



# IMF Working Paper

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## Mobilizing Revenue in Sub-Saharan Africa: Empirical Norms and Key Determinants

*Paulo Drummond, Wendell Daal,*

*Nandini Srivastava, Luiz Edgard Oliveira*

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African Department

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**Prepared by Paulo Drummond, Wendell Daal, Nandini Srivastava,**

**Luiz Edgard Oliveira<sup>1</sup>**

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**Abstract**

Mobilizing more revenue is a priority for sub-Saharan African (SSA) countries. Countries have to finance their development agendas, and weak revenue mobilization is the root cause of fiscal imbalances in several countries. This paper reviews the experience of low-income SSA countries in mobilizing revenue in recent decades, with two broad aims: identify empirical norms of how much and how fast countries have been able to mobilize more revenue and empirical determinants (panel estimates) of revenue mobilization. The paper finds that (i) the frequency distribution of changes in revenue ratios for SSA low-income countries (LICs) peaks at a pace of about ½–2 percentage points of GDP in the short-to-medium term and at a pace of about 2–3½ percentage points of GDP over the longer term, and that (ii) almost all SSA-LICs managed to increase revenue ratios by more than 2 percentage points of GDP in the short-to-medium term, at least once in the last two decades. The sustainability of large increases in revenue ratios can be an issue, in particular for fragile countries. The panel estimates suggest that structural factors, such as per capita GDP, share of agriculture in GDP, inflation, degree of openness, and rents received from natural resources, are important determinants of tax revenue.

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Author's E-Mail Address: pdrummond@imf.org, wdaal@imf.org, ns431@cam.ac.uk, loliveira@imf.org

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## I. OVERVIEW

### **Mobilizing more revenue is a priority for most sub-Saharan African (SSA) countries.**

Countries have to finance their development agendas, and weak revenue mobilization is the root cause of fiscal imbalances in several countries. Of course, raising revenue is not an end in itself. Governments seek to provide more of essential services such as better health care, education, and infrastructure. Raising revenue is a way to create fiscal space, increase priority spending, and reduce dependence on budget support, which is not without limits.

**Raising revenue, however, poses challenges for most countries.** Low domestic resource mobilization is associated with structural factors that can be difficult to influence in the short-to-medium term such as low income, demographic factors, and underdeveloped financial markets. In many SSA countries, the task of mobilizing more fiscal revenue is complicated by increased mobility of tax bases resulting from trade liberalization and the mobility of investment and capital income, tariffs, and other trade taxes. As noted in Keen and Mansour (2009), as countries try to attract more investment they experience great pressure to sustain revenue from corporate income taxation because of tax competition. Another pressure on tariff revenue is the formation of free trade zones and customs unions, which could result in displacement of the tax base. Not surprisingly, increasing domestic resource mobilization has been dubbed the “hard option” for closing Africa’s resource gap (Aryeetey, 2004).

**The paper reviews the experience of SSA countries in mobilizing revenue in recent decades with two broad aims:**

- **Derive empirical norms for raising revenue: the “how much” and “how fast” questions.** The paper derives norms by looking at frequency distributions of changes of fiscal revenue in sub-Saharan African low-income countries (SSA-LICs) in 1-, 3-, 5- and 10-year periods and for different comparator groups.
- **Identify determinants of revenue: the “how to” question.** To identify how some SSA countries have managed to mobilize revenue faster than others, the paper presents an econometric analysis of the main factors that may explain the variation in resource mobilization of all SSA countries and reviews country cases. Specifically, we look at econometric determinants of tax revenue (excluding grants) of the central government and analyze the extent to which factors such as the structure of the economy, institutions, and the stage of development explain their variation. The analysis fills a gap in the literature by incorporating new variables such as corruption, bureaucratic quality, and size of the informal economy, among others, as potential determinants of revenue performance. The paper addresses the traditional econometric issues in panel estimates, provides a series of robustness checks, and employs econometric specifications that take into account, among other things, the persistence of revenue performance.

**Of course, historical evidence can only go so far in terms of providing norms or identifying determinants of revenue mobilization.** What individual countries can aim at, and eventually achieve, depends on the specific circumstances of each country and the strength of policy reforms. Therefore, country-specific idiosyncrasies have to be taken into account. Moreover, the ability to mobilize revenue depends also on a broad range of forward-looking factors such as the extent of economic diversification or the outlook for natural resources, for example. Therefore, while the analysis in this paper takes into account several aspects of revenue mobilization, it leaves many considerations out. Inevitably, then, its application requires judgment.

**The paper is organized as follows:** Section II looks into how fast and how much revenue low-income SSA countries have been able to mobilize in recent decades. Section III analyzes the key determinants of revenue mobilization in SSA countries. Subsection A briefly reviews the literature on tax revenue mobilization and studies that have explored linkages between structural and institutional factors and raising revenue. Subsection B presents some stylized facts about tax revenue in SSA countries. Subsection C provides an empirical analysis (panel regressions) of tax revenue determinants for SSA countries. Section IV is concluding.

**The paper's findings are as follows:**

***How much and how fast***

- *Countries can aim at modest increases in revenue ratios* in the short-to-medium term; and somewhat larger increases in the long term. The frequency distribution of changes in revenue ratios for SSA-LICs peaks at a pace of about  $\frac{1}{2}$ –2 percentage points of GDP in the short-to-medium term and at a pace of about 2– $3\frac{1}{2}$  percentage points of GDP in the long term.
- *Fragility matters.* Fragile countries were able to raise the revenue ratios only marginally ( $0$ – $\frac{1}{2}$  percentage point of GDP) compared to nonfragile ones ( $\frac{1}{2}$ – $1\frac{1}{2}$  percentage points of GDP) in the short term.
- *Countries can be cautiously ambitious.* Almost all SSA-LICs managed to increase revenue ratios by more than 2 percentage points of GDP in the short-to-medium term, at least once in the last two decades. About 16 SSA-LICs out of 28 were able to raise revenue ratios by 5 percentage points of GDP or more in at least one 3-year period in the last two decades. Only five countries managed to increase their revenue ratios by double digits.
- *Sustainability can be an issue.* Most nonfragile SSA-LICs were able to sustain their short to medium-term revenue gains, whereas fragile SSA-LICs struggled. Countries were more successful sustaining moderate gains than sustaining gains from exceptional increases.

- *Success stories arise among fragile and nonfragile countries.* Among the nonfragile SSA-LICs, Ghana, Kenya, Zambia, Rwanda, and Niger were able to mobilize the most revenue in a 1-, 3-, 5-, or 10-year period and sustain it; whereas Sierra Leone, the Democratic Republic of the Congo, Burundi, and Liberia are among the fragile SSA-LICs that achieved the largest increases in revenue ratios in at least one of these periods and were able to at least partially sustain it.

### ***The determinants***

- The empirical analysis suggests that structural factors like per capita GDP, inflation, share of agriculture in GDP, degree of openness, and rents received from natural resources are important determinants of tax revenue.
- Institutional factors such as the degree of corruption and size of the shadow economy also significantly affect tax revenue. Starting position and conditions in the country (fragile or not) also matter.
- We could not establish correlation between aid and tax revenue.
- Countries' ability to mobilize more revenue partly reflects their endowments. Resource-rich countries have not only experienced a decline in average tax revenue but also have seen greater volatility, whereas non-resource-rich countries are now at similar levels to the resource rich.
- As economies develop, indirect taxes seem to become more important contributors to tax revenue. In addition, lower and declining trade taxes are associated with trade liberalization, underscoring that countries cannot rely exclusively on such taxes as a source of revenue.
- Stable and healthy macroeconomic environments, political stability, and will to bring about tax policy reforms matter. Administrative reforms are important for more efficient collection of revenue, especially when mixed with or followed by policy reforms that broaden and simplify the tax base. As discussed in Appendix I, Mozambique was able to sustain an increase in tax revenue partly through reforms.

## II. MOBILIZING REVENUE IN SSA-LICs: HOW FAST AND HOW MUCH?

### A. The Methodology

To establish empirical norms for mobilizing fiscal revenue,<sup>1</sup> we use the frequency distribution of the changes in the revenue-to-GDP ratio in SSA-LICs in different time horizons: short- to medium-term (1- and 3-year) changes and longer-term (5- and 10-year) changes. The sample consists of 28 SSA-LICs, subdivided into 15 nonfragile and 13 fragile countries.<sup>2</sup> We review their fiscal revenue performance—i.e., tax and non-tax revenue, excluding grants—in 1990–2010, a period that coincides with the launching of economic reforms in several countries in the region. This gives us a sample size of 298, 267, 239, and 165 observations for respectively the 1-, 3-, 5-, and 10-year changes for the nonfragile SSA-LICs, and of 240, 208, 186, and 129 observations for respectively the 1-, 3-, 5-, and 10-year changes for the fragile SSA-LICs. For each period we inferred from the frequency distribution empirical norms for mobilizing revenue and were able to classify the pace of mobilizing revenue in three categories: most frequent pace, middle pace, and the exceptional pace of mobilizing revenue. The changes in fiscal revenue with the highest frequency in the sample are used to identify the most frequent pace of mobilizing revenue. The tail of the distribution, with a 5 percent cut-off, is used to identify the outliers or the so-called “exceptional pace” of mobilizing revenue. Observations on changes in fiscal revenue that fall between the most frequent pace and the exceptional pace will be used to define the norm for the so-called “in-between” or “middle” pace.

To assess how ambitious countries can be on their revenue raising targets, this section looks into the maximum increase in revenue-to-GDP ratios in different time horizons for each of the SSA-LICs. It also determines if these changes were sustainable, by looking into the cumulative changes over 3 and 5 years in revenue ratios following the initial maximum increase. The observations on maximum increase per country, combined with whether it was sustained, are used to provide an indication of how much and how fast these countries can mobilize revenue.

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<sup>1</sup> Fiscal revenue consists of taxes, social contributions, and non-tax revenue, but excludes grants received (GFSM 2001). Tax revenue is compulsory transfers and fees that are clearly out of proportion to the costs of providing services (for example, motor vehicle or business licenses). Taxes exclude certain compulsory transfers, such as most social contributions and fines and penalties but may include receipts from taxation on natural resource sectors of the economy. Non-tax revenue includes property income (e.g., interest, dividends, rent); proceeds from sales of goods and services (including from natural resource sectors of the economy where applicable); fines, penalties, and forfeits; voluntary transfers other than grants (in other words, all voluntary transfers other than those from governments or international organizations); and miscellaneous other revenue.

<sup>2</sup> Grouping of SSA countries is based on the classification in the April 2011 *Regional Economic Outlook: Sub-Saharan Africa*.

## B. The Pace of Mobilizing Revenue

The frequency distributions for changes in fiscal revenue ratio show that the pace of mobilizing fiscal revenue in SSA-LICs can be categorized as follows (Text Table 1, Figures 1 and 2):

- The most frequent pace of mobilizing revenue falls between  $\frac{1}{2}$  and 2 percentage points of GDP in the short-to-medium term, and  $2\frac{1}{2}$ – $3\frac{1}{2}$  percentage points of GDP in the longer term. In a 1-year period, the pace differs between fragile and nonfragile SSA-LICs. Nonfragile SSA-LICs managed to raise their revenue ratios on average by about  $\frac{1}{2}$ – $1\frac{1}{2}$  percentage point of GDP in a 1-year period. In contrast, fragile SSA-LICs in most cases were able to raise their revenue ratios only marginally (by about  $\frac{1}{2}$  percentage point of GDP), reflecting the challenges these countries face in mobilizing more revenue. During a 3-year period, both fragile and nonfragile SSA-LICs were often able to mobilize revenue by about 1 to 2 percentage points of GDP, which is slightly higher than in a 1-year period. The frequency distributions for longer-term changes in revenue in the nonfragile SSA-LICs shifts to the right compared with that for the 1- and 3-year periods, indicating a higher pace for mobilizing more revenue over the long term.
- The middle pace of mobilizing revenue in the sample is 2–5 percentage points of GDP for short- to medium-term changes and  $3\frac{1}{2}$ – $7\frac{1}{2}$  percentage points of GDP for longer-term changes. The frequency distributions for both fragile and nonfragile LICs for the 3-year changes are wider than the ones for the 1-year horizons, indicating that countries were more often able to reach the middle pace in a 3-year horizon. Over the longer term, the non-normal and wider shape of the frequency distribution for both group of countries indicate that there is an even larger number of observations supporting the middle pace.
- An exceptional pace of mobilizing revenue is defined as increases larger than 5 percentage points of GDP over the short-to-medium term and larger than  $7\frac{1}{2}$  percentage points of GDP over the longer term, as captured by the tail of the frequency distribution. The tail of frequency distribution becomes fatter over time, indicating that times matter. Exceptional increases were more often achieved over longer periods.

Text Table 1. SSA-LICs: Empirical Norms for Mobilizing Fiscal Revenue (percentage points of GDP)

	Most Frequent Pace	Middle Pace	Exceptional Pace
Short-to-medium term (1–3 years)	$\frac{1}{2}$ –2	2–5	>5
Longer term (5–10 years)	$2\frac{1}{2}$ – $3\frac{1}{2}$	$3\frac{1}{2}$ – $7\frac{1}{2}$	> $7\frac{1}{2}$



### C. How Ambitious Can Countries Be?

Countries can be cautiously ambitious based on historical revenue performance. As reflected in the frequency distribution, countries have reached the most frequent pace of mobilizing revenue increases in both the short-to-medium term and the longer term. However, almost all SSA-LICs managed to reach the middle pace of mobilizing revenue, at least once in the last two decades. Reaching the exceptional pace of mobilizing revenue poses more of a challenge.

#### *Short-to-medium term*

Data on maximum changes in revenue ratios in SSA-LICs in the last two decades shows that almost all of the countries were able to reach the middle pace of mobilizing revenue over the short-to-medium term (Text Table 2). Only 3 countries out of 28 could not mobilize revenue by more than 2 percentage points of GDP. The majority of SSA-LICs (57 percent) were able to reach maximum 1-year increases in revenue ratios between 2–5 percentage points. However, fewer countries (12 out of 28 countries) achieved maximum 3-year increases between 2–5 percentage points, as the fragile countries were in most cases able to go beyond 5 percentage points of GDP. However, this is not a true reflection of the potential for mobilizing revenue in the fragile countries; as shown below some of the exceptional increases in revenue ratios in these countries reflect one-off increases. About 30 percent and 60 percent of these countries managed to reach maximum 1- and 3-year increases in revenue ratios larger than 5 percentage points of GDP (the exceptional pace of mobilizing revenue) at least once in the last 20 years.

Text Table 2. SSA-LICs: Categorization of Maximum Changes in Fiscal Revenue by Country and Empirical Norm (short-to-medium term)

		Most Frequent Pace (½–2 percentage points of GDP)		Middle Pace (2–5 percentage points of GDP)		Exceptional Pace (>5 percentage points of GDP)	
		Number of Countries	Share of Subgroup	Number of Countries	Share of Subgroup	Number of Countries	Share of Subgroup
Nonfragile SSA-LICS	1-year	3	20%	8	53%	4	27%
	3-years	0	0%	9	60%	6	40%
Fragile SSA- LICS	1-year	0	0%	9	69%	4	31%
	3-years	0	0%	3	23%	10	77%
SSA-LICS	1-year	3	11%	17	61%	8	29%
	3-years	0	0%	12	42%	16	57%

#### *Longer term*

In the longer term, most SSA-LICs were also able to reach at least the middle pace of mobilizing revenue (Text Table 3). About 60 percent of SSA-LICs reached maximum 5-year increases in revenue ratios between 3½–7½ percentage points of GDP. Compared with

nonfragile countries, more fragile countries were able to reach the exceptional pace of mobilizing revenue. As mentioned before this is not a true reflection of their potential. In a 10-year period, both fragile and nonfragile countries were able to do even more; more than half of these countries raised revenue ratios by more than 7½ percentage points of GDP at least once during the last two decades.

Text Table 3. SSA-LICs: Categorization of Maximum Changes in Fiscal Revenue by Country and Empirical Norm (longer term)

		Most Frequent Pace (2½–3½ percentage points of GDP)		Middle Pace (3½–7½ percentage points of GDP)		Exceptional Pace (>7½ percentage points of GDP)	
		Number of Countries	Share of Subgroup	Number of Countries	Share of Subgroup	Number of Countries	Share of Subgroup
Nonfragile SSA-LICS	5-year	2	13%	9	60%	4	27%
	10-years	2	13%	5	33%	8	53%
Fragile SSA-LICS	5-year	0	0%	7	54%	6	46%
	10-years	2	15%	4	31%	7	54%
SSA-LICS	5-year	2	7%	16	57%	10	35%
	10-years	4	14%	9	32%	15	54%

#### D. A Closer Look into Strong Performers

Strong performers, i.e., countries that reached the exceptional pace of mobilizing revenue, are concentrated among a few countries, although the degree of concentration varies between the nonfragile and the fragile countries. The level of concentration among the top performers—i.e., the country with the largest increase in revenue ratio over a time horizon—is very high among the fragile countries and low among the nonfragile countries (Tables 1 and 2, Figures 3 and 4).

The strong performers among the nonfragile countries are concentrated among 8 countries (out of 15 countries). The same countries managed to reach the exceptional pace of mobilizing revenue over different time horizons. Three of these countries—Kenya, Zambia, and Ghana—achieved exceptional increases over all time horizons (1, 3, 5, and 10 years), while Malawi and Niger were strong over three periods and Rwanda over two periods; Mali and Ethiopia reached an exceptional pace only over the 10-year period.

There are more strong performers (11 countries out of 13) among the fragile countries than among the nonfragile countries. Two countries—São Tomé & Príncipe and Sierra Leone—achieved exceptional increases over all four time periods. Eritrea, Liberia, the Democratic Republic of the Congo, Burundi, and Guinea-Bissau recorded exceptional increases over three

time horizons. The other four countries were able to reach exceptional increases only once: Comoros (3-year), Gambia (3-year), Central African Republic (3-year), and Togo (10-year).

The top performer in each time horizon varies among the nonfragile countries, while among the fragile countries it is always the same country:

- Among the nonfragile countries, Malawi and Zambia reached the largest increase (about 8 percentage points of GDP) in revenue ratio over a 1-year period, Kenya and Zambia had the strongest performance (about 10½ percentage points of GDP) over a 3-year period, Zambia, Ghana, and Kenya mobilized the most revenue over a 5-year period, reaching double figures, whereas Ghana achieved the most (about 11 percentage points of GDP) over a 10-year period.
- Among the fragile countries, São Tomé & Príncipe is the top performer over all four time horizons, reaching double-digit increases in revenue ratios, followed by Eritrea with double-digit increases over 1-, 3-, and 5-year periods. Other fragile countries with double-digit increases are Sierra Leone (3-year), Liberia (5- and 10-year), the Democratic Republic of the Congo (5- and 10-year), and Burundi (10-year).

To what extent can strong revenue performance be related to commodity price fluctuations or other exogenous factors? Although this question goes beyond the scope of this study, anecdotal evidence suggests that in some of the strong performers, but not all, some of the large increases in fiscal revenue coincided with sharp increases in the international prices of their main commodity exports, indicating some correlation between commodity prices and revenue performance in nonfragile countries (Text Table 4). However, the share of revenue from natural resources in total revenue for some of these countries is not a determining factor and cannot be considered the main driver of revenue growth. Section III looks at the determinants of revenue performance more broadly. More definite answers could usefully rely on case studies, and useful extensions of this paper could explore evidence on the effect of commodity prices or other exogenous factors vis-à-vis policy-driven factors on top fiscal revenue mobilizers.

Text table 4. SSA-LICs: Top Short-to-Medium term Fiscal Revenue Mobilizers: Main Commodity International Prices (variable time periods)<sup>1 2</sup>

	Period of greatest total revenue change				Commodity Prices (yearly percent change)				
	1 year		3 years		1 year	3 years			
	Start year	End year	Start year	End year		First year	Second year	Third year	
Top Nonfragile SSA LICs									
Malawi (Uranium)	1993	1994	2002	2005	n.a.	13.4	15.4	10.2	
Zambia (Metal ores)	1993	1994	1992	1995	20.6	-16.1	20.6	27.2	
Kenya (Mineral fuels)	1999	2000	1992	1995	63.7	-3.6	-7.4	6.5	
Ghana (Non-monetary gold)	1993	1994	1992	1995	6.7	4.7	6.7	0.0	
Niger (Uranium)	1994	1995	2005	2008	n.a.	10.0	81.5	62.4	
Top Fragile SSA LICs									
Sierra Leone (Diamonds)	1999	2000	1998	2001	-9.9	38.2	-9.9	-18.9	
Eritrea (None)	1992	1993	1992	1995	n.a.	n.a.	n.a.	n.a.	
Liberia (Non-monetary gold)	2006	2007	2005	2008	15.3	35.9	15.3	25.1	
Congo, Dem. Rep. of (Metal ores)	2007	2008	2005	2008	1.9	70.3	22.9	1.9	
Burundi (Non-monetary gold)	1995	1996	1998	2001	-14.6	-5.2	0.1	-2.9	

Sources: IMF, African Department database; World Bank, Commodity Prices database; Comtrade, Exports database.

<sup>1</sup> The values shown for fiscal revenues from natural resources correspond to the years detailed in the "Period of greatest revenue change" section.

<sup>2</sup> Principal exports are selected on a share of total exports of goods basis.

### **E. Was It Sustainable?**

Sustaining the gains from revenue mobilization can be an issue, in particular for fragile countries (Text Table 5). A breakdown of the countries by the pace of mobilizing revenue shows that half of SSA-LICs could sustain the gains from middle pace of mobilizing revenue, while fewer countries were able to sustain the gains from their exceptional increases in revenue ratios. Most nonfragile SSA-LICs were able to sustain the gains from their short- to medium-term increases, while most fragile SSA-LICs struggled to sustain their gains (Tables 1 and 2).

#### ***Sustainability of the middle pace of mobilizing revenue***

Within the category of countries with the middle pace of mobilizing revenue, mainly nonfragile countries were able to sustain their short- to medium-term gains over a 5-year period, following the initial increase. More than half of the 11 nonfragile countries in this category of mobilizing revenue were able to raise the level of their revenue ratio further over 5 years and about 35 percent of these countries managed to partially maintain their revenue gains, while only one country was not successful. In contrast, less than half of the 9 fragile countries in this same category of mobilizing revenue were able to sustain these gains while the rest could only maintain these gains partially. A closer look at country-specific performance shows that

- Of the nonfragile SSA-LICs, Niger and Rwanda were able to secure these gains, more than doubling their revenue ratios in the following 5 years. Burkina Faso, Uganda, Ethiopia, and Mali managed to lock in their revenue gains, resulting in a cumulative gain ranging from about 2 to 6 percentage points of GDP over 5 years.
- Of the fragile SSA-LICs, Burundi, Gambia, Central African Republic, and Guinea-Bissau managed not only to lock in their revenue gains, but also to raise their revenue ratio further.

Text Table 5. SSA-LICs: Sustainability of Short- to Medium-Term Gains in Fiscal Revenue

	Middle Pace of Mobilizing Revenue (2–5 percentage points of GDP)			Exceptional Pace of Mobilizing Revenue (>5 percentage points of GDP)		
	Non-Fragile Countries	Fragile Countries	SSA-LICs	Non-Fragile countries	Fragile Countries	SSA-LICs
<b>Sustained*</b>						
Number of countries	6	4	10	4	1	5
Percent of subgroup	55	44	50	67	10	31
<b>Partially sustained**</b>						
Number of countries	4	5	9	2	9	11
Percent of subgroup	36	56	45	33	90	69
<b>Not sustained***</b>						
Number of countries	1	0	1	0	0	0
Percent of subgroup	9	0	5	0	0	0

\* Sustained: when the original increase in revenue ratio is maintained or increased further over 3 years after the year the original increase occurred (the cumulative increase after 3 years is equal to or larger than the original increase).

\*\* Partially sustained: when only part of the original increase in revenue ratio is maintained over 3 years after the year the original increase occurred (the cumulative increase after 3 years is positive, but smaller than the original increase).

\*\*\* Not sustained: when the original increase in revenue ratio has not been maintained over 3 years after the year the original increase occurred, i.e., in the 3 years after the original increase the revenue ratio has declined by as much or more than the original increase (the cumulative increase after 3 years is zero or negative).

### ***Sustainability of the exceptional pace of mobilizing revenue***

Most of the SSA-LICs were able only partially to lock in the gains from their short- to medium-term exceptional increase in revenue ratio; in particular the fragile countries struggled to sustain these gains. Almost all nonfragile SSA-LICs were able to sustain their exceptional increase in revenue ratio in the years following the initial increase. A closer look into country-specific performance shows that

- Of the nonfragile SSA-LICs, Zambia was not only able to sustain the initial increase in revenue, but also to raise it further, resulting in the highest cumulative increase in its revenue ratio in the following years. Also Ghana and Kenya were able to raise their revenue ratio further, following the initial 1-year increase, leading to substantial cumulative increases. Rwanda more than doubled its revenue ratio, following the initial 3-year exceptional increase. Malawi raised the most revenue over a 1-year period, but it managed to lock in only part of the initial increase.
- However, of the fragile SSA-LICs only Sierra Leone managed to lock in its revenue gain, nearly doubling its revenue ratio in the following 5 years. São Tomé & Príncipe, Eritrea, and Guinea-Bissau's cumulative increases following the exceptional 1- and 3-year increases reflect the transitory nature of these increases. São Tomé & Príncipe received a lump sum related to oil exploration, and Guinea-Bissau's increase reflects a resumption of revenue collection, following a disruption related to the civil war.

### III. WHAT ARE KEY DETERMINANTS OF REVENUE IN SSA?

#### A. The Methodology

In this section we use a simple empirical framework to identify the determinants of revenue. Our framework is broadly in line with existing theory, as presented in the literature review below. Specifically, we look at the determinants of tax revenue in SSA<sup>3</sup> by using a panel estimation methodology. In line with existing empirical literature, we focus on tax revenue, instead of fiscal revenue, because it is more directly related to economic policy, and the government has more control.<sup>4</sup>

#### B. Literature Review

What affects tax revenue (measured as the ratio of tax revenue to GDP) has been the subject of several studies (Bahl, 1971; Tanzi, 1987; Leuthold, 1991; Stotsky and WoldeMariam, 1997). Some more recent empirical studies (Gupta, 2007; Davoodi and Grigorian, 2007) have focused on traditional determinants of tax revenue such as per capita GDP, the sectoral composition of output, the degree of trade openness, inflation, external debt, the ratio of foreign aid to GDP, the current account balance, and foreign direct investment.

- Per capita income is a proxy for the overall development of the economy and is expected to be positively correlated with tax revenue because it is expected to be a good indicator of the overall level of economic development and sophistication of the economic structure.
- The sectoral composition of output may also matter because certain sectors of the economy are easier to tax than others. For example, the agriculture sector may be difficult to tax, especially if it is dominated by a large number of subsistence farmers. On the other hand, a vibrant mining sector dominated by a few large firms can generate large taxable surpluses.
- The degree of trade openness (measured by the share of exports and imports) may also matter for revenue performance. Imports and exports are amenable to taxes because these activities take place at specified locations. Trade taxes were affected by widespread

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<sup>3</sup> The empirical results did not significantly deviate when using a sample of SSA-LICs only, although the results were more robust using the larger sample of countries.

<sup>4</sup> In many countries, for instance, non-tax revenue can include compensation agreements with development partners that are not directly under the control of the government.

liberalization after the Uruguay round. Keen and Simone (2004) argue that revenue can increase if liberalization occurs through policies like adding tariffs to quotas, eliminating exemptions, reducing tariff peaks, and improving customs procedures. Rodrik (1998) also points out that there is a strong positive correlation between trade openness and the size of the government because societies seem to demand (and receive) more public goods when they are subject to greater external risks as a result of liberalization. This has a beneficial effect on collection of tax revenue.

- Inflation might have a detrimental impact on tax collection as a general proxy for macroeconomic conditions (Agbeyegbe, Stotsky, and WoldeMariam, 2004; Gupta and others, 2004; Rad, 2003).
- The degree of external indebtedness of a country is correlated with revenue as well. For example, a country may choose to increase import tariffs or other taxes to generate a primary budget surplus to service the debt, so we might expect tax revenue to increase as a result (Agénor and Montiel, 1996; Oks and Wijnbergen, 1995).
- The impact of foreign aid on revenue has been discussed often in the literature, although its effect is still ambiguous. Aid can have an impact on the tax base. It is likely that policy reforms like trade liberalization are associated with aid conditions that will affect the tax base (Aizenman and Jinjara, 2006; Baunsgaard and Keen, 2005; Osei, Morrissey, and Lloyd, 2005; Morrissey, Dasgupta, and Bougheas, 2007; Teera and Hudson, 2004).
- The current account balance is important because, if deficits persist, the country's external position may eventually become unsustainable because of an increasing debt burden (Perotti, 1999; Ghura, 1998; Claessens, Oks and Wijnbergen, 1993; April 2004 *World Economic Outlook*). This could undermine the country's ability to mobilize revenue and affects the tax base. A highly negative current account balance can potentially also have crowding out effects on consumption and investment affecting tax revenue.
- Foreign direct investment can also help explain variations in revenue. In many countries, the rationale behind tax incentives and policies—such as low statutory rates and selective preferential tax treatment, like free zones, tax holidays, and credit—is associated with tax competition. The idea is that these policies will help incentivize investment decisions which will help boost tax revenue and this is the hypothesis we wish to test (Keen and Mansour, 2009; Moran, 1998; Shah, 1995). Because most studies question this rationale on theoretical and case evidence, we wish to find empirical support for the same.

Empirical findings in the literature regarding tax revenue reflect the sensitivity of the results to the set of countries, period of analysis, and controls. Our choice of controls is directly motivated by the literature on determinants of tax revenue. Lotz and Morss (1967) and Piancastelli (2001) find that per capita income and trade shares significantly affect tax revenue. Leuthold (1991) uses panel data to find a positive impact from trade, but a negative one from the share of agriculture. Tanzi (1991) and Eltony (2002) found that foreign debt is positively related to resource mobilization. Tanzi (1992) finds that in developing countries,

half of the variation in tax ratio is explained by per capita income, import share, agriculture share, and foreign debt. Stotsky and WoldeMariam (1997) find that agriculture and mining are negatively related to the tax ratio, while exports and per capita income have a positive effect. They also find a positive but weak link between IMF programs and tax revenue. Ghura (1998) concludes that the tax ratio rises with income and degree of openness and falls with the share of agriculture in GDP. Many studies employ cross-section empirical methods and hence ignore variation over time which our analysis addresses.

Recently, a growing number of studies have looked at the importance of institutional factors like quality of institutions and governance in addition to traditional measures, in determining revenue performance. These factors are thought to influence tax revenue through their contribution to tax evasion, improper tax exemptions, and weak tax administration (Tanzi and Davoodi, 1997). Bird, Martinez-Vasquez, and Torgler (2004) find empirical evidence that factors such as corruption, rule of law, and entry regulations play key roles. Bird (2004) notes that any successful tax reform should be supported by a strong political will to reform. Moreover, as Alm and Martinez-Vazquez (2003) note, a country's tax record reflects its sociopolitical institutions. Bird, Martinez-Vazquez, and Torgler (2004) also conclude that a legitimate and responsive state able to secure the rule of law and keep corruption under control, appears to be an essential precondition for more adequate tax collection.

The econometric estimates in this paper marry these two strands in the literature by conducting the panel estimation with a broad set of controls that include institutional factors. While the literature on empirically examining fiscal and tax revenue has burgeoned over the last decade, a thorough and extensive empirical analysis of tax revenue across all SSA countries with up-to-date data on tax revenue is lacking. Increasingly, a number of studies have started looking at how specific taxes have evolved over time and the role of tax administration and revenue authorities in achieving greater resource generation. The trend has been to take a disaggregated view of revenue mobilization. We intend to redress this imbalance by revisiting cross-country differences in tax revenue in panel estimations. Thus, this study extends the literature by incorporating a set of controls of tax revenue across SSA countries while highlighting the role of institutional factors.

### **C. Some Tax Revenue Correlates in SSA**

#### ***The ability to mobilize more revenue has several correlates***

- The average fiscal revenue ratio (without grants) was around 20 percent of GDP in 2010 (Figure 5). But this average masks differences across countries according to income and fragility. In 2010, low-income countries averaged tax revenue of about 13 percent of GDP compared to 20 and 22 percent for middle- and upper-middle-income countries (Figure 6). Fragile countries, in particular, have much lower average tax revenue (14 percent) as a proportion of GDP than nonfragile countries (20 percent) (Figure 7).
- Income tax revenue (as a proportion of GDP) has been increasing in low-income countries



but has not changed much in middle-income countries (Figure 8). The low buoyancy of income tax revenue in some countries may be associated with countries attempt to maintain some degree of nominal progressivity in tax revenue. On the contrary, taxes on goods and services have generally been increasing across all countries in SSA.

- Revenue from trade taxes as a proportion of GDP has generally been declining since the late 1990s (Figure 9). This feature underscores that countries cannot rely exclusively on such taxes as a source of revenue.
- Tax revenue is lower and more volatile in oil-rich/resource-rich countries (Figure 10).
- Aid does not seem to have a direct apparent correlation with tax revenue (Figure 11).
- In general, corporate taxes and trade taxes account for a lower share of tax revenue as a proportion of GDP compared to income tax and taxes on goods and services (Figure 12). But tax mix patterns, differ across countries. For instance, South Africa and Angola generate most of their revenue from direct taxation, whereas Uganda, Senegal, Zimbabwe, and Mauritius emphasize indirect taxes. South Africa, Cape Verde, Chad, Ghana, Zimbabwe, Senegal, Swaziland, and Zambia have a relatively balanced mixed of different types of taxes. On the other hand, Angola, Burundi, the Central African Republic, the Republic of Congo, and Nigeria almost entirely rely on one tax.

#### D. Panel Estimation

What factors affect revenue and tax revenue mobilization for the entire SSA region? Because fiscal and tax revenue are highly positively correlated, we present the results here for tax revenue only, which are also more directly relevant for policy purposes. Following the literature on tax revenue mobilization, we write the reduced form equation for a cross-country panel regression:

$$TAX_{i,t} = \alpha + \beta X_{i,t} + \epsilon_{i,t}$$

The dependent variable is tax revenue as a share of GDP for country  $i$  at time  $t$ .  $X_{i,t}$ <sup>5</sup> contains a variety of determinants of revenue for country  $i$  at time  $t$ —for which we closely follow the literature (Gupta, 2007; Ghura, 1998)—and  $\epsilon_{i,t}$  denotes the error term. We consider a range of controls including per capita income level as a proxy for the level of a country’s development; rate of consumer price inflation to proxy the quality of a country’s macroeconomic policies

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<sup>5</sup> Tax revenue as a proportion of GDP is defined as in the Government Finance Statistics database (Compilation Guide for Developing countries, 2011) where tax revenue is defined as compulsory transfers to the government, in cash or kind, made by institutional units to government units including collections of fees out of all proportion to the cost or distribution of a government service provided to the payer. The data used here is sourced from the IMF AFR DMX database.

and to capture any direct impact of inflation on tax collection; share of agriculture in GDP because typically the agricultural sector is relatively harder to tax; ratio of exports plus imports to GDP to measure the degree of openness of the economy. Other controls included rents from oil and natural resources; short-term debt; foreign direct investment (FDI); current account balances; and aid as a share of GDP respectively. Additionally we control for institutional factors that could explain variations in tax revenue following the literature as discussed in Subsection A.

The approach outlined above is attractive because of its ability to provide a simple empirical framework to measure a country's tax effort vis-à-vis that of its peers (Tanzi and Zee, 2000). The baseline analysis is based on data on 41 sub-Saharan African countries from the World Bank's *World Development Indicators* from 1980 to 2009. The sample in this section of the paper is extended in time and to non-LIC SSA countries to make results more robust, but results for SSA-LICs and for subsamples are in line with the findings for the whole sample. The indicator for level of corruption used in the paper is from the International Country Risk Guide (ICRG). The empirical strategy is to conduct a panel analysis using fixed effects and robust standard errors.

Our findings from the empirical analysis show that the significant determinants of tax revenue are share of agriculture in GDP, inflation, GDP per capita, and oil rents as a proportion of GDP (Table 5).

- Per capita GDP is significantly positive in most specifications for revenue and tax revenue. This is in line with other studies that found that the capacity to collect and pay taxes increases with the level of development.
- Our results also suggest a strong negative and significant relationship between share of agriculture and revenue performance. This could be explained by the difficulty of taxing a large subsistence agricultural sector. A large agricultural sector may also reduce spending on goods and services that derive more from urbanization.
- Inflation has a significant negative impact on revenue. A stable macroeconomic regime is more conducive to greater collection of revenue and tax revenue.
- In most specifications we find a strong positive relationship between openness and tax revenue performance as discussed earlier.
- Oil rents or natural resource rents are negatively related to tax revenue. This might indicate that countries dependent on natural resources tend to have weaker tax systems because they rely on rents from these resources.
- Aid, short-term external debt, FDI and current account balances have weak and nonsignificant relationships with tax revenue in our specification.

Our results are broadly in line with previous studies of determinants of tax revenue. GDP per capita, inflation, degree of openness, and the share of agriculture have the expected signs. It is

interesting to note here that aid and FDI do not seem to play a significant role in explaining the variation in tax revenue from a policy perspective. According to our analysis, they do not seem to be significant determinants and hence, policies granting excessive tax expenditure to attract foreign investment, for instance, may be misguided. In terms of coefficient estimates, in the baseline specification for the full sample (Table 5), we find that a percentage point increase in

- Share of agriculture decreases tax revenue (as a proportion of GDP) by 0.1 percentage point
- Degree of openness increases tax revenue by 0.02 percentage point
- Oil rents decreases tax revenue by 0.19 percentage point
- GDP per capita increases tax revenue by 0.001 percentage point
- Inflation decreases tax revenue by 0.0004 percentage point

Key variables have the predicted signs and are consistent with our initial hypothesis and with the results of most of the studies cited in this paper. The coefficients on share of agriculture, degree of openness, and GDP per capita have the expected signs, and the sizes of the coefficients are in line with previous empirical studies (Gupta 2007; Davoodi and Grigorian 2007; Ghura 1998). It is interesting to note however, that the size of the coefficient on inflation, even though statistically very highly significant and robust across various specifications, is relatively small. The sign, size, and significance of the coefficient on per capita GDP varies across different studies, choice of controls, and empirical methodology. The estimates range from 0.12 to 0.05 (Ghura, 1998; Gupta, 2007) to 0.00003 (Davoodi and Grigorian, 2007).

### ***Role of institutions and shadow economy***

The set of explanatory variables was extended to include the role of institutions in mobilizing revenue.<sup>6</sup> This is intended to capture various aspects such as governance of the public sector, rule of law, extent of rent seeking, and regulatory burden. As expected, corruption has a significant negative impact on tax revenue across all subsamples. A unit increase in the degree of corruption reduces tax revenue by 0.5 units. Initial estimates are broadly unchanged (Table 5). This is in line with other studies that examine the role of corruption like Gupta (2007) and Bird, Martinez-Vazquez, and Torgler (2004).

To control for the shadow economy, we run the panel using a measure of shadow economic

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<sup>6</sup> Data for Corruption Index from ICRG is available only for 30 SSA countries from our sample. The index is constructed in a way that more corruption is conducive to less tax revenue, i.e., the dummy is multiplied by -1.

activity (as a percent of GDP). The data for the size of the shadow economy is available from 1999 through 2007 (Schneider, Buehn, and Montenegro, 2010).<sup>7</sup> As expected, the impact of the shadow economy is negative and significant, underlining the need to introduce policies that encourage agents to participate in enhancing tax revenue similar to Davoodi and Grigorian (2007). Not many studies have explored the role of the shadow economy on tax revenue; and as our results suggest, it is a significant determinant with important policy implications.

### ***Robustness tests***

To support the results and further extend our analysis, we conduct extensive robustness checks, as follows:

First, we identified outliers<sup>8</sup> in the data—Zimbabwe, the Democratic Republic of the Congo, Gambia, Chad, and Liberia. Running the regression excluding these outliers and excluding oil-rich nations confirms our analysis (Table 6).

Second, we conduct the analysis on subsamples (1990–2009 and 2000–2009) and 3-year non-overlapping averages. The results tend to confirm our previous observations (Table 5).<sup>9</sup>

Third, to address the possibility of persistence in tax revenue, we employ an alternative econometric specification including the lagged value of the dependent variable. To overcome the well-known estimation problem of having a lagged dependent variable correlated with the error term, we use the Arellano and Bond (1991) estimation. The results of the estimation do not change our initial analysis (Table 6). We conduct both the Sargan test of the null hypothesis that the model and overidentifying conditions are correctly specified and the Arellano-Bond test that there is no serial correlation in the first-difference disturbances.<sup>10</sup>

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<sup>7</sup> Data is available from 1997 through 2006.

<sup>8</sup> Outliers were detected using scatter plot analysis of all dependent variables against tax revenue to GDP ratios and confirmed using Cook's distance measure test

<sup>9</sup> Additionally, we also conducted tests for endogeneity by including lags of control variables, controlling for initial levels of tax to GDP ratios, and running the regression for only LICs and separately for countries under the Extended Credit Facility program (previously known as the Poverty Reduction and Growth Facility program). They are not reported here because there was no significant difference in estimates.

<sup>10</sup> Not reported here.

#### IV. CONCLUDING REMARKS

Our results suggest several policy recommendations.

1. Alongside economic development and economic structure, macroeconomic stability and governance are critical for revenue mobilization.
2. We interpret the significant positive association between institutions and revenue mobilization, and the finding that nonfragile countries, on average, have performed better (in terms of tax revenue as a proportion of GDP) than fragile countries, as suggestive that policies that strengthen institutions and reduce overall economic fragility can be conducive to better revenue mobilization. Fragile economies tend to lag behind in collecting more revenue. Based on analysis of tax revenue as a proportion of GDP for resource rich and nonresource rich countries and the strong negative association of resource rents and collection of tax revenue, we infer that resource rents can cause dependency and may lead to weaker tax structures.
3. Countries can be cautiously ambitious in their revenue efforts. History suggests countries can reasonably expect modest increases in revenue ratios in the short-to-medium term and somewhat larger increases in longer time horizons. An increase of about  $\frac{1}{2}$  to 2 percentage points in the 1- to 3-year horizon and about 2–3 $\frac{1}{2}$  percentage points of GDP over longer terms is consistent with historical patterns.
4. Time matters. Over longer periods, countries have been able to achieve higher increases in revenue ratios, with the frequency distribution shifting to the right in 10-year periods.
5. Sustainability cannot be taken for granted. Almost all SSA-LICs were able to at least partially sustain their revenue gains. But this is far from assured.
6. Success stories emerge among fragile and nonfragile countries. Among the nonfragile SSA-LICs, Ghana, Kenya, Zambia, and Niger are countries that were able to mobilize the most revenue consistently in a 1-, 3-, 5-, or 10-year period, whereas Liberia and the Democratic Republic of the Congo are among the fragile SSA-LICs that achieved the largest increases in revenue ratios in at least one of these periods.

## APPENDIX 1: CASE STUDY

Mozambique is an interesting case of a country that has experienced positive changes in revenue ratios and where specific supporting policies could be well identified.

### Macroeconomic conditions

The Mozambican economy has experienced strong post-civil war economic expansion and strong growth since 1994. Output since 2000 has grown by 6½ percent a year on average, increasing output per capita by nearly one-third and facilitating a noticeable reduction in poverty. Robust private and public capital inflows, prudent macroeconomic policy management, and well-sequenced structural reforms were part of the reason for this economic expansion.

On average, real GDP growth over the last decade has been around 8 percent a year. The annual inflation rate has averaged to 10.7 per cent from 2000-2010, a significant decline from previous decades. However, international food and energy prices and an accommodative monetary policy have been behind the rise in inflation over recent years. The rate of inflation grew from 3.2 to 12.7 per cent from 2009 to 2010. Bank of Mozambique gradually lowered its key policy rates at an accelerated pace in 2009 to support credit supply in the wake of the global crisis which further added to inflationary pressures. Since then, monetary policies have decisively implemented monetary tightening to successfully bring down average inflation to 10.4 per cent in 2011. In 2009, the primary, secondary and tertiary sectors contributed to 29, 23 and 48 per cent of the GDP at factor cost respectively. The secondary sector has grown considerably and the primary sector has shrunk relatively over past two decades. According to a study in 2000, the informal economy was responsible for 40.3 percent of GNP, a percentage somewhat lower than the average for a sample of 23 African countries (42 percent).<sup>11</sup>

These circumstances indicate more favorable conditions than those that prevail in countries where agriculture (which is more difficult to tax than other sectors) and informal activities play more important roles in the economy. A recent mission from the IMF's Fiscal Affairs Department (FAD)<sup>12</sup> estimated Mozambican society's taxation capability, i.e., how much revenue could potentially be collected in this country, at about 22 percent of GDP, similar to

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<sup>11</sup> Friedrich Schneider (2002), "Size and Measurement of the Informal Economy in 110 Countries around the world," paper presented at a workshop held at the Australian National Tax Centre, Australian National University, Canberra, Australia, July 17. Available at [http://rru.worldbank.org/documents/paperslinks/informal\\_economy.pdf](http://rru.worldbank.org/documents/paperslinks/informal_economy.pdf).

<sup>12</sup> Ricardo Varsano and others [spell out all the names if it is three or fewer (2005) "Tanzania—Tax Policy Issues and Reforms," aide-mémoire by the mission, December.

that of Kenya and higher than most of its neighbors, but still much lower than that of South Africa and Swaziland.

### Tax Policy Reforms

An important driver behind healthy revenue collections in Mozambique has been the tax reform launched by the authorities since 1996. It centered on improving administrative efficiency, broadening the tax base, and moderating tax rates to improve collection. Customs reforms (which led to a simple tariff schedule with only five tax rates) have been followed by the comprehensive reform of the tax system and the institutions responsible for administering it implemented by the government. Import duty rates underwent an important revision in 1999, and at the same time a modern value-added tax (VAT) was introduced as a replacement for the cascade tax. In contrast to the situation in other countries of the region, the tertiary sector in Mozambique creates near half (about 45 percent in recent years) of the economic activity. This structural feature emphasizes the importance of the VAT as a source of revenue.

Legislative changes went hand in hand with policy reforms. The Assembly of the Republic of Mozambique now has exclusive authority to define the foundations of tax policy and the fiscal system.<sup>13</sup> No longer can tax incidence, rate, or exemptions be enacted by mere government decree. The constitution also established the principle that “the base of tax incidence cannot be broadened, nor tax rates made more burdensome, within the same financial year.”<sup>14</sup> This is an important step towards ensuring maintenance of a desirable legislative stability.

The 2002 Tax Benefits Code rationalized the incentives system in Mozambique, even though some aspects still need correction. This is an important step as it underlies the understanding that even if tax benefits do in fact encourage investment, in most cases the decision to invest is based on a much broader set of factors. Investors consider various factors that affect project profitability, such as availability of natural resources and infrastructure, quality of the available workforce, and country risk. Tax incentives therefore are very often just an additional bonus for an investor who would locate a project even without them. Transparency, sound administration and stability of rules in the tax system play a more important role in incentivizing investors, more so than the intensity of taxation in many cases. Another factor that affects investment decisions is the way profits are taxed in the country of residence. For instance, in a system of universal taxation of income, giving credit for taxes paid in other

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<sup>13</sup> Art. 179, part (o), and Art. 180 of the *Chambres Régionales de Métiers*(CRM)

<sup>14</sup> Art. 127, No. 4, of the CRM.

countries on business profits, a reduction or exemption granted in Mozambique is not actually an incentive, inasmuch as it reduces the amount of the credit given in the country of origin of the capital. This is just as a transfer of tax revenue from one country to another.

An alternative to the use of incentives could be to expand the government's efforts in educating and training its labor force, developing the infrastructure needed for production, and providing the public services companies need to operate through increased public investment (via public-private partnerships, coordination with donors, awarding tax benefits to private enterprises that invest in public works).

The reason Tax Benefits code is an improvement is because it favors incentives in the form of investment credits and accelerated amortization. It has an advantage over the previous code, which granted income tax exemptions or reductions which relate the size of the investment to the size of the incentive. In contrast, tax exemptions and reductions tie the incentive to the size of the profit and so are not of much benefit to companies that usually do not earn profits during the installation phase so the 2002 Tax Benefit Code was a significant improvement in the quality of the tax incentive system.

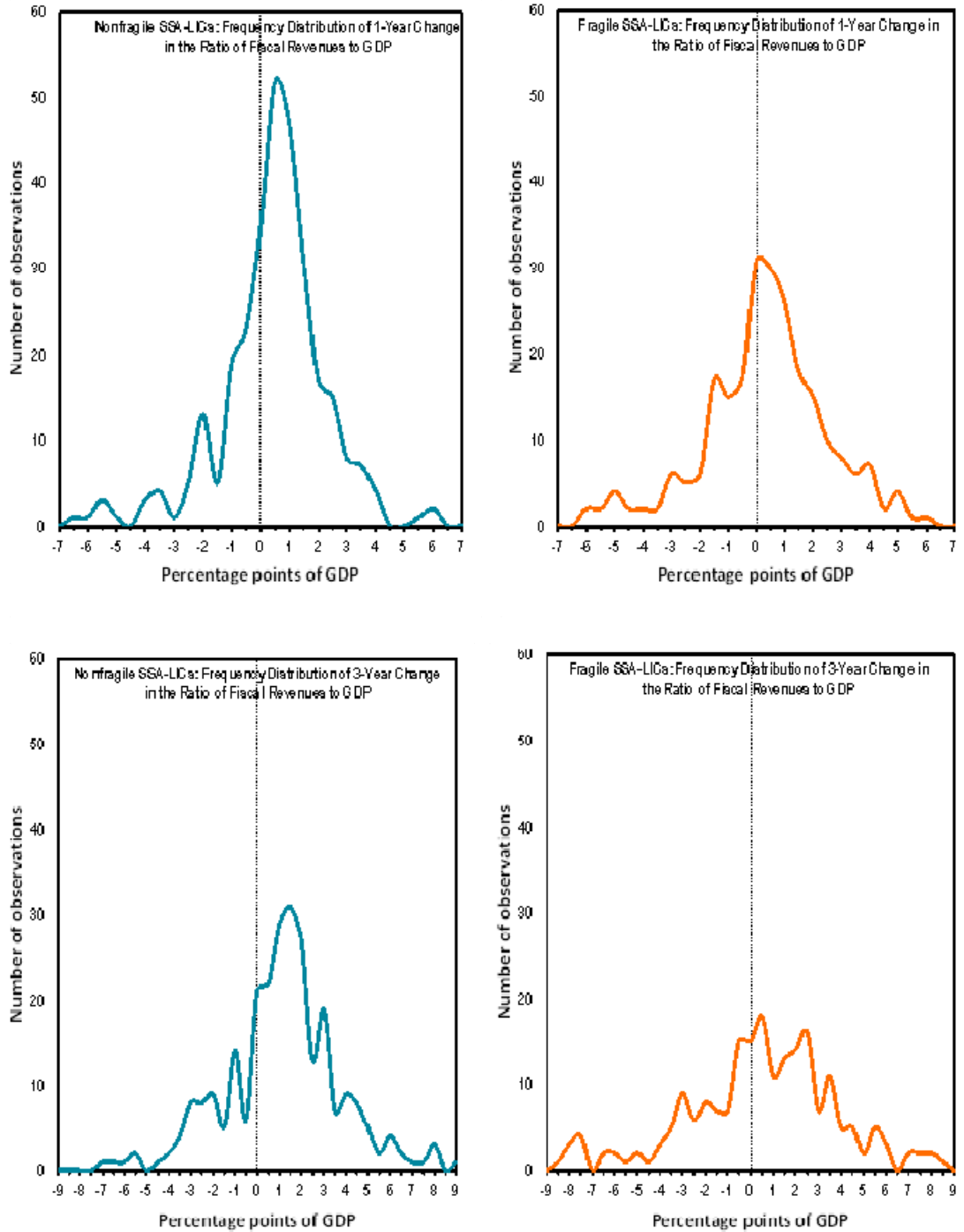
#### Tax Administration Reforms

There have been significant institutional and administrative changes, too. The authorities commitment to enhancing further tax administration is evident in formalizing anti corruption units, establishing the Central Revenue Agency (CRA), the tax tribunals, adoption of a new tax code for municipalities (introduced in 2004), adoption of the new electronic financial administration system (e-SISTAFE), strengthening the Treasury Single Account (TSA) amongst others. The government also started phasing out the fuel subsidy and aims to gradually restore market-based retail prices. Another key step on the administrative side was reinforcing the large taxpayers unit (LTU). There has also been noticeable progress in key operational areas of revenue administration like strengthening services and information to taxpayers; creating a specialized unit in the tax audit directorate to handle "mega projects," financial institutions, and extractive industries; expediting VAT refunds; simplifying tax returns; reinforcing the organizational structure at a regional level; and computerizing transit procedures and dramatically increasing the number of post release audits in customs.

Thus Mozambique's situation shows how a stable macroeconomic and institutional environment is important for revenue mobilization. At the same time, along with administrative changes, tax policy reforms like simplification and base broadening measures, and gradually doing away with tax expenditures to rationalize incentives under the tax benefits code have caused the upward trend in tax revenue.

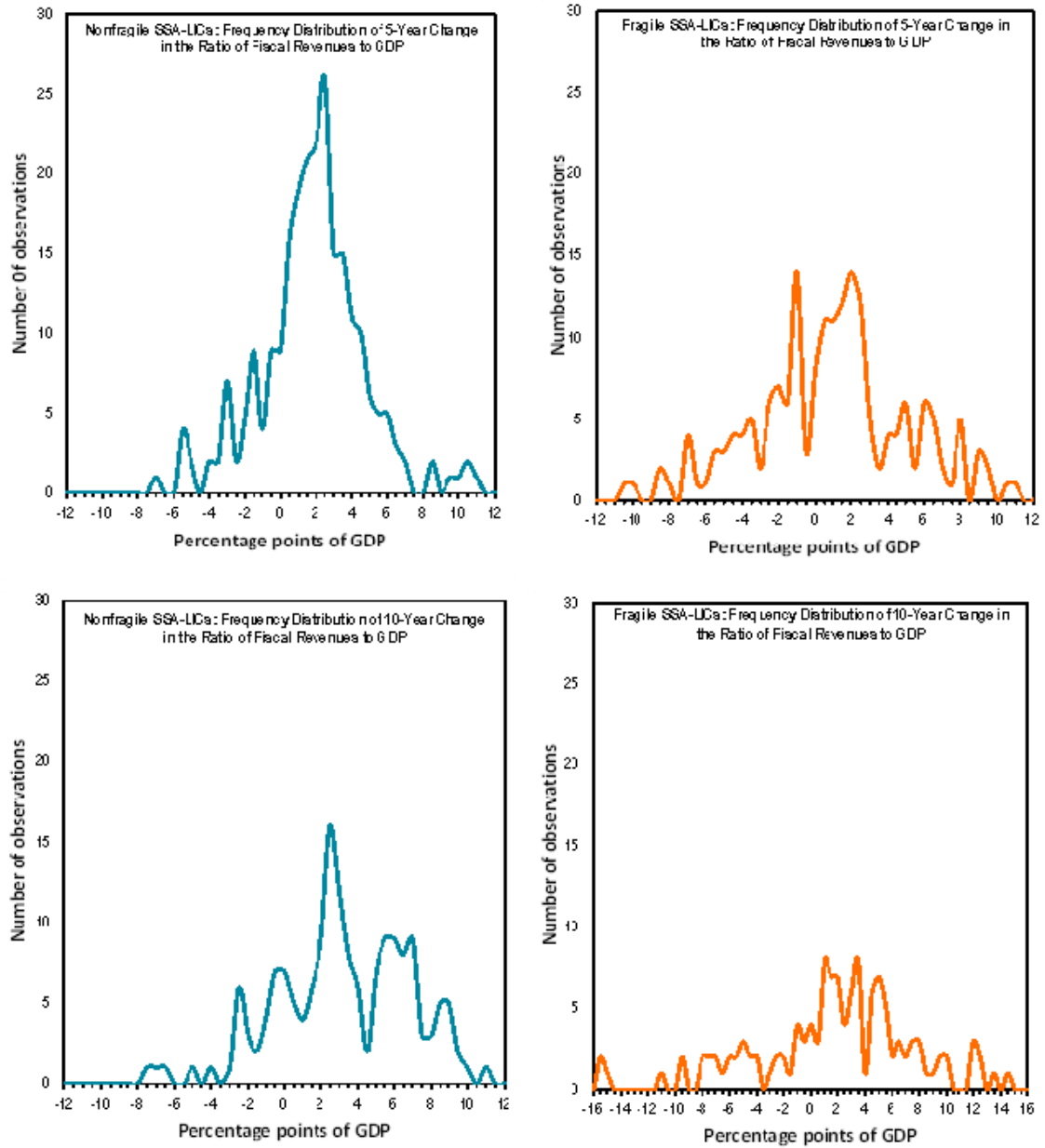


Figure 1. SSA-LICs: Frequency Distribution of Short- to Medium-Term Changes in Revenue-to-GDP ratio, 1990-2010 (Number of Observations)



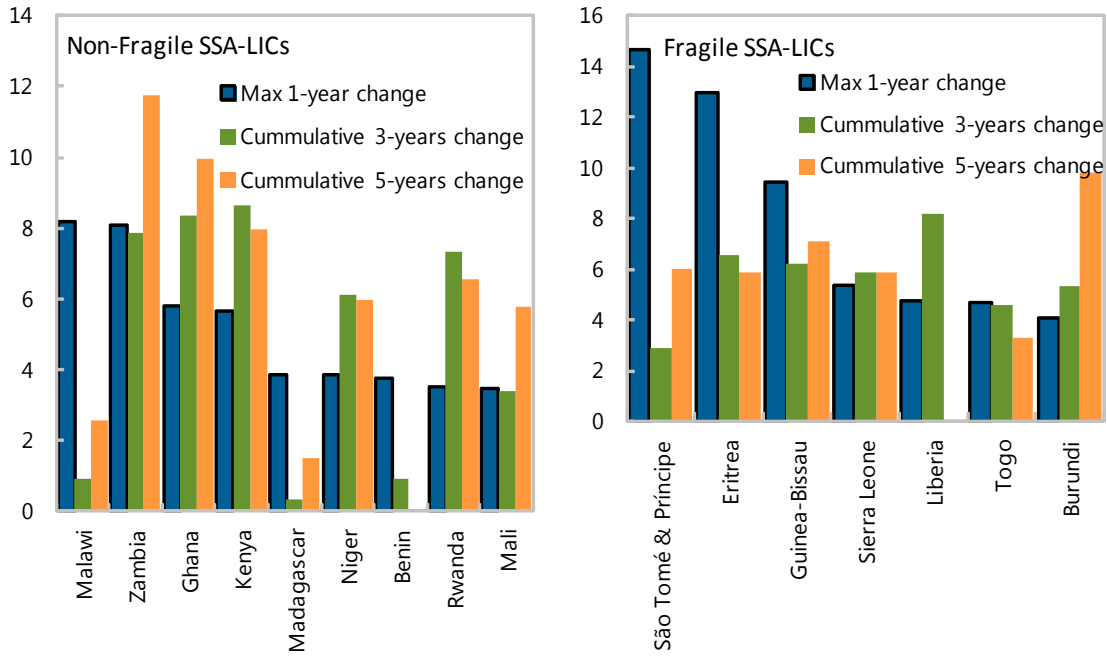
Source: IMF.

Figure 2. SSA-LICs: Frequency Distribution of Longer Term Changes in Revenue-to-GDP ratio, 1990-2010  
(Number of Observations)



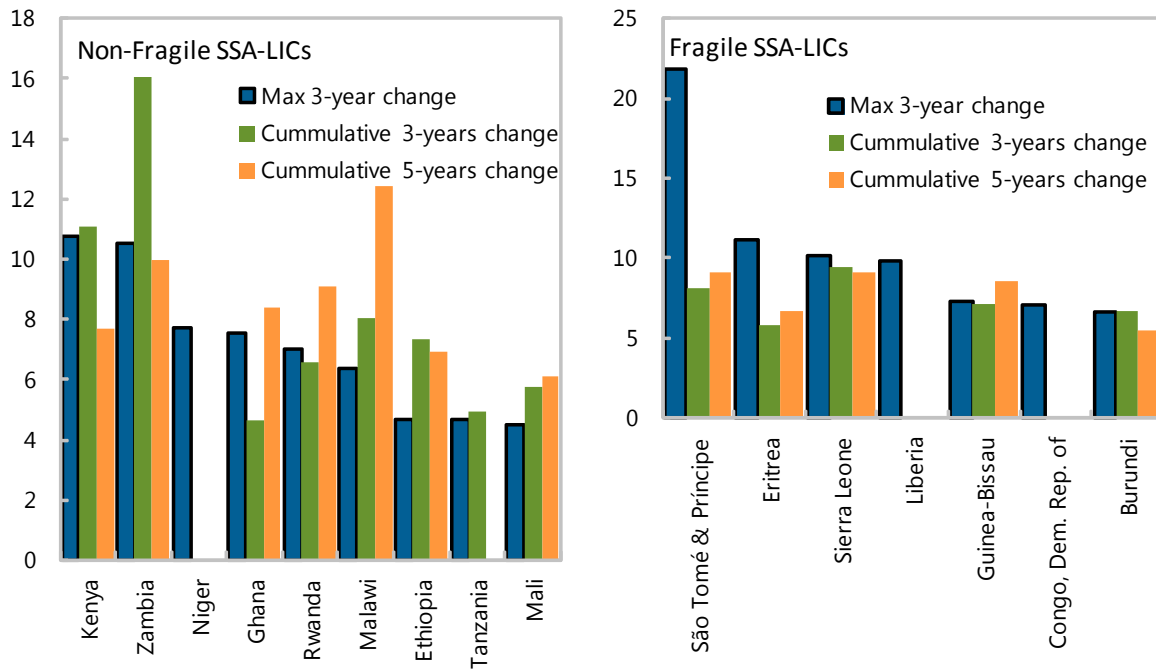
Source: IMF.

Figure 3. SSA-LICs: Maximum and Cumulative Changes in The Ratio of Fiscal Revenue to GDP, 1990-2010 (Short- to medium-term changes; percentage points of GDP)



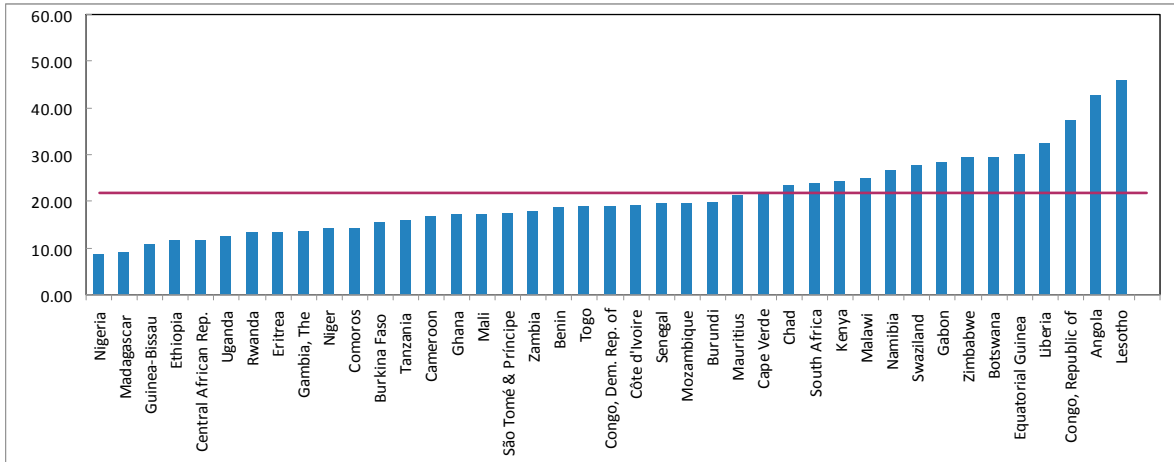
Source: IMF

Figure 4. SSA-LICs: Maximum and Cumulative Changes in The Ratio of Fiscal Revenue to GDP, 1990-2010 (Short- to medium-term changes; percentage points of GDP)



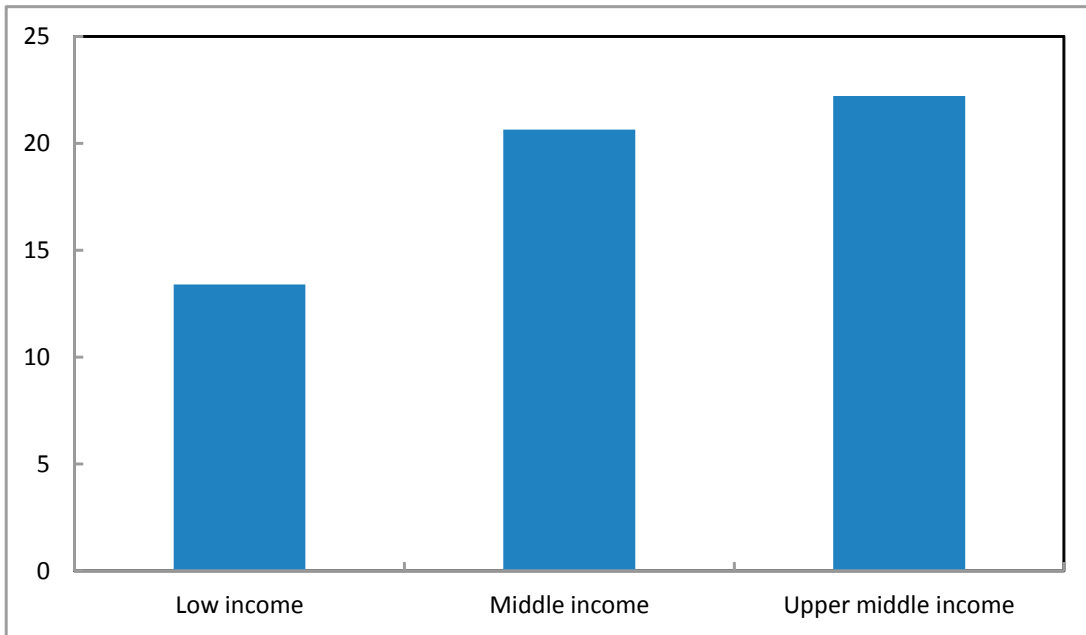
Source: IMF

Figure 5. Total Revenue (without grants) as a Proportion of GDP, 2010



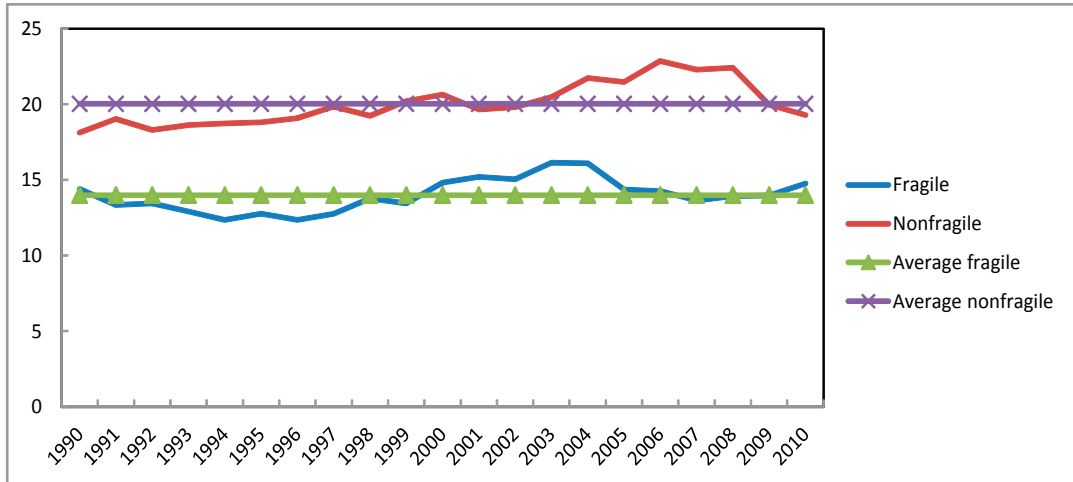
Source: Revenue Mobilization in Developing Countries (2011), Board Paper, International Monetary Fund

Figure 6. Average Tax Revenue as a Proportion of GDP, 2010



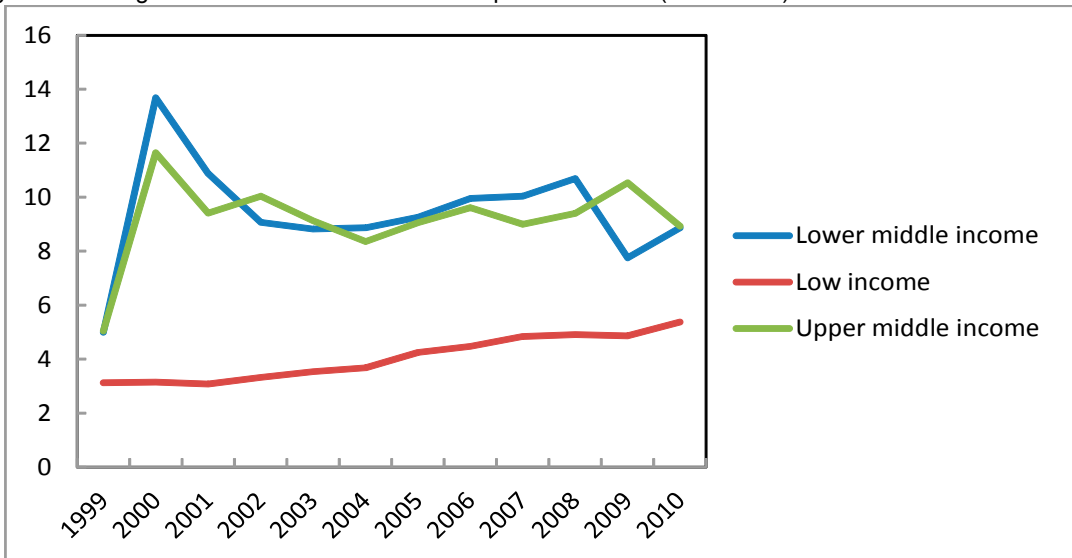
Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF

Figure 7. Average Tax Revenue as a Proportion of GDP Fragile vs. Nonfragile (1990-2010)



Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF

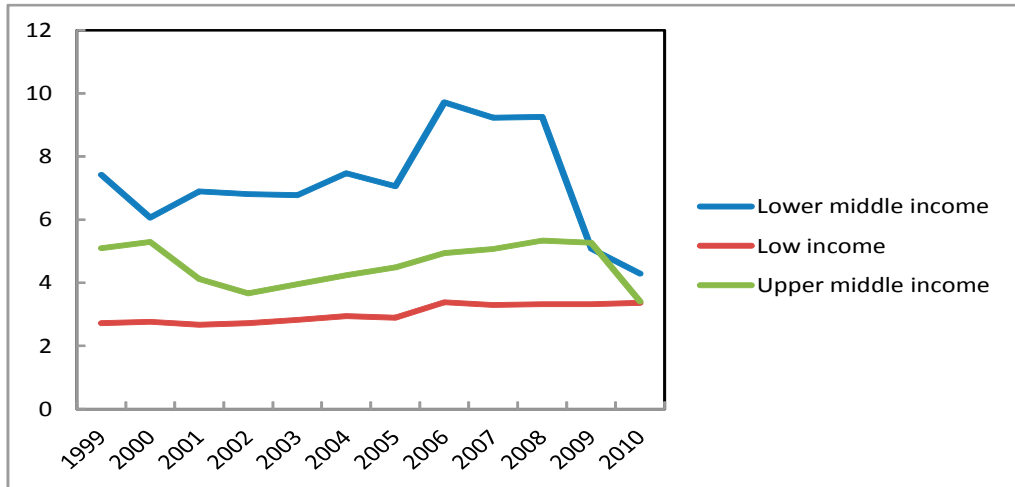
Figure 8. Average Income Tax Revenue as a Proportion of GDP (1999-2010)<sup>1</sup>



<sup>1</sup> Average is taken from 1999-2010 due to limitations of data availability

Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF

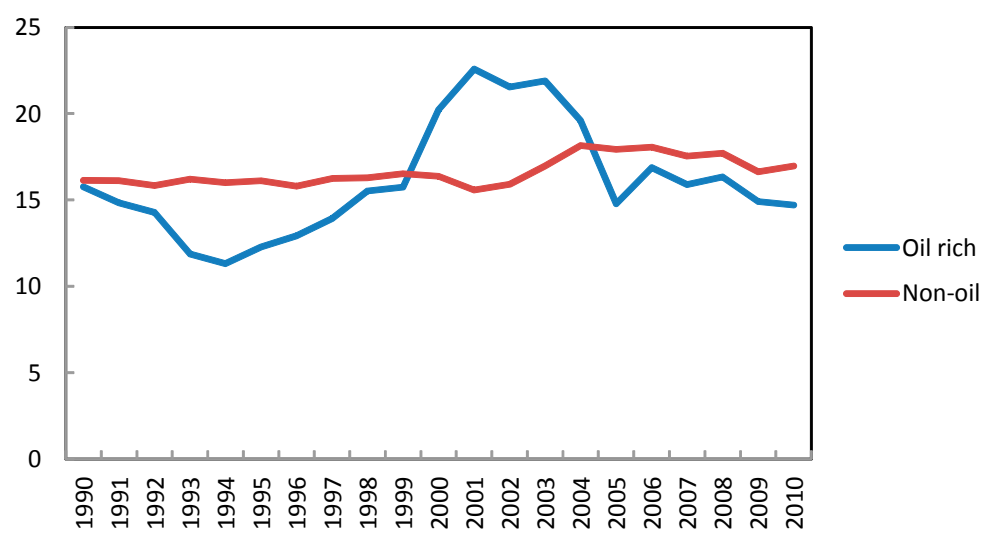
Figure 9. Average Trade Tax Revenue as a Proportion of GDP (1999-2010) <sup>1</sup>



<sup>1</sup> Average is taken from 1999-2010 due to limitations of data availability

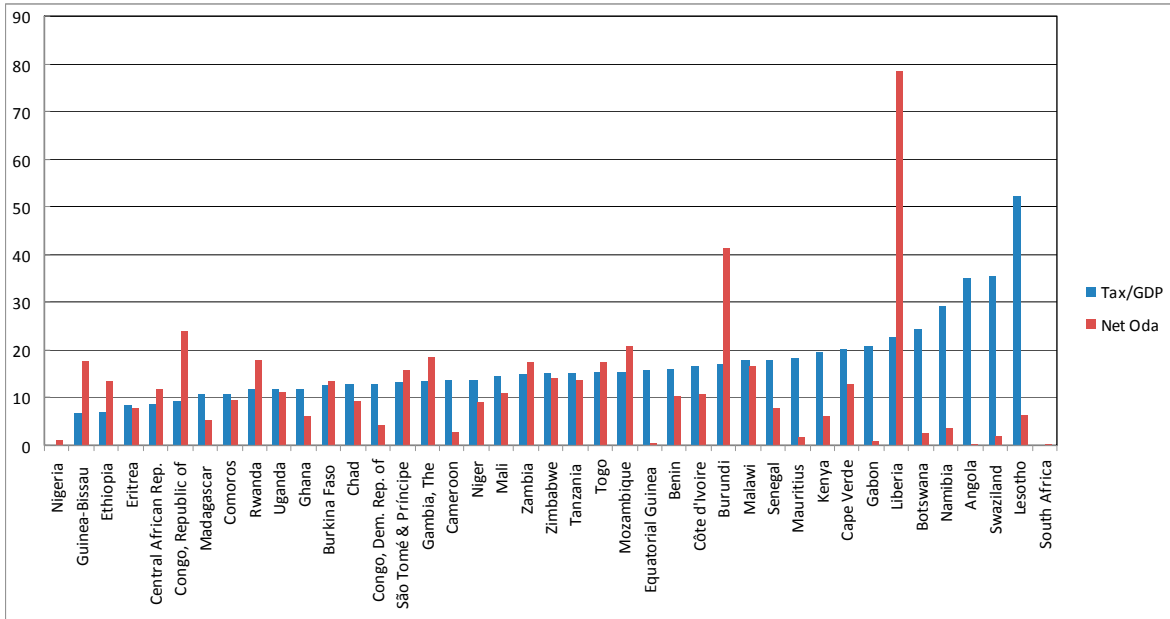
Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF

Figure 10. Average Tax Revenue as a Proportion of GDP Oil vs NonOil (1990-2010)



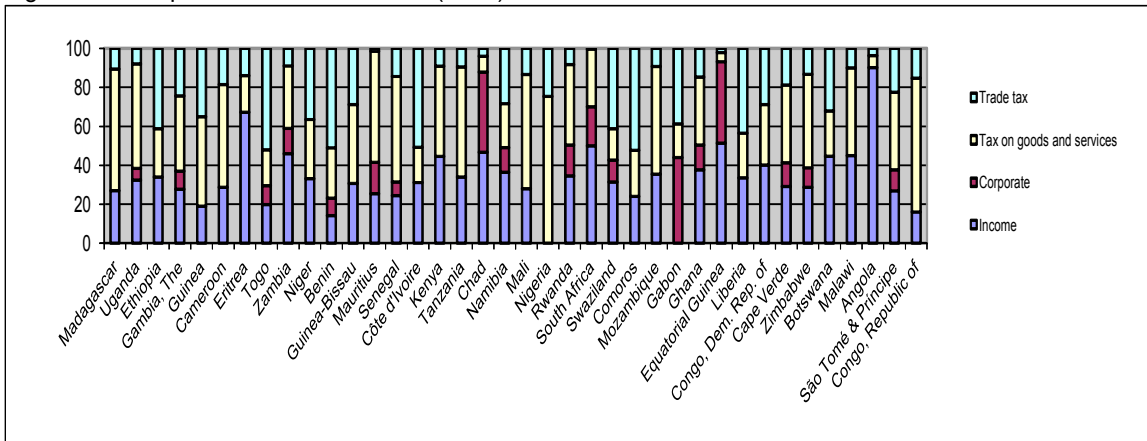
Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF

Figure 11. Aid and Tax Revenue (2009)



Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF; World Bank World Development Indicators

Figure 12. Composition of Tax Revenue (2010) <sup>1</sup>



<sup>1</sup> Missing data for income tax for Nigeria and Gabon, for corporate tax for Madagascar, Ethiopia, Guinea, Cameroon, Eritrea, Niger, Guinea-Bissau, Côte d'Ivoire, Kenya, Tanzania, Mali, Nigeria, Comoros, Mozambique, Liberia, Democratic Republic of Congo, Botswana, Malawi, Angola, Republic of Congo

Source: Revenue Mobilization in Developing Countries (2011), Board Paper, IMF

Table 1. Nonfragile SSA LICs: Maximum Changes in the Short-to-Medium Term in Fiscal Revenue  
(Percentage points of GDP)

Country	Max Change	Starting Level	Max Change Period		Level After		Cumulative Increase After	
					3 Years	5 Years	3 Years	5 Years
1-year change								
Malawi	8.2	13.7	1993	1994	14.6	16.3	0.9	2.6
Zambia	8.1	12.0	1993	1994	19.9	23.8	7.9	11.7
Ghana	5.8	11.9	1999	2000	20.2	21.8	8.3	9.9
Kenya	5.7	13.1	1993	1994	21.7	21.1	8.6	8.0
Madagascar	3.9	8.2	1991	1992	8.5	9.7	0.3	1.5
Niger	3.9	3.3	1994	1995	9.4	9.3	6.1	6.0
Benin	3.8	16.8	2006	2007	17.8	n.a.	0.9	n.a.
Rwanda	3.5	3.6	1994	1995	10.9	10.2	7.3	6.6
Mali	3.5	8.0	1990	1991	11.4	13.8	3.4	5.8
Mozambique	2.4	11.4	1991	1992	11.7	10.4	0.2	-1.0
Ethiopia	2.4	9.6	1994	1995	14.7	14.3	5.1	4.7
Tanzania	2.1	15.3	2006	2007	17.7	n.a.	2.4	n.a.
Burkina Faso	2.0	9.9	1990	1991	10.8	12.1	0.9	2.2
Uganda	1.9	7.3	1994	1995	10.6	11.3	3.3	4.0
Senegal	1.7	13.7	1994	1995	15.6	16.9	1.9	3.2
3-year change								
Kenya	10.8	11.4	1992	1995	22.5	19.1	11.1	7.7
Zambia	10.5	9.3	1992	1995	25.4	19.3	16.1	10.0
Niger	7.7	10.6	2005	2008	n.a.	n.a.	n.a.	n.a.
Ghana	7.6	9.3	1992	1995	14.0	17.7	4.6	8.4
Rwanda	7.0	3.6	1994	1997	10.2	12.7	6.6	9.1
Malawi	6.3	12.8	2002	2005	20.9	25.3	8.1	12.4
Ethiopia	4.7	7.3	1992	1995	14.7	14.3	7.3	6.9
Tanzania	4.7	12.7	2004	2007	17.7	n.a.	5.0	n.a.
Mali	4.5	8.0	1990	1993	13.8	14.1	5.8	6.1
Uganda	4.2	5.8	1993	1996	11.6	11.0	5.8	5.1
Mozambique	4.0	9.7	1990	1993	9.7	10.4	0.0	0.7
Benin	3.9	16.7	2004	2007	17.8	n.a.	1.1	n.a.
Madagascar	2.9	8.0	2002	2005	13.3	10.5	5.3	2.5
Senegal	2.7	18.3	2004	2007	19.3	n.a.	1.0	n.a.
Burkina Faso	2.5	11.0	2001	2004	13.5	13.6	2.6	2.6



Table 2. Fragile SSA LICs: Maximum Changes in the Short-to-Medium Term in Fiscal Revenue  
(Percentage points of GDP)

Country	Max Change	Starting Level	Max Change Period		Level After		Cumulative Increase After	
					3 Years	5 Years	3 Years	5 Years
1-year change								
São Tomé & Príncipe	14.7	10.9	1998	1999	13.8	16.9	2.9	6.0
Eritrea	12.9	22.3	1992	1993	28.8	28.2	6.5	5.9
Guinea-Bissau	9.5	1.3	1998	1999	7.5	8.4	6.2	7.1
Sierra Leone	5.3	6.7	1999	2000	12.6	12.6	5.9	5.9
Liberia	4.7	18.9	2006	2007	27.1	n.a.	8.2	n.a.
Togo	4.7	12.3	2002	2003	16.9	15.6	4.6	3.3
Burundi	4.1	10.2	1995	1996	15.5	20.0	5.3	9.8
Congo, Dem. Rep. of	3.8	14.7	2007	2008	n.a.	n.a.	n.a.	n.a.
Comoros	3.7	10.2	2000	2001	15.6	13.6	5.4	3.4
Gambia, The	3.6	10.9	2003	2004	16.9	15.1	6.0	4.2
Central African Rep.	3.4	4.2	1994	1995	5.6	9.3	1.4	5.1
Guinea	3.1	11.5	2004	2005	15.6	16.6	4.2	5.1
Côte d'Ivoire	3.0	15.8	1993	1994	19.3	16.4	3.5	0.6
3-year change								
São Tomé & Príncipe	21.8	7.4	1997	2000	15.6	16.5	8.2	9.1
Eritrea	11.2	22.3	1992	1995	28.2	29.0	5.9	6.7
Sierra Leone	10.1	3.2	1998	2001	12.6	12.2	9.4	9.1
Liberia	9.9	14.2	2005	2008	n.a.	n.a.	n.a.	n.a.
Guinea-Bissau	7.3	1.3	1998	2001	8.4	9.8	7.1	8.5
Congo, Dem. Rep. of	7.0	11.4	2005	2008	n.a.	n.a.	n.a.	n.a.
Burundi	6.7	13.4	1998	2001	20.1	18.9	6.7	5.5
Comoros	5.6	10.2	2000	2003	13.6	13.1	3.4	2.8
Gambia, The	5.3	10.9	2003	2006	15.1	n.a.	4.2	n.a.
Central African Rep.	5.3	6.1	1999	2002	8.2	10.3	2.2	4.2
Togo	4.3	12.6	2000	2003	16.9	15.6	4.3	2.9
Côte d'Ivoire	3.6	15.8	1993	1996	16.4	17.3	0.6	1.5
Guinea	3.4	11.0	2003	2006	16.5	n.a.	5.4	n.a.

Table 3. Nonfragile SSA LICs: Maximum Changes in the Longer Term in Fiscal Revenue  
(Percentage points of GDP)

Country	Max Change	Starting Level	Max Change Period		Level After		Cumulative Increase After	
					3 Years	5 Years	3 Years	5 Years
5-year change								
Zambia	13.3	12.0	1993	1998	19.0	17.9	7.0	5.9
Ghana	10.5	11.9	1999	2004	22.7	22.7	10.8	10.8
Kenya	10.3	11.4	1992	1997	19.1	20.1	7.7	8.6
Niger	8.2	10.2	2003	2008	n.a.	n.a.	n.a.	n.a.
Rwanda	6.9	3.6	1994	1999	12.7	12.2	9.1	8.6
Malawi	6.6	12.8	2002	2007	25.3	n.a.	12.4	n.a.
Ethiopia	6.4	8.2	1993	1998	15.0	15.2	6.7	6.9
Uganda	6.0	5.3	1992	1997	11.3	11.5	6.0	6.2
Tanzania	5.7	11.7	2002	2007	17.7	n.a.	6.0	n.a.
Mali	4.7	14.9	2000	2005	17.3	21.9	2.4	7.0
Mozambique	4.7	13.1	2004	2009	n.a.	n.a.	n.a.	n.a.
Benin	4.5	9.4	1990	1995	14.4	16.2	5.0	6.8
Madagascar	3.7	8.0	2002	2007	10.5	n.a.	2.5	n.a.
Senegal	3.2	17.9	2002	2007	19.3	n.a.	1.4	n.a.
Burkina Faso	2.2	10.5	1992	1997	11.7	11.6	1.2	1.1
10-year change								
Ghana	10.8	11.9	1999	2009	n.a.	n.a.	n.a.	n.a.
Niger	9.0	9.4	1998	2008	n.a.	n.a.	n.a.	n.a.
Mali	8.8	10.7	1995	2005	17.3	21.9	6.5	11.1
Kenya	8.6	11.4	1992	2002	21.2	22.0	9.8	10.6
Rwanda	8.6	3.6	1994	2004	12.3	12.8	8.8	9.2
Zambia	8.5	9.3	1992	2002	17.6	18.4	8.3	9.2
Ethiopia	8.3	7.3	1992	2002	14.6	12.7	7.3	5.4
Malawi	7.6	17.7	2000	2010	n.a.	n.a.	n.a.	n.a.
Mozambique	7.3	11.5	2000	2010	n.a.	n.a.	n.a.	n.a.
Benin	6.9	13.7	1997	2007	17.8	n.a.	4.0	n.a.
Uganda	6.8	4.2	1991	2001	10.9	12.5	6.7	8.3
Tanzania	6.3	10.7	1999	2009	n.a.	n.a.	n.a.	n.a.
Senegal	5.9	15.2	1997	2007	19.3	n.a.	4.1	n.a.
Madagascar	3.1	10.2	1998	2008	n.a.	n.a.	n.a.	n.a.
Burkina Faso	2.7	10.8	1994	2004	13.5	13.6	2.8	2.8

Table 4. Fragile SSA LICs: Maximum Changes in the Longer Term in Fiscal Revenue  
(Percentage points of GDP)

Country	Max Change	Starting Level	Max Change Period		Level After		Cumulative Increase After	
					3 Years	5 Years	3 Years	5 Years
5-year change								
São Tomé & Príncipe	22.0	7.2	1995	2000	15.6	16.5	8.4	9.3
Eritrea	14.5	22.3	1992	1997	29.0	23.9	6.7	1.6
Liberia	12.9	11.2	2003	2008	n.a.	n.a.	n.a.	n.a.
Congo, Dem. Rep. of	10.8	7.7	2003	2008	n.a.	n.a.	n.a.	n.a.
Sierra Leone	9.4	3.2	1998	2003	12.2	11.5	9.1	8.3
Burundi	9.0	10.2	1995	2000	21.1	20.0	10.9	9.8
Togo	6.5	10.5	1998	2003	16.9	15.6	6.4	5.1
Guinea-Bissau	6.2	1.3	1998	2003	9.8	9.1	8.5	7.8
Gambia, The	5.7	10.5	2001	2006	15.1	n.a.	4.6	n.a.
Comoros	5.7	10.1	1998	2003	13.6	13.1	3.5	3.0
Guinea	5.0	11.5	2004	2009	n.a.	n.a.	n.a.	n.a.
Central African Rep.	4.0	7.3	1997	2002	8.2	10.3	0.9	3.0
Côte d'Ivoire	4.0	17.0	2005	2010	n.a.	n.a.	n.a.	n.a.
10-year change								
São Tomé & Príncipe	21.7	7.5	1990	2000	15.6	16.5	8.1	9.0
Congo, Dem. Rep. of	14.1	5.1	2000	2010	n.a.	n.a.	n.a.	n.a.
Burundi	13.2	6.9	1994	2004	18.6	18.6	11.7	11.7
Liberia	11.8	15.2	2000	2010	n.a.	n.a.	n.a.	n.a.
Togo	9.1	7.9	1993	2003	16.9	15.6	9.0	7.7
Sierra Leone	8.3	3.2	1998	2008	n.a.	n.a.	n.a.	n.a.
Guinea-Bissau	7.8	1.3	1998	2008	n.a.	n.a.	n.a.	n.a.
Guinea	5.7	10.7	1999	2009	n.a.	n.a.	n.a.	n.a.
Central African Rep.	4.8	5.6	1998	2008	n.a.	n.a.	n.a.	n.a.
Côte d'Ivoire	4.3	16.7	2000	2010	n.a.	n.a.	n.a.	n.a.
Comoros	4.1	10.2	2000	2010	n.a.	n.a.	n.a.	n.a.
Gambia, The	3.4	11.1	1994	2004	16.9	15.1	5.8	4.0
Eritrea	1.6	22.3	1992	2002	25.9	21.2	3.6	-1.1

Table 5. Results of Panel Estimation

Dependent Variable	Tax Revenue/GDP		Including Shadow Economy		1990–2009	3-year non-overlapping average (1980–2009)	Including Corruption		2000–2009
	1980–2009	Including Corruption							
Control variables:									
GDP per capita	0.00112** (1.74)	0.0011406** (1.45)	0.0010521** (1.52)	0.0027115*** (2.73)	0.00186*** (2.50)	0.00180*** (2.39)	0.000554 (0.65)	0.0017706*** (1.86)	0.00261*** (2.58)
Share of agriculture in GDP	-0.103*** (-2.34)	-0.0845695*** (-1.69)	-0.1823801*** (-2.59)	-0.0051849*** (-1.89)	-0.0933*** (-2.75)	-0.125*** (-2.81)	-0.0413 (-1.08)	-0.1122353*** (-3.07)	0.0166584 (0.10)
Inflation	-0.000392* (-1.48)	-0.0008125*** (-16.86)	-0.0007533*** (-15.16)	-0.0007504*** (-7.48)	-0.000385* (-1.26)	-0.000367* (-1.19)	0.0000581*** (-6.60)	-0.000766*** (-18.53)	-0.0006145*** (-7.60)
Degree of openness	0.0215** (1.55)	0.0314454*** (1.67)	0.0501996*** (3.39)	0.1026031*** (1.90)	0.0271*** (3.24)	0.0374*** (4.73)	0.0420*** (2.02)	0.0414096*** (5.22)	0.0867229*** (1.50)
Oil rents	-0.196*** (-4.50)	-0.0943209* (-1.83)			-0.150* (-1.20)		-0.171*** (-3.50)		
Natural resource rents			-0.1831798*** (-2.40)	-0.2206015*** (-1.81)		-0.0917** (-1.53)		-0.0984322*** (-1.84)	-0.1872718* (-1.25)
Aid	0.000742 (0.04)	-0.0023504 (-0.24)	-0.0026459 (-0.19)	0.0225858 (0.20)	0.0428 (1.03)	0.0465* (1.22)	-0.0122 (-0.70)	0.0276829*** (1.70)	0.1106536** (1.75)
Short-term debt		0.0356754 (0.47)	0.0291976 (0.42)	0.0172686 (0.19)	-0.0818*** (-1.71)	-0.0681* (-1.29)	-0.00745 (-0.08)	0.0047133 (0.07)	-0.0752481* (-1.44)
FDI	0.0986 (0.68)	0.1234117 (0.34)	0.3719272 (0.89)	0.3934651 (0.91)	0.149 (0.98)	0.190 (1.18)	-0/0793 (-0.24)	0.2572334 (0.64)	0.1940265 (1.02)
Current-account balance	-0.0106 (-0.46)	-0.0109151 (-0.31)	-0.0178363 (-0.48)	-0.0176219 (-0.55)	-0.0311 (-0.88)	-0.0445* (-1.27)	-0.0310* (-1.46)	-0.0178995 (-0.37)	-0.0534358 (-0.68)
Corruption		-0.7264521*** (-2.24)	-0.8135721*** (-2.40)	-0.581732*** (-1.72)				-1.254407** (-1.54)	
Shadow economy				-0.0488828** (-1.41)					
Constant	19.63*** (10.68)	18.94*** (8.16)	21.62*** (8.02)	15.89*** (6.09)	19.85*** (8.10)	19.31*** (9.10)	14.71*** (6.03)	19.50*** (7.45)	14.322*** (1.91)
N	593	479	479	162	382	382	233	321	203

Note : t stats in parentheses ( \* p<0.15, \*\* p<0.10, \*\*\*p<0.05).

Table 6. Results of Robustness Checks

Dependent Variable	Tax Revenue/GDP 1980–2009		
	Excluding Oil	Excluding Outliers	Arellano Bond
Control variables:			
GDP per capita	0.000402 (1.07)	0.00118** (1.66)	0.000602*** (1.72)
Share of agriculture in GDP	-0.145** (-1.58)	-0.148*** (-2.06)	-0.0102 (-0.31)
Inflation	-0.000810*** (-10.02)	-0.000754*** (-13.70)	-0.000449*** (-3.60)
Degree of openness	0.109*** (2.48)	0.0521*** (3.37)	0.0299*** (3.19)
Oil rents			0.112*** (2.12)
Natural resource rent	-0.153*** (-2.20)	-0.114** (-1.65)	
Aid	-0.00564 (-0.33)	0.0471 (1.11)	0.0183 (1.06)
Short-term debt	-0.0231 (-0.28)	0.000862 (0.01)	
FDI	0.270* (1.34)	0.299 (0.75)	0.182 (0.59)
Current account balance	-0.00791 (-0.16)	-0.0371 (-1.07)	-0.0120 (-0.43)
Corruption	-1.052*** (-2.30)	-0.820*** (-2.47)	-0.521*** (-2.66)
Lag			0.639*** (16.39)
Constant	17.79*** (4.25)	19.85*** (8.79)	
N	326	425	432

Note : t stats in parentheses ( \* p<0.20, \*\* p<0.15, \*\*\*p<0.10).

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