95	..	..
Madagascar	11.25	15.96	0.71	10.92	16.09	0.68	11.35	15.92	0.71
Malaysia	21.43	19.68	1.09	21.09	20.08	1.05	21.68	19.38	1.12
Maldives	32.53	..	..	27.42	..	..	37.64	..	..
Mali	16.07	12.34	1.30	14.00	12.08	1.16	16.59	12.43	1.33
Malta	38.29	24.44	1.57	..	..	..	38.29	24.44	1.57
Mauritius	23.47	..	..	..	..	..	23.47	..	..

Table A8 (cont'd)– Actual Fiscal Revenue, Revenue Capacity (Predicted Revenue) and Revenue Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort
Mexico	14.52	16.78	0.87	14.52	16.78	0.87	..	..	..
Moldova	28.63	25.55	1.12	26.06	24.64	1.06	30.87	26.00	1.19
Mongolia	26.79	14.91	1.80	21.38	14.68	1.46	34.00	15.21	2.24
Morocco	31.90	18.53	1.72	..	..	..	31.90	18.53	1.72
Myanmar	6.05	..	..	6.27	..	..	5.47	..	..
Namibia	30.37	17.87	1.70	31.69	18.72	1.69	28.62	16.72	1.71
Nepal	11.07	..	..	10.44	..	..	11.69	..	..
Netherlands	40.40	33.97	1.19	40.79	34.07	1.20	40.06	33.89	1.18
New Zealand	35.55	21.34	1.67	33.83	20.94	1.62	35.84	21.42	1.67
Nicaragua	16.08	15.37	1.05	14.02	15.99	0.88	18.13	14.75	1.23
Niger	12.38	..	..	..	..	..	12.38	..	..
Norway	48.64	32.75	1.49	47.89	32.86	1.46	48.83	32.72	1.49
Oman	26.66	21.04	1.27	26.66	21.04	1.27	..	..	..
Pakistan	14.79	9.54	1.55	15.83	9.45	1.68	13.76	9.63	1.43
Panama	23.67	18.35	1.29	23.67	18.35	1.29	..	..	..
Papua New Guinea	23.62	12.97	1.82	23.76	13.26	1.79	22.47	10.63	2.11
Paraguay	17.30	13.83	1.25	17.07	14.68	1.16	17.53	12.98	1.35
Peru	17.66	16.02	1.10	17.49	16.03	1.09	17.84	16.01	1.11
Philippines	16.14	15.68	1.03	17.14	15.84	1.08	15.14	15.51	0.98
Poland	31.48	27.85	1.13	31.54	28.26	1.12	31.48	27.80	1.13
Portugal	35.27	30.53	1.16	34.15	30.66	1.11	36.26	30.41	1.19
Romania	25.68	26.97	0.95	..	..	..	25.68	26.97	0.95
Russian Federation	30.75	26.69	1.15	..	..	..	30.75	26.69	1.15
Rwanda	..	..	..	..	..	..	..	..	..
Senegal	16.05	15.95	1.01	16.05	15.95	1.01	..	..	..
Seychelles	42.78	..	..	43.12	..	..	42.43	..	..
Sierra Leone	10.80	10.13	1.07	9.89	10.82	0.91	11.70	9.44	1.24
Singapore	23.58	..	..	27.47	..	..	19.68	..	..
Slovak Republic	30.86	30.04	1.03	..	..	..	30.86	30.04	1.03
Slovenia	37.55	30.81	1.22	36.94	31.27	1.18	38.16	30.54	1.25
South Africa	28.69	18.52	1.55	26.89	18.34	1.47	29.13	18.56	1.57
Spain	28.48	29.65	0.96	31.39	29.83	1.05	25.94	29.49	0.88
Sri Lanka	16.90	14.12	1.20	18.16	14.16	1.28	15.47	14.07	1.10
St. Kitts and Nevis	32.74	..	..	30.26	..	..	33.97	..	..
St. Vincent and the Gren.	28.93	..	..	29.71	..	..	26.85	..	..
Sudan	7.58	8.53	0.89	7.58	8.53	0.89	..	..	..
Swaziland	26.79	..	..	26.68	..	..	26.95	..	..
Sweden	38.36	33.22	1.15	40.85	33.34	1.23	35.86	33.12	1.08
Switzerland	20.60	32.79	0.63	22.53	33.23	0.68	18.39	32.29	0.57
Syrian Arab Republic	22.78	16.62	1.37	22.78	16.62	1.37	..	..	..

Table A8 (cont'd)– Actual Fiscal Revenue, Revenue Capacity (Predicted Revenue) and Revenue Effort by Country

	1994-2009			1994-2001			2002-2009		
Country	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort	Revenue/GDP	Predicted revenue/GDP	Tax Effort
Tajikistan	11.33	..	..	10.34	..	..	13.31	..	..
Thailand	19.79	17.62	1.12	..	..	..	19.79	17.62	1.12
Togo	16.36	11.37	1.44	..	..	..	16.36	11.37	1.44
Trinidad and Tobago	29.22	18.97	1.54	26.81	18.75	1.43	30.26	19.06	1.59
Tunisia	29.80	19.23	1.55	29.60	19.10	1.55	30.01	19.35	1.55
Turkey	23.80	25.49	0.93	..	..	..	23.80	25.49	0.93
Uganda	11.72	12.99	0.90	10.90	11.94	0.91	12.14	13.52	0.90
Ukraine	31.13	27.13	1.15	25.56	27.11	0.94	33.22	27.14	1.22
United Kingdom	36.35	31.63	1.15	36.07	32.01	1.13	36.59	31.29	1.17
United States	18.13	22.66	0.80	20.12	22.24	0.90	17.88	22.72	0.79
Uruguay	26.34	17.67	1.49	26.46	17.63	1.50	26.22	17.71	1.48
Vanuatu	21.14	..	..	21.14	..	..	..	..	..
Vietnam	22.09	14.10	1.57	21.42	14.00	1.53	23.89	14.35	1.66
Yemen, Rep.	25.05	16.65	1.50	25.05	16.65	1.50	..	..	..
Zambia	18.49	16.07	1.15	19.30	16.19	1.19	17.55	15.92	1.10
Zimbabwe	25.94	17.36	1.49	25.94	17.36	1.49	..	..	..