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Tax Revenue Mobilization Episodes in Emerging Markets and Low-Income Countries: Lessons from a New Dataset

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Abstract

How do countries mobilize large additions to tax revenue—defined as an average increase in the tax-to-GDP ratio of 0.5 percent per year over three years or more? To answer this question, we build a novel dataset covering 55 episodes of large tax revenue increases in low-income countries and emerging markets. We find that: (i) reforms of indirect taxes and exemptions are the most common tax policy measures; (ii) multi-pronged tax administration reforms often go hand in hand with tax policy measures; and (iii) sustainability of the episodes hinges on tax administration reforms in the key compliance areas (risk-based audits, registration, filing, payment, and reporting).

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I. INTRODUCTION

Tax revenue mobilization is a central concern of economic policymaking in many countries. Experience has shown that while some countries exhibit marked increases in their tax-to-GDP ratios, others show little or no increase in their ratios over extended periods. Greater domestic resource mobilization is critical for many countries. In particular, in developing countries, enhancing mobilizing tax revenue is integral for governments to create fiscal space to fund public investment and deliver public services. Enhancing tax revenue collection is therefore at the top of fiscal policymakers' agendas in many countries.

In recent years, there has been wider and renewed interest by many governments and multilateral institutions in enhancing tax capacity, stemming from the recognition that tax capacity is at the core of state building and development (Besley and Persson, 2009, 2010; IMF, 2011; Gaspar et. al, 2016a, 2016b). The importance of building tax capacity was underscored by the G-20 leaders in 2010, who called on the IMF and development institutions to monitor revenue mobilization efforts.[2] The UN member countries have also collectively recognized the need to raise tax revenue to fund the Sustainable Development Goals (SDGs) by 2030, and made strengthening domestic resource mobilization a specific target (SDGs target 17.1). Similarly, in 2015, partner countries to the Addis Tax Initiative (ATI) committed to "step up domestic revenue mobilization".

Given the daunting challenges some countries face in tackling this prominent policy issue, the paramount question to many policymakers is "how" to mobilize sufficient tax revenue. The questions that frequently arise are: "What have other countries done to increase revenue collection?"; "How fast can a country boost tax revenue?" Answers to these questions would provide a useful tool to assist policymakers in their revenue mobilization efforts. However, the literature does not provide sufficient cross-country evidence on successful tax revenue mobilization, especially for low-income countries (LICs) and emerging markets (EMs).

This study helps to close the gap in the literature with a novel dataset that provides a comprehensive analysis of efforts to increase tax revenues in LICs and EMs over the period 2000-2015. The dataset covers 55 episodes of tax revenue mobilization during which revenue administration and tax policy reforms played a crucial role in increasing the tax-to-GDP ratios; of these, 29 are observed in LICs, 18 in EMs, and 8 in resource-rich (RR) economies. For the identified episodes, the tax-to-GDP ratios increased by at least an average of 0.5 percent of GDP per year over a minimum of three years. Each episode details the specific tax policy measures (with a focus on the introduction of new taxes, rate and base changes) and revenue administrative measures. The dataset, which will be released with this paper, provides a short

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[2] IMF (2011, p.6).

descriptive summary of policy measures.[3] We further: (i) present the initial revenue level; (ii) record the overall revenue gain; (iii) indicate whether the revenue gain was sustained after the end of the episode; and (iv) report on IMF-supported programs accompanying the reform effort.

The key findings of this paper are the following:

- Many countries that observed large revenue increases pursued revenue administration and tax policy reforms in parallel, and only a few countries pursued either tax policy or revenue administration measures alone.

- Broadening the tax base for both direct and indirect taxes by means of revenue administration and tax policy, especially through improvements in compliance and by reducing exemptions and/or eliminating tax holidays, were frequently used measures.

- Many countries focused on indirect taxation in their revenue mobilization efforts. Besides changes to general goods and services taxes, the introduction of value added tax (VAT), its simplification and increasing its efficiency often led to significant revenue gains. Excise taxation was also used frequently. Property taxes have played a limited role during the identified episodes in both LICs and EMs.

- About one third of the increases in the tax-to-GDP ratios were sustained (they did not fall for at least three years after the increase), and another one third fell moderately (less than one third of the initial gain was lost). Sustainability of the episodes usually coincides with tax administration reforms in the key compliance areas (risk-based audits, registration, filing, payment, and reporting). Most frequently, tax revenue mobilization efforts in the latter half of the 2000s were hindered by the global financial crisis of 2007/08.

Causality cannot be inferred. The paper is a stocktaking exercise of what countries have done during episodes of large revenue increases. While tax policy and revenue administration measures likely contributed or were the main driver behind much of the observed revenue increase, causality cannot reliably be established given the lack of additional micro-evidence or natural control groups for most reforms. In addition, it should be noted that not all tax systems that raise more revenue are necessarily better. Examples include reforms that raise equity concerns, or revenue being raised by failing to give full and timely VAT refunds.

Our research revealed that a high-level political commitment and buy-in from all stakeholders played a crucial role for success. These findings are further discussed in the follow-up papers on cases studies (Akitoby et al. 2018a, Akitoby et al. 2018b, and Akitoby et al. 2018c). For example, Georgia's comprehensive tax reform was feasible only after the country had

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[3] The dataset will be posted on the IMF external website (www.imf.org). The reference to the dataset should be as follows: Akitoby, Bernardin, Anja Baum, Clay Hackney, Olamide Harrison, Keyra Primus, and Veronique Salins, 2018, "Dataset on Large Tax Revenue Mobilization in Low-Income Countries and Emerging Markets," (Washington: International Monetary Fund).
https://www.imf.org/~/media/Files/Publications/WP/2018/datasets/wp18234.ashx

reached a high degree of dysfunction, triggering a revolution. Similarly, in Ukraine, the 2004 Orange Revolution was a catalyst for tax reform. And in 2003, Liberia initiated reform after the civil war had ended. While a clear political mandate to increase revenue collection is important, it is not sufficient. A political commitment at the highest level with deep social dialogue enhances the likelihood of reforms being implemented and sustained.

The paper is organized as follows: Section II discusses recent tax revenue developments in LICs and EMs, and Section III provides a description of the revenue data. Section IV outlines the analytical framework for identifying revenue mobilization episodes and discusses the findings from these episodes. This section also examines improvements in tax effort by relating tax revenue ratios to the state of economic development as a robustness test. Section V discusses the revenue administration and tax policy reforms that contribute to increases in the tax-to-GDP ratios. The final section concludes.

II. Tax Revenue Developments[4]

Tax revenue has been rising in LICs and EMs over the last fifteen years. Between 2000 and 2015, two broadly similar points in the business cycle, the average tax revenue increased by 3.5 percent of GDP, and measured 16.4 percent in 2015 on (an unweighted) average. In EMs, the increase in tax revenue was less pronounced, rising by 0.9 percent of GDP between 2000 and 2015, and reaching an average 17.3 percent. These levels remain well below those of advanced economies (AEs), where the average tax-to-GDP ratio measured 25.5 percent in 2015.

Both resource-rich (RR)[5] and non-RR economies experienced overall increases in their tax revenue-to-GDP ratios (Figure 1). Since 2000, the average annual increase was 0.2 percent for non-RR countries and 0.3 percent for RR countries. In RR LICs and EMs, favorable commodity market developments have contributed to the observed increase. However, highly volatile commodity prices and production discoveries led to more pronounced fluctuations in tax revenue—a trend not observed in non-RR countries.

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[4] Appendix I and II detail the country groupings and summary statistics across the tax revenue categories, as well as by region.

[5] RR countries are defined here as those with more than 20 percent of exports or fiscal revenues from nonrenewable commodities. Nonrenewable commodities are commonly oil, gas, and metals.

Figure 1. Tax Revenue Development

**Non-Resource Rich Economies,
Average Tax Revenue**
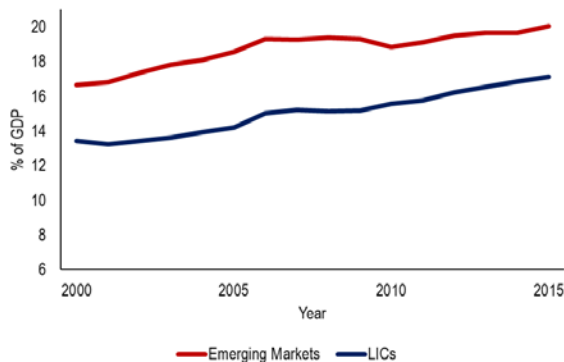
**Resource-Rich Economies,
Average Non-Commodity Revenue**
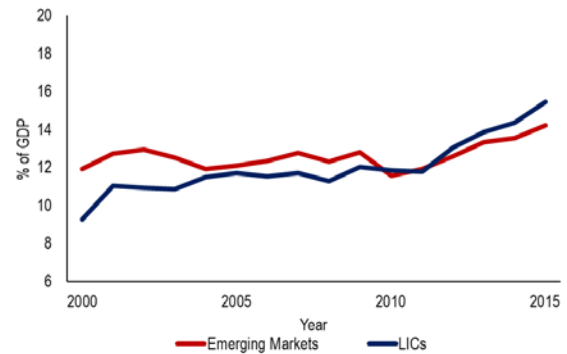
Note: For RR countries, non-commodity revenue is computed by subtracting commodity revenue and grants from general government (GG) revenue.

Sources: WoRLD, WEO, and IMF staff estimates.

The average tax revenue structure has changed significantly, mostly reflecting declining trade tax revenues and a shift towards income tax and VAT, as well as increased use of excise taxes in some countries (Figure 2, Appendix II):

- *Trade tax revenue has been declining as a share of GDP in the last decade as a result of trade liberalization.* This trend called for a rebalancing of revenue mobilization efforts towards domestic taxes, in particular direct and consumption taxes (see Keen and Ligthart (2002) for a welfare analysis of a shift towards consumption taxes). Experience has shown that increasing domestic tax revenue to compensate for trade tax revenue has been a challenge in LICs (Baunsgaard and Keen, 2010), often attributed to weak administrative capacity, which can hinder domestic revenue collection. EMs have, on average, been more successful in replacing lost revenue from trade.

- *Direct taxes increased significantly for LICs, from about 20 to 30 percent in the overall revenue share.* Average income tax (personal and corporate combined) as a share of GDP measured 6.3 percent in 2015 for EMs, up from 4.5 percent of GDP in 2000, and 5.1 percent of GDP for LICs, up from 3.3 percent of GDP in 2000. Given that more than 75% of the country cohort has data available as of 2000, it indicates that LICs have recently converged towards the income tax collection effort of EMs as opposed to composition effects. A closer inspection of the composition of income tax reveals that revenue from corporate income tax (CIT) increased modestly in LICs, in comparison to average revenue from personal income tax (PIT), which roughly doubled between 2000 and 2015. In EMs, CIT and PIT rates were reduced in many countries to stimulate growth, accompanied by a substitution towards indirect tax

revenue (see OECD, 2017). Yet, EMs recorded gains in income tax revenue equivalent to 1.2 percent of GDP between 2000 and 2015.

- *Many LICs and EMs introduced VAT, which has proved to be a robust source of revenue* (Keen, 2013). Since 2000, 23 (out of 70) LICs and 20 (out of 83) EMs introduced VAT,[6] including Seychelles (2012), The Gambia (2013), Malaysia (2015), and Suriname (2016). VAT revenue accounted for approximately one third of all tax revenue in both LICs and EMs in 2015. The data also reveal that countries with VAT recorded higher tax-to-GDP ratios than those without (see Figure 3, Keen and Lockwood, 2010, and Ulfier, 2014).

- *One contributory factor to the increase in VAT revenue is enhanced collection efficiency, as measured by the C-efficiency* (Figures 2 and 4). LICs and EMs have improved average C-efficiency from 0.25 and 0.47 in 2000 to 0.36 and 0.57 in 2015, respectively.[7] However, progress in improving efficiency has slowed since the global financial crisis, is on a slight decline in EMs, and remains overall low in LICs.

- *Excise tax revenue as a share of GDP has increased over the sample period.* In LICs, collection of excise taxes increased from 1.7 percent of GDP in 2000 to 2.1 percent of GDP in 2015. Excise taxes on a few key products are a modest source of revenue, and usually among the simplest taxes to implement. Also, excises on items such as alcohol and tobacco can address broader social or health concerns.

- *Property tax revenue, albeit still small, is on the rise.* Revenue from property tax remains below one percent of GDP for both income groups, but it is increasing steadily in EMs. The low ratios reflect weaknesses in design and implementation, especially in LICs, which have lower capacity levels. Property rights are still poorly defined in many countries and enforcement tends to be weak. Nevertheless, revenue is likely to rise further in the future if more resources are allocated to identifying, capturing and valuing all relevant properties, upkeeping of a fiscal cadaster for property taxes, and ensuring effective collection of the tax (see, for example, Norregaard 2013).

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[6] Data source: IMF database "DART". In the here used dataset, 21 of 65 LICs and 17 of 71 EMs introduced VAT since 2000.

[7] C-efficiency is defined as the ratio of actual VAT to potential VAT if all final consumption were taxed at the standard rate.

Figure 2. Tax Revenue Composition

LICs, Non-Resource Rich

Emerging Markets, Non-Resource Rich
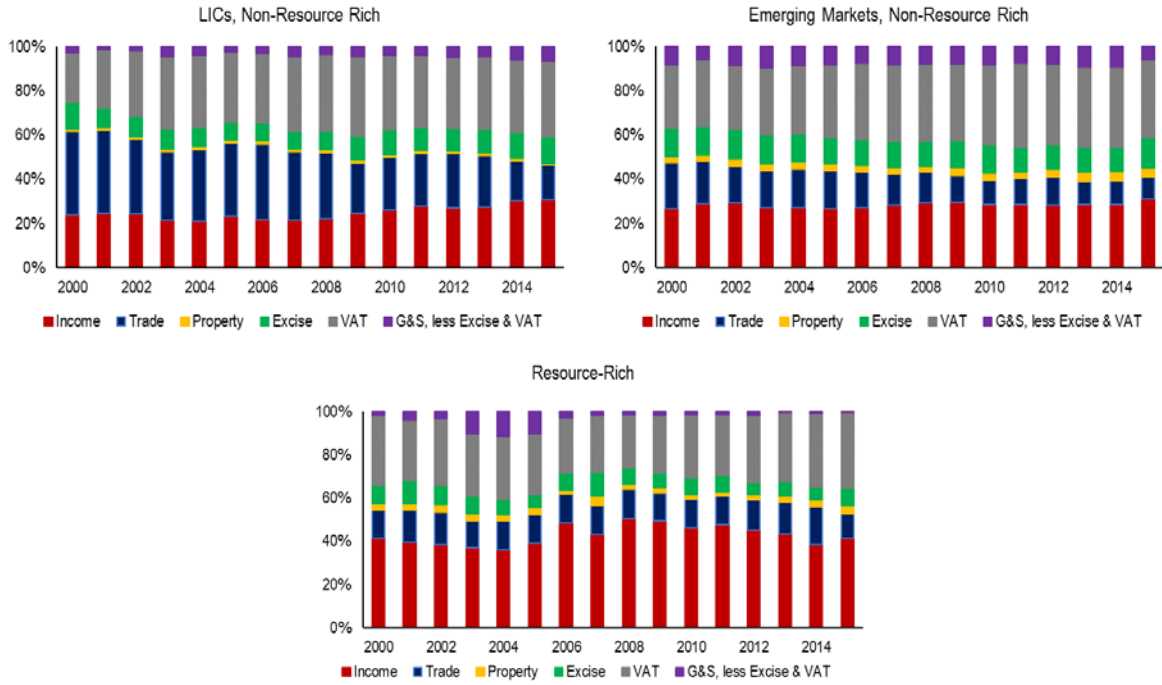
Resource-Rich

Note: Resource-Rich data are in terms of percent of non-commodity revenue.
Sources: World Revenue Longitudinal Database and IMF staff estimates.

Figure 3. Average Tax Revenue, 2013-2015 (percent of GDP)
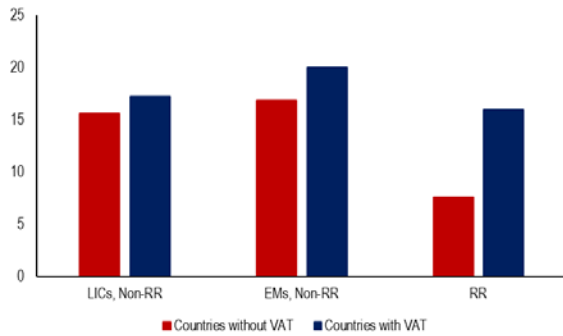
Figure 4. Average C-Efficiency Development, 2000-2015

Source: IMF staff estimates.
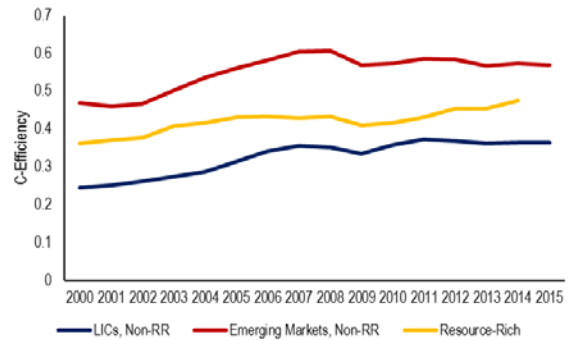
Sources: RA-Gap and IMF staff estimates.

III. DATA DESCRIPTION AND SOURCES

The annual data used to identify episodes of revenue mobilization cover 136 countries (71 EMs and 65 LICs) from 2000-2015.[8] The levels of government covered are important, as various government levels collect tax revenue. In cases where tax revenue data for general government (GG) are available, we use this information. Where GG data are unavailable, notably in LICs, we use central government (CG) tax revenue data as a proxy for GG data.

Data on overall tax revenue comprise the following categories: PIT; CIT; goods and service taxes, separated into VAT, excise taxes, and general (other) goods and services taxes; trade tax; property tax; and others. Annual data for tax revenue (including its subcategories) are taken from the publicly available World Revenue Longitudinal Database (WoRLD).[9] For RR countries, given the absence of non-commodity tax revenue, non-commodity revenue is computed by subtracting total commodity revenue as well as grants from GG revenue. Data on non-commodity revenue are sourced from the World Economic Outlook (WEO) database.

Data and descriptive information on revenue administration and tax policy measures are assembled from published IMF country reports (e.g., IMF staff reports), internal IMF technical assistance reports, and several external sources on country-cases (World Bank, OECD, and others).

IV. EMPIRICAL STRATEGY

A. Episodes of Tax Revenue Mobilization

In the first step, we identify episodes of rapid increases in tax revenue mobilization that might be driven by fiscal policy decisions and reforms. It may of course be that some observed tax increases are be driven by the business cycle or shifts in the composition across economic goods. We therefore adjust the tax revenue ratio to represent only its structural component, taking out the cyclical element by applying an output elasticity to tax revenue of

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[8] Of the 71 EMs, 49 are non-RR; whereas 52 out of the 65 LICs are non-RR. Of the 136 countries in the sample, 31 are fragile states (FS). Following IMF (2017), FS have either weak institutional capacity as measured by the World Bank's Country Policy and Institutional Assessment (CPIA) score (average of 3.2 or lower) and/or experience conflict (signaled by presence of a peace-keeping or peace-building operation in the most recent three-year period).

[9] These data are sourced from the IMF's *Government Finance Statistics* and *World Economic Outlook* (WEO) and the OECD.

one, as common in the literature.[10] The initial identification thus takes the ratio of the cyclically adjusted tax revenue-to-trend GDP as a baseline.

Figure 5. Distribution of 172 Identified Episodes
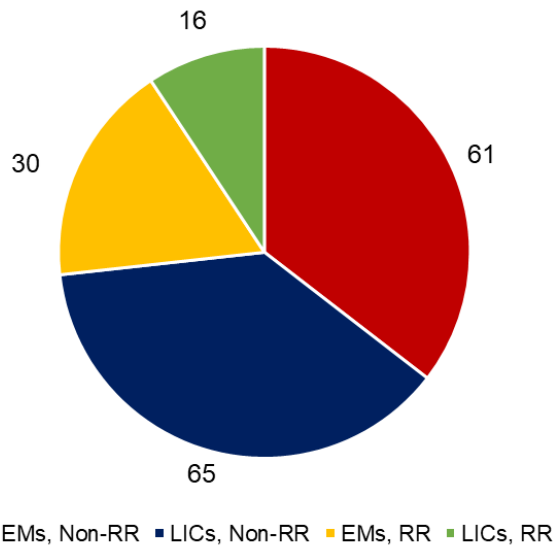
Sources: WoRLD and IMF staff estimates.

Episodes are defined as 3-year compounded windows of an average increase of 0.5 percent per year or more. The first episode is triggered by the first 3-year window in which the tax-to-GDP ratio increases by an average of at least 0.5 percent per year (1.5 percent within three years). The threshold of 0.5 percent of GDP per year is often set as a target in IMF supported programs (e.g. Bangladesh 2004 and Madagascar 2016) or by governments.[11] It was also suggested that to build stronger institutions and support growth, countries should aim to achieve revenue gains of 0.5 percent of GDP per year.[12] Following the initial window, successive three-year windows (including the second and third years of the previous window) for which this criterion continues to be satisfied are compounded into the same episode. The end-point of an episode is the last overlapping window fitting this criterion. From the sample of 136 countries over 2000-2015, we identify 172 episodes that fit this criterion. Of those, 61/30 are observed in non-RR/RR EMs, and 65/16 in non-RR/RR LICs. Episodes are thus relatively evenly spread over the two income groups. The RR results are robust to using non-oil GDP as the denominator rather than nominal GDP. In Section V, when we analyze the underlying policy choices, we narrow the 172 episodes down to those with more tangible tax revenue mobilization results using two additional episode qualifiers.

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[10] See Fedelino et al. (2009) for a derivation of the cyclically adjusted revenue ratio: $R^{CA} = R*(Y^p/Y)^{\varepsilon_R}$, where R^{CA} is cyclically adjusted revenue, Y^p and Y are potential and total output, and ε_R is the elasticity of revenue to output. It should be noted that with an assumed revenue elasticity to GDP of one, the ratio of cyclically adjusted tax revenue-to-trend GDP is equivalent to the ratio of tax revenue to GDP.

[11] The average country standard error for year-over-year revenue changes is 0.33 percent of GDP in non-RR countries. The average country standard error for year-over-year non-commodity revenue less grants changes is 0.44 percent of GDP in RR countries.

[12] In the recent G20 Compact Initiative with Africa, Lagarde (2017) noted that given the increased attention to build stronger institutions and improve growth outcomes, "there is no reason why countries should not aspire to achieving revenue gains of half a percent of GDP each year."

B. Main Characteristics of Tax Revenue Mobilization Episodes

We begin with a general characterization of all episodes during which large tax revenue increases were observed.

Duration of episodes. Figure 6 plots the length of the identified episodes. The average episode duration is 3.5 years in RR countries and 3.4 years in non-RR countries, with a median duration of 3 years across all countries. Episodes can also be shorter than three years if the entire 1.5 percent increase (or more) occurred within one or two years only. Indeed, 16 percent of episodes lasted only one year. Notably, 23 percent of the identified episodes lasted for longer than 5 years, implying that some countries registered a sustained increase over a significantly longer period.

Figure 6. Episode Duration
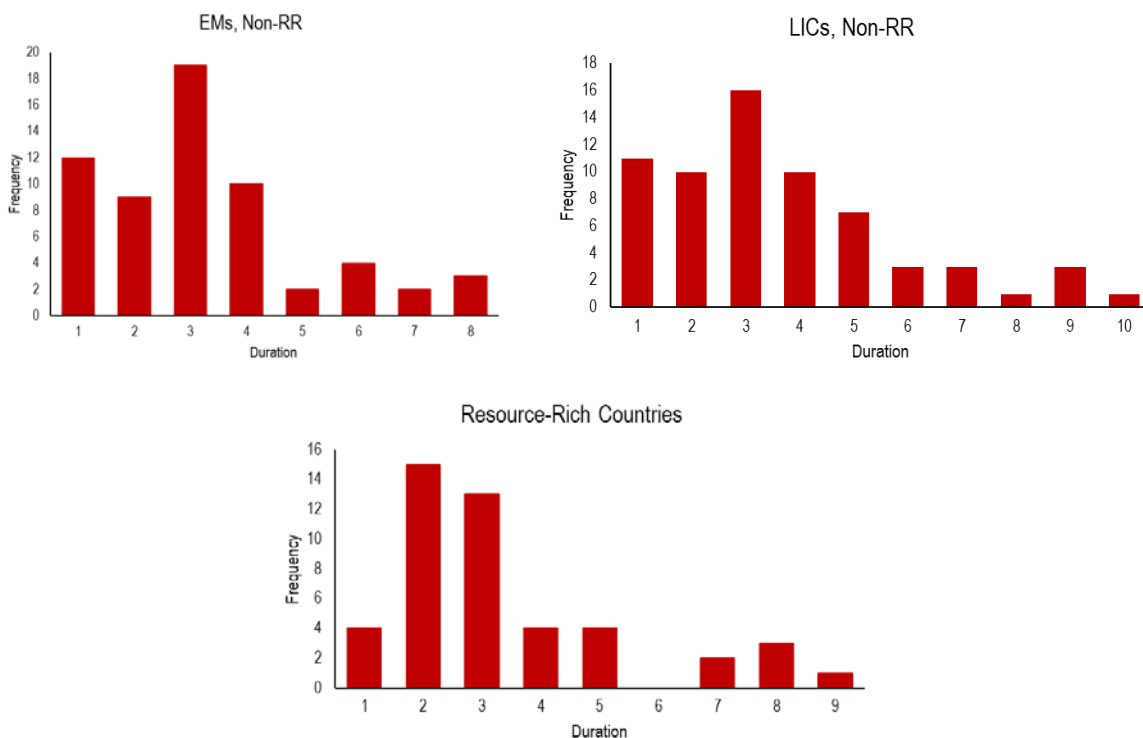
Note: Episodes are defined as 3-year compounded windows of an average increase of 0.5 percent per year or more. The first episode is triggered by the first 3-year window in which the tax-to-GDP ratio increases by an average of at least 0.5 percent per year (1.5 percent within three years).
Sources: WoRLD, WEO, and IMF staff estimates.

Initial tax ratios: Episodes of tax revenue mobilization occurred with both low and high initial tax-to-GDP ratios (Figure 7). Figure 7 presents the initial tax ratio also in relation to the "tipping point" of tax revenue, around 13 percent of GDP, after which countries tend to experience higher and sustained economic growth, as defined in Gaspar et al. (2016a) and Gaspar et al. (2016b). For

LICs and RR countries, most large increases began while the tax-to-GDP/non-commodity revenue-to-GDP ratio was below 15 percent. For example, while not sustained, Afghanistan increased its tax-to-GDP ratio by 3.3 percent within two years, from an initial ratio of 5.6 percent. Liberia increased its tax-to-GDP ratio significantly from a level of 11.4 percent to above 16 percent within two years and succeeded in sustaining the increase. EMs frequently registered larger increases starting beyond a ratio of 15 percent, which reflects the higher average tax ratios in these countries. It thus seems that revenue mobilization can be achieved from a wide range of initial revenue ratios, although it is more frequently observed from a lower starting point.

Figure 7. Initial Revenue Ratios at the Onset of Successful Revenue Mobilization
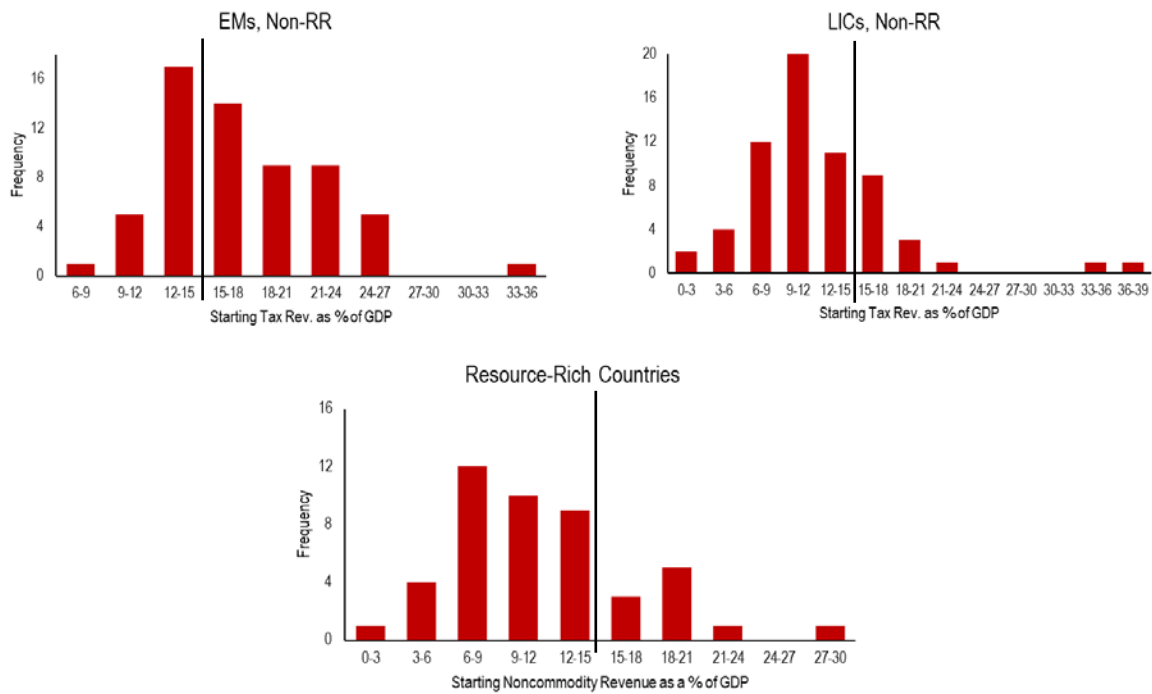
Note: Vertical lines represent the "tipping point" of tax revenue to GDP in Gaspar et al. (2016a) and Gaspar et al. (2016b), which finds that countries which achieve a tax-to-GDP rate of at least 12.75 experience sustained economic growth. Even past this tipping point, the data displays room from improvement.
Sources: WoRLD, WEO, and IMF staff estimates.

Sustainability of end-of-episode tax ratios: Sustainability of the achieved revenue gain is a crucial element of any tax reform. Figure 8 shows that revenue increases were sustained/increased in slightly less than one third of the cases, while it fell by up to one third of the initial tax revenue increase in close to one third of the cases. In more than one third of the cases the gains were not sustained, which is especially the case in RR countries. In the majority of cases, the decline in tax revenue at the end of the episode was explained by macroeconomic shocks (internal or external, above all the global financial crisis) and/or revenue-reducing policy

Figure 8. Short-Term Sustainability of Revenue Increase
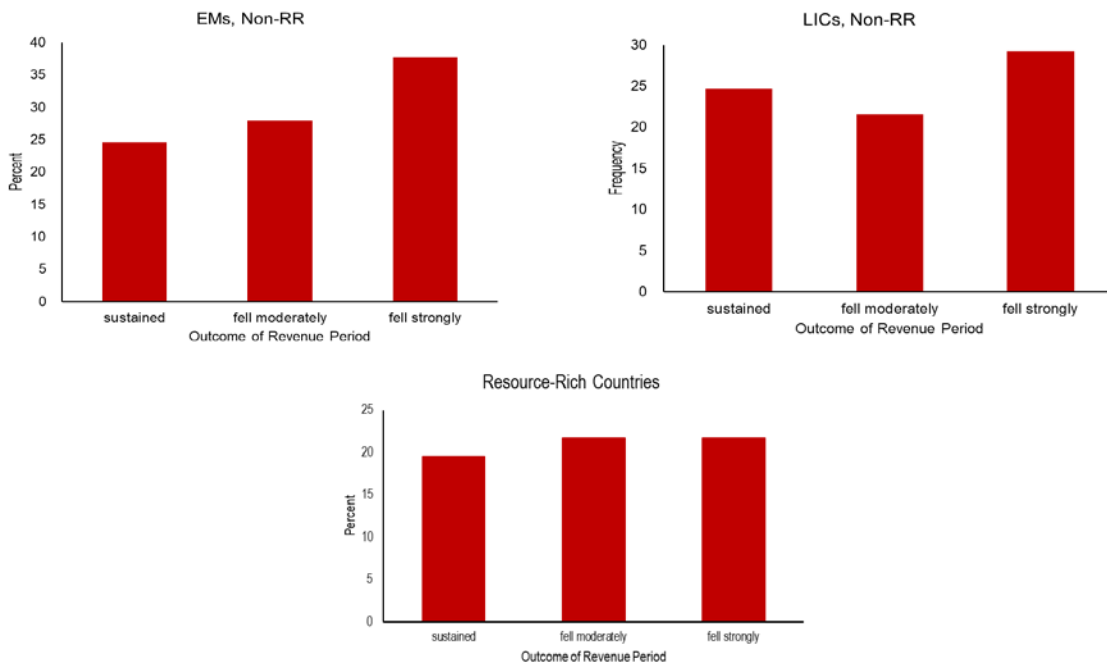
Notes: Sustained indicates that revenue increased or stayed the same for at least three years after the revenue period ended (two years for episodes ending in 2015). Fell moderately indicates revenue fell by less than one third of the overall increase. Fell strongly indicates a fall of more than one third of the overall increase.

Sources: WoRLD, WEO, and IMF staff estimates.

measures.[13] For example, Moldova's tax revenue fell by about 1.3 percent in 2008 following a deep recession caused by the global financial crisis (GFC). In Antigua and Barbuda, and Dominica, the effects from the GFC were emphasized by a granted temporary tax relief and a reduction in personal income tax rates.

C. Robustness: "Top Revenue Performers" Based on Income Levels

Some of the above tax-to-GDP increases might have been driven by temporary economic or structural factors, rather than underlying revenue administration or tax policy changes. To complement the in-depth analysis of tax policy and revenue administration measures by controlling for GDP and output, we employ a second strategy for all countries, following von Haldenwang and Ivanyna (2012). This strategy relates countries' tax-to-GDP ratios to their development levels, as measured by their GDP per capita. Since the relationship likely varies

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[13] This inference is made based on country reports and policy documents of the post-revenue mobilization periods of the in-depth analyzed country cases (presented in Section V).

across income groups, we split the analysis in line with the income categories used in the previous sections.[14]

For each income group (LICs and EMs, excluding RR economies) we regress the 2015 tax-to-GDP ratio on logged GDP per capita. We then categorize the countries into four groups: (i) "High tax performers" – countries lie above the 85th percentile of the trend line (fitted values); (ii) "Good tax performers" – countries are within the 50th and 85th percentiles; (iii) "Low tax performers" – countries fall within the 15th and 50th percentiles; and (iv) "Poor tax performers" – countries below the 15th percentile. We then plot the 2009 tax-to-GDP ratio/logged GDP per capita combinations against the 2015 categories to examine if there have been changes over time.

Between 2009 and 2015, some countries have experienced significant changes in their tax performance, and moved categories in an upward direction (Figure 9)**.** Overall, 18 out of 79 countries registered an improvement. The Maldives jumped two categories, from poor to good collection relative to peers. Of those 18 identified cases, all except for six (Albania, Bahamas, Jamaica, Philippines, Senegal, and Turkey) were also identified under the main identification strategy. The method is robust to varying the baseline years of the analysis. This strategy complements the first strategy as it takes a longer view and moves away from the across-the-board criterion regardless of the level of development. For instance, some countries may have fallen slightly short of the 0.5 percentage point improvement in their tax-to-GDP ratios in three consecutive years, but may still have consistently improved their ratios relative to their peers at the same level of development. These cases deserve consideration as "top tax performers" and may yield valuable lessons for countries struggling to improve their tax ratios. We add the six countries that were not in the original sample to the in-depth analysis to capture all countries that improved their tax performance.[15]

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[14] See, for example, Tanzi (1992); Burgess and Stern (1993); Teera and Hudson (2004); Clist and Morrissey (2011).

[15] Albania was excluded from further analysis (and appendices III-V) because policy documents and country reports did not provide any evidence that the tax revenue increase resulted from tax policy or revenue administration reforms.

Figure 9. Comparison of Tax Revenue to GDP per Capita Performance Matrix, 2009 vs. 2015
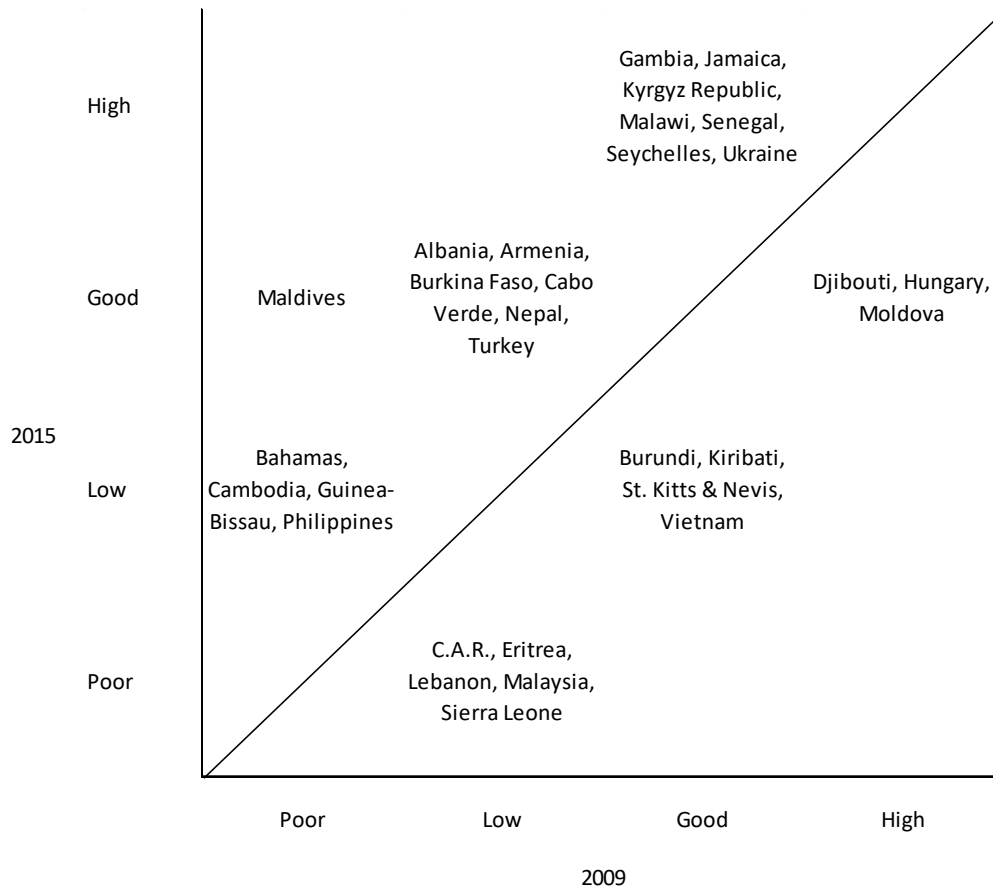
Notes: Comparisons made to line of best fit based on 2015 values by country group. The residual from the 2015 line of best fit is compared to the percentile. Below the 15th percentile is classified as "Poor", between the 15th and 50th percentile is "Low", from 50th to 85th is "Good" and above 85th is "High."
Source: IMF staff estimates.

V. TAX POLICY AND ADMINISTRATION REFORMS BEHIND REVENUE MOBILIZATION

For the countries and episodes identified above, we conduct a country-by-country in-depth policy analysis to identify the discretionary tax revenue measures that have been implemented during the episodes. We cannot infer causality, as several other factors, such as the sectoral composition of output, foreign aid and investment, external debt, and various political-institutional indicators would need to be controlled for to establish causality, which is beyond the scope of this paper. An ideal control group of identical countries that did not implement such measures is also, of course, not available. To focus on countries with more tangible tax revenue mobilization results, we limit the 172 episodes from the first identification method to: (i) countries that have increased their tax-to-GDP ratios by a minimum of 0.5 percent each year for at least 3 consecutive years (48 cases); and (ii) countries with beyond average tax

increases (72 cases),[16] with 19 cases overlapping between the two methods. In addition, we add the 6 countries from the robustness analysis that are not identified under those two methods, giving a total of 107 countries subject to in-depth analysis. The analysis rests on information provided in published country reports (for instance IMF staff reports), internal IMF technical assistance reports, and expertise of IMF staff.

The in-depth analysis excludes instances of revenue changes primarily driven by exogenous economic factors or external shocks. For example, all four episodes identified in Lesotho and Swaziland were excluded, as the significant increase in tax revenues was linked primarily to the strong increase in Southern African Customs Union (SACU) revenues.

Overall, we find evidence of underlying revenue administration and tax policy measures that coincide with the observed tax revenue increase in 55 out of 107 studied cases. Table 1 presents details of the episodes as well as the main identified measures. This main table is accompanied by several appendices providing more information: Appendix III details the strategies under which the respective analyzed episodes have been identified, which are baseline identifications (i) and (ii), as well as the robustness analysis;[17] Appendix IV provides a table with further details on the tax policy measures, separating them into tax introductions, rate changes, threshold changes, and changes to exemptions; and Appendix V splits the revenue administration measures into eight categories. The descriptive dataset, released in parallel to this paper, includes a short description of revenue administration and tax policy measures corresponding to each of these episodes.[18]

The findings below indicate that successful revenue mobilization is most frequently supported by a combination of: (i) rationalization of exemptions; (ii) implementation of or adjustments to a broad-based VAT and other goods and services taxes; (iii) rate changes to or introduction of excises on a few selected goods; (iv) strong revenue administration management and governance arrangements; and (v) improvements in core tax administration functions.

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[16] We determine "beyond average tax increase" cases in the following way: we plot the overall tax revenue increase against the duration of the episode; a line of best fit is used to separate cases of beyond average increase per episode length from below average increase per episode length.

[17] In the case of the Maldives, all three strategies apply, implying that between 2010 and 2015 the country achieved a significant tax revenue increase, which lasted for at least three subsequent years, and led to a shift from poor to good tax revenue performance.

[18] The dataset will be released in parallel to this paper, with the title "Dataset on Large Tax Revenue Mobilization in Low-Income Countries and Emerging Markets" (authors: Bernardin Akitoby, Anja Baum, Clay Hackney, Olamide Harrison, Keyra Primus, and Veronique Salins).
https://www.imf.org/~/media/Files/Publications/WP/2018/datasets/wp18234.ashx

Revenue administration measures underpinned revenue mobilization efforts in almost all the episodes and country cases, regardless of the income group and the range of tax policy measures (Table 1). Sometimes, revenue administration measures were prominent, and in a few cases the main reason for the revenue increase (Cambodia, Republic of Congo, Sierra Leone). In a few cases (St. Vincent & the Grenadines, Antigua & Barbuda, Barbados, Turkey, and Ecuador) no significant administrative measures could be identified.

Overall, most of the reforms are broadly consistent with IMF staff advice on tax policy and revenue administration.[19] This is in line with the observation that 58 percent of the analyzed episodes were accompanied by IMF programs (last column in Table 1). As outlined in Crivelli and Gupta (2014), IMF programs tend to have a positive effect on tax revenue, especially where revenue conditionality applies, and most strongly for LICs where the revenue ratios are below the group average. Crivelli and Gupta (2014) also find that stronger institutions (less perceived corruption) strengthen the positive impact of revenue conditionality.

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[19] While acknowledging that the timing, relative importance, and precise design of appropriate tax policy reform measures varies substantially, IMF (2011) provides an extensive review of the lessons learned on revenue mobilization in developing countries.

Table 1. Summary of Identified Episodes (continued)

Country	Period	Fragile State	Revenue in T-1[1]	Revenue Increase	Persisted (S/FM/FS)	PIT	CIT	General GST	VAT	Excise	Trade Taxes	Property	Subsidies	RA	Economic changes	IMF Program
Low Income Countries																
Afghanistan	2009-2010	1	5.6	3.3	FS			•						•		2006-09
Burkina Faso	2009-2013		11.8	4.4	FM		•	•	•	•		•		•	•	2007-16
Burundi	2009-2011	1	12.0	2.2	FS				•	•				•		2008-15
Cabo Verde	2004-2007		17.8	3.4	FS			•	•		•			•	•	2002-04/ 2006-09
Cambodia	2012-2015		10.3	4.0	-									•		-
Central African Republic	2008-2010	1	7.3	1.9	FS				•	•	•		•	•		2006-09
Comoros	2001-2003	1	9.1	4.6	FS		•	•		•	•		•	•	•	-
Dominica	2004-2006		20.9	4.3	FM				•	•				•		2002-06
Gambia, The	2006-2007		12.7	2.8	FS			•		•	•			•	•	-
Gambia, The	2011-2015		12.6	5.1	-	•	•	•	•	•			•	•		2012-15
Guinea-Bissau	2009-2015	1	5.4	3.7	-					•				•	•	2010-13
Kyrgyz Republic	2004-2007		14.2	4.5	FM	•	•		•	•				•		2005-08
Kyrgyz Republic	2011-2012		18.2	3.2	FM		•	•	•					•	•	2008-14
Lao P.D.R	2007-2009		10.1	3.0	S					•				•		-
Liberia	2006-2007	1	11.4	4.9	S			•		•				•		-
Liberia	2009-2012	1	16.3	4.6	FM	•	•	•		•				•	•	2008-15
Malawi	2012-2014	1	14.5	2.4	-								•	•		2010-15
Maldives	2011-2015		10.0	14.6	-		•	•		•				•		2009-12
Moldova	2003-2006		18.5	4.9	FS	•	•		•					•		-
Nepal	2007-2010	1	8.9	4.0	S				•	•	•	•		•	•	-
Nicaragua	2002-2006		10.7	5.1	FM				•	•				•	•	2002-05
Rwanda	2010-2014		12.1	3.0	-	•		•		•	•			•		2010-16
St. Vincent & the Grenadines	2005-2008		19.3	4.2	FS			•		•	•			•		-
Senegal	2010-2015		18.0	1.8	-	•			•	•		•		•		2007-13
Sierra Leone	2010-2011	1	8.3	3.1	FS									•		2006-13
Solomon Islands	2002-2013	1	10.9	20.7	-				•	•				•	•	2010-15
Solomon Islands (subinterval)	2003-2004	1	11.6	5.5	S									•	•	-
Solomon Islands (subinterval)	2007-2008	1	18.6	6.0	S				•	•				•	•	-
Solomon Islands (subinterval)	2009-2010	1	24.5	5.8	S				•	•				•	•	2010-15
Tonga	2005-2006		18.8	2.9	FS			•						•		-
Tuvalu	2013	1	15.0	4.0	-				•					•	•	-
Uganda	2013-2015		10.5	2.5	-	•			•	•				•		2010-16

Summary of Identified Episodes (end)

Country	Period	Fragile State	Revenue in T-1 [1]	Revenue Increase	Persisted (S/FM/FS)	PIT	CIT	General GST	VAT	Excise	Trade Taxes	Property	Subsidies	RA	Economic changes	IMF Program
Emerging Markets																
Antigua & Barbuda	2006-2007		16.5	3.0	FM	●		●							●	-
Armenia	2013-2014		16.8	4.0	-	●	●			●		●		●		2010-17
Bahamas	2015		14.6	1.5	-				●	●	●	●		●		-
Barbados	2010-2011		24.8	1.5	FS				●	●						-
Belize	2013-2014		22.2	2.6	-			●		●				●		-
Bosnia & Herzegovina	2005-2006	1	21.3	4.1	FS			●	●					●		2002-03
Bulgaria	2003-2006		19.3	3.6	FS	●	●			●				●		2004-06
Georgia	2004-2008		11.9	12.3	S	●	●			●	●	●		●	●	2004-10
Jamaica	2012-2015		23.5	2.1	-	●	●	●	●	●	●			●		2010-17
Morocco	2004-2008		18.7	7.7	FS	●	●		●					●	●	-
Namibia	2005-2007		23.1	6.2	FS				●				●	●		-
Paraguay	2003-2005		8.2	2.6	FM		●		●	●				●		2003-05
Philippines	2010-2015		13.4	1.6	-		●			●				●		-
Seychelles	2002-2003		24.8	6.9	FS	●	●							●		-
Seychelles	2008-2011		21.4	10.1	FM	●	●	●	●	●	●		●	●		2008-10
Turkey	2009-2013		18.0	3.2	-					●	●				●	2005-08
Ukraine	2005-2006		19.5	5.5	S		●		●	●				●		2004-05
Uruguay	2003-2006		16.7	3.4	FM					●				●	●	2002-08
Low Income Countries - Resource-Rich Economies																
Congo, Republic of	2011-2015	1	7.7	9.7	-									●	●	2008-11
Guinea	2007-2009	1	9.9	3.1	S					●				●		2007-10
Guinea	2011-2012	1	11.7	4.3	FM	●								●		-
Guyana	2004-2010		10.8	10.1	S	●	●	●	●	●				●	●	-
Guyana	2014-2015		21.2	3.9	-				●					●		-
Mauritania	2010-2013		17.5	3.0	-	●	●			●				●	●	2006-13
Emerging Markets - Resource-Rich Economies																
Algeria	2008-2011		9.5	3.0	S		●		●					●		-
Ecuador	2010-2014		21.5	6.1	-		●								●	-

Notes: Bullets indicate that a specific measure was adjusted during the revenue mobilization period. The column "Economic changes" indicates that economic growth occurred during the period, which might have contributed to tax revenue increases. However, none of the cases presented above can be wholly explained by favorable economic conditions alone. Persisted categories are: S - Sustained; FM - Fell moderately; and FS - Fell strongly; Sustained indicates that revenue increased or stayed the same for at least three years after the revenue period ended; FM indicates revenue fell by less than one third of the overall increase; FS indicates a fall of more than one third of the overall increase. RA – Revenue administration. Revenue for non-resource rich economies is tax revenue as a percent of GDP. For resource rich countries, noncommodity revenue less grants as a percent of GDP is used.
Source: IMF staff estimates.

A. Key Findings – Tax Policy Measures

Large tax revenue increases often coincide with higher collection of revenue from indirect taxation. Figure 10 shows the frequency of the different tax policy measures, presented as the ratio of the observations in a specific category to total identified tax policy measures. Changes to indirect taxation make up more than 56 percent of all discretionary tax policy changes. This result mirrors the overall increase in indirect tax ratios in both LICs and EMs. Changes to income taxes account for another 26 percent.

Countries rely on a wide range of tax policy instruments in their revenue mobilization reforms. As can be seen in Figure 11, most of the country-episodes used multiple tax instruments ("0" tax policy instruments indicate revenue administration was the primary reform-driver). For example, Belize, 2013-2014 (GST and excise taxes), Kyrgyz Republic, 2011-12 (CIT, VAT, excises, and other GST), and Seychelles, 2008-11 (PIT, CIT, VAT, excises, other GST, trade taxes and subsidies) all used two or more tools in parallel.

Rate changes and reduction of exemptions are leading the tax policy mix. We split the tax policy measures into tax introductions ("new taxes"), rate changes (positive or negative), threshold changes (increases or reductions) and changes to exemptions, the latter two falling under base broadening. Appendix IV provides a detailed breakdown per country, summarized in Table 2 and Figure 12. Rate changes are most common (85 out of 187 observations, excluding subsidies), driven by those to excise taxation. Reductions in exemptions, above all to VAT, CIT, and other goods and services taxes, are the second most frequent tax policy tool to mobilize revenue. Threshold changes are not common during the identified episodes.

Rate increases are observed primarily for indirect taxes, while rate changes to PIT and CIT were primarily negative (Table 2). 7 out of 10 rate changes were negative for both PIT and CIT during the identified episodes (see also Appendix IV), partly aimed at stimulating economic activity, and primarily following international trends, especially for CIT rates. Often, these reductions were balanced by tax increases in indirect tax categories (for example in The Gambia, Liberia, and Seychelles). Similarly, half of the identified 8 threshold adjustments were increases (positive direction in Table 2). The impact from threshold reductions is not necessarily positive, and changes are often aimed at re-distributional and efficiency concerns rather than revenue mobilization.

Broadening the tax base, which has sometimes involved reducing the number of tax rates, was frequently part of revenue mobilization strategies. For example, Georgia simplified the tax system by reducing the number of taxes to be paid from 21 to 7. Targeting the tax base more directly, Morocco reduced the number of VAT special regimes, Jamaica introduced VAT to residential electricity consumption, and Seychelles converted the narrowly applied 7 percent GST into a broad-based 12 percent GST.

Figure 10. Frequency of Tax Policy Instruments (in percent)
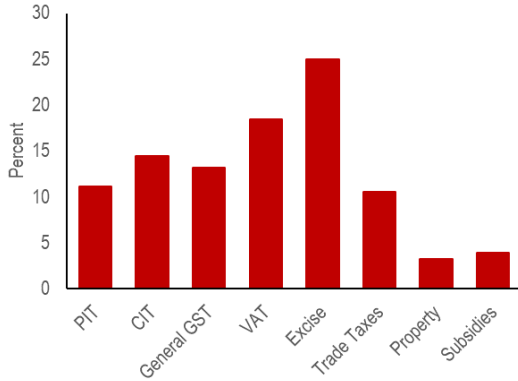
Note: Ratio of observations in a specific category to total identified discretionary measures.
Source: IMF staff estimates.

Figure 11. Number of Tax Policy Instruments Used Per Episode
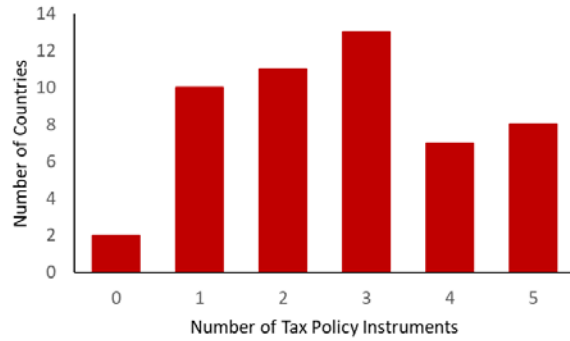
Source: IMF staff estimates.

Table 2. Introductions, Rate and Base Changes

Tax	Measure	Observations	Positive Change	Negative Change
PIT	New	5	5	0
	Rate	10	4	7
	Threshold	2	2	0
	Exemptions	4	4	0
CIT	New	5	5	0
	Rate	10	3	8
	Threshold	1	0	1
	Exemptions	11	11	0
General GST	New	8	8	0
	Rate	9	8	1
	Threshold	1	0	1
	Exemptions	11	11	0
VAT	New	10	10	0
	Rate	6	3	3
	Threshold	4	2	2
	Exemptions	16	16	0
Trade	Rate	13	13	6
	Exemptions	7	7	0
Excise	New	6	6	0
	Rate	35	34	5
	Exemptions	7	7	0
Property	New	3	3	0
	Rate	2	1	2

Note: General GST (sales taxes) excludes VAT and excise tax. Positive rate and threshold changes describe an increase in the tax rate or threshold value, respectively. Columns add up to more than one if positive and negative adjustments were made in the same episode.
Source: IMF staff estimates.

Figure 12. Frequency of Introductions, Rate and Base Changes
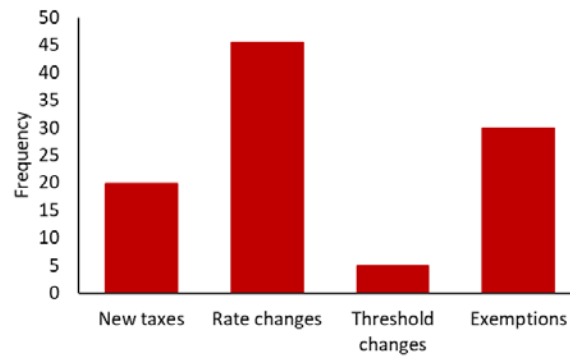
Source: IMF staff estimates.

Curbing tax exemptions was a prominent measure. In more than half of the country episodes, various exemptions were eliminated, most frequently related to VAT, general GST, and CIT. Specific measures include reducing statutory and discretionary exemptions (for example in Guyana and Solomon Islands); ending tax holidays (Burkina Faso); ending CIT exemptions (Mauritania); and eliminating VAT exemptions (Uganda).

VAT and other general goods and services taxation (sales taxes) were a common measure for revenue mobilization. In some cases, it was observed that substantial increases in tax revenue resulted from the introduction of VAT (Bahamas, Bosnia and Herzegovina, Dominica, The Gambia, and Guyana), and after rate hikes (for example Barbados and Tuvalu). In 48 percent of episodes, changes to VAT (introduction, rate changes, thresholds or exemptions) were an element of the revenue mobilization strategy, and 29 percent of episodes made use of changes to other general goods and services taxation.

Increases in excise taxation were frequently applied. Excises are easy to implement and often used for immediate revenue needs or to balance revenue shortfalls from other reforms. In our sample, higher excise taxes were often levied on fuels, tobacco, alcoholic and non-alcoholic drinks, and cars. In other cases, increases in excise taxes were imposed on the telecom sector (for instance, Guyana and The Gambia). Changes to excises often accompanied other tax changes and did not generate large tax revenue changes by themselves.[20]

Taxing sector-specific domestic economic rents (e.g., tourism, telecom, oil), while less frequent, helped some countries to boost tax revenue. This strategy targets sectors in which profits have an element of location-specificity that can imply high potential for revenue mobilization. Examples include the Maldives (tourism sector), and Malawi and Rwanda (telecom).

Property taxation, and the reduction of subsidies were least frequently observed. Property taxation has not been a common tool to mobilize revenue, being observed in only 3 percent of cases, likely because it has not been broadly implemented in many developing countries. Similarly, legal loopholes (for instance, the absence of cadaster to define property rights) and weak tax administration capacity could limit its application as a policy tool, especially at the local level to which it is often allocated. At 4 percent of observations, the reduction of subsidies was infrequent, but demonstrates revenue raising potential from targeting inefficient subsidies.

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[20] Excise tax rates are sometimes adjusted for inflation to maintain the revenue share of excises. The database identifies rate changes beyond those that result from automatic indexation.

B. Key Findings – Revenue Administration Measures

The analysis identifies several RA measures that were implemented during the tax reform periods. Given the difficulty of measuring the impact of revenue administration measures, which often impact multiple revenue sources, this paper does equally not attempt to quantify their impact on tax collection, nor to empirically establish a causal link between such measures and the outcome.[21] Based on international experiences, however, it is broadly accepted that tax administration measures that facilitate and enforce tax compliance will help reduce the tax gap and thereby increase the tax yield (Brondolo et al. 2008).[22] With this understanding, we highlight key revenue administrative measures which were implemented during the reform periods (when tax collection increased significantly).

Revenue administration measures have been used widely across many episodes. As shown in Table 1, Figure 13, and Appendix V, revenue administration measures were common in almost all (90 percent) of the episodes, regardless of a country's income group and the range of tax policy measures. In some cases (for example Sierra Leone and Republic of Congo), the authorities focused only on administrative measures during the tax reform period.

Steps to improve audits and other verification measures were undertaken in most countries that achieved an increase in tax revenue. 89 percent of the episodes that involved an improvement in revenue administration targeted changes in audits and verification programs (Figure 13), with a focus on administering audits, combatting tax evasion and reducing corruption. Evidence has shown that strengthening the auditing and enforcement capacity remains crucial for effective tax collection in developing countries (Carrillo et al. 2017). The findings in this study show that improvements in tax revenue collection in Georgia and Guinea coincided with intensified tax and customs audits.

Many countries focused on strengthening management, governance, and human resources (HR) to enhance their tax performance. Hiring more qualified staff, strategic planning and monitoring performance, focusing on training and development to strengthen technical skills of staff at tax and customs offices, and strengthening tax legislation to empower revenue collection agencies were commonly used measures (77 percent of the episodes). In some cases, their tax-to-GDP ratios increased following the setting up and empowering of a semi-autonomous revenue authority (e.g., Jamaica). This result is supported by Ebeke et al. (2016), who find that semi-autonomous revenue agencies have on average had a large and positive effect on non-resource taxes. However, establishing semi-autonomous agencies alone will not guarantee a

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[21] It is difficult to isolate the influence of the inputs from the many other factors that can affect the outcomes (Crandall, 2010).
[22] Quantitative analysis presented in Brondolo et al. (2008) showed that a reduction in the tax gap led to an increase in tax revenue in Indonesia.

revenue impact, especially if capacity and staffing are insufficient (see also Kidd and Crandall, 2006).

Figure 13. Revenue Administration Measures
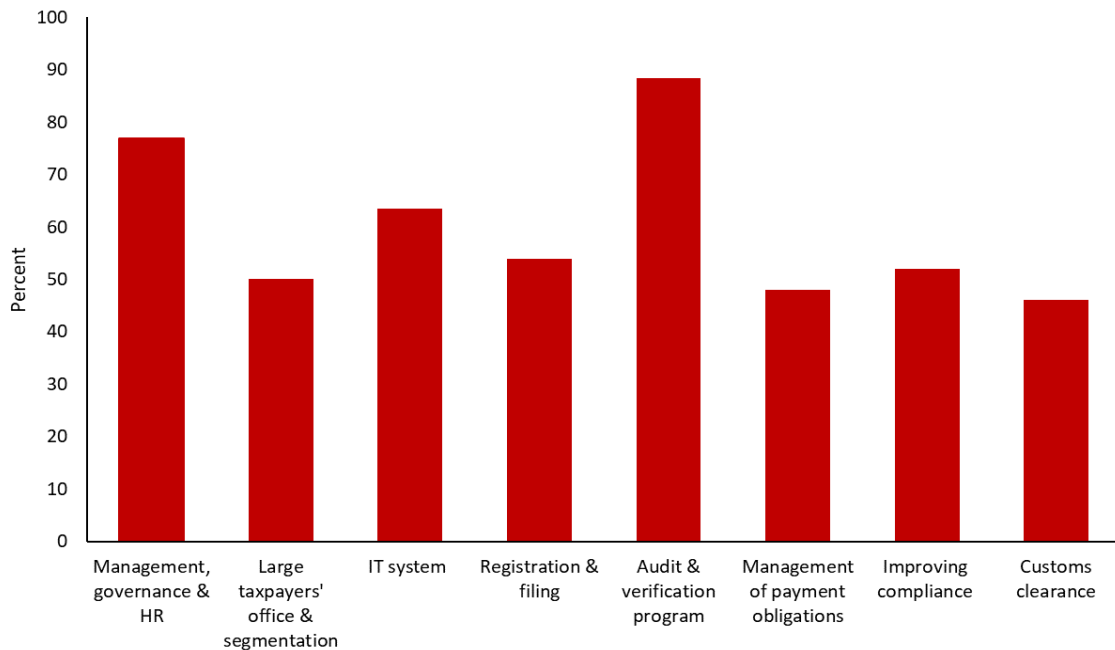
Source: IMF staff estimates.

In more than half of the episodes improvements in information technology (IT) systems provided support for core revenue administration processes. In these cases (for example in Burkina Faso, Tonga, Guinea-Bissau, and Uruguay), tax collection increased following the implementation of an IT strategic plan, the enhancement of the IT system, the computerization of tax and customs administration to support tax payments, and filing and use of third-party information. Russell (2010) noted that IT is important to build capacity in core tax administration functions, such as registration, filing and payment enforcement, and it supports compliance management. Also, the introduction of an electronic system could support tax collections by accelerating the processing of tax payments. However, as noted in IMF (2015), despite significant investment into IT, many developing countries still struggle with successfully automating basic compliance operations, and IT improvements will need to go hand in hand with advances in other administrative procedures to be fully beneficial.

Several countries employed measures to strengthen the registration process and improve filing. Improvements in tax revenue were supported by an increase in the number of registered taxpayers (Central African Republic), and in some cases re-registering taxpayers (Georgia,

Guinea-Bissau). Several countries focused on ensuring timely filing and payment of taxes, and enforcing sanctions for failure to file.

Several countries improved voluntary compliance and strengthened the customs clearance process during the tax reform period. For instance, in Tonga, the increase in revenue coincided with strengthening tax compliance and reorganizing the one-stop shop for customs tariff payments. Guinea-Bissau strengthened customs administration by improving cross-border controls.

Some countries improved the management of payment obligations and strengthened segmentation (often focusing on large taxpayers). Developing a policy to limit, manage, and recover tax arrears contributed positively to tax revenue performance in several countries (Burundi, Comoros, Dominica). Some countries implemented a large taxpayer unit (LTU) (Cabo Verde, Uruguay) and strengthened management of large taxpayers to ensure timely filing and payment of taxes. Large taxpayers can account for as much as 80 percent of all tax revenue, therefore strengthening procedures targeted at them is seen as a critical reform step.[23]

Countries often relied on an array of revenue administration instruments in their mobilization efforts. Most of the revenue administration measures are interlinked and closely associated, therefore a more comprehensive approach with multiple revenue administration instruments could enhance the results if they are successfully implemented. In more than 30 percent of the country-episodes, 4-5 elements of revenue administration were addressed in parallel (Figure 14). For example, in Paraguay the authorities streamlined the auditing and collection process, improved the efficiency of the customs clearance process, and adopted measures to reduce corruption. The anti-corruption driven revenue mobilization strategy in Georgia (2003-2008) also benefitted from a range of administrative measures, including the mass-replacement and training of staff, strengthening of legal procedures for tax disputes, upgrading of IT, simplifying of tax returns and improvement of audits (Akitoby 2018 and Akitoby et al. 2018a).[24]

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[23] Empirical studies, however, find somewhat mixed results on the impact of LTUs. Baum et al. (2017) find evidence of a positive impact of the establishment of LTUs on revenue performance, whereas, in Sub-Saharan Africa, Ebeke et al. 2016 find that the existence of LTUs did not have a significant impact on tax revenue.

[24] See also the IMF SDN (2016) and IMF Board Paper (2018) for detailed discussions on the link between fiscal institutions and corruption, and evidence showing that revenue reforms can have positive effects in reducing corruption.

Figure 14. Number of Revenue Administration Instruments Used
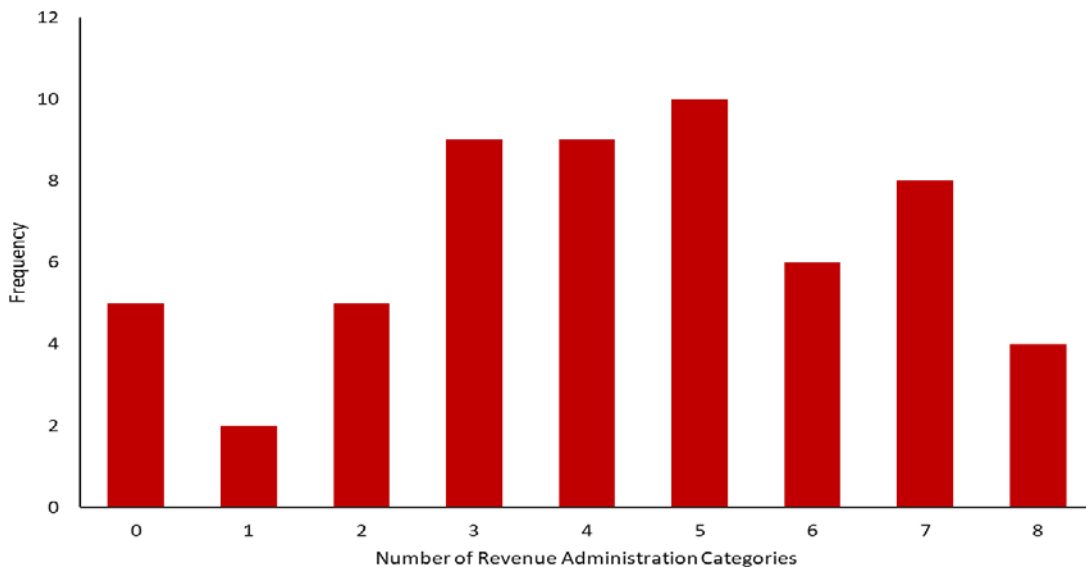
Source: IMF staff estimates.

In some cases, the initial success following tax policy measures was eroded in the absence of sustained reform efforts for revenue administration. For example, Antigua and Barbuda increased its tax-to-GDP ratio temporarily, helped by the introduction of a sales tax. However, most of the other tax categories declined during this time, amid limited improvements in tax and customs administration. Similarly, in The Gambia, the introduction of VAT was a positive contribution to revenue performance, but the limited capacity to enforce compliance caused VAT and other tax revenue growth to slow down, especially between 2015 and 2016. In general, almost all of the countries that sustained the increase have undertaken reforms to revenue administration, often in combination with other measures (see Table 1 and Appendix V).

VI. CONCLUSIONS

This study provides an assessment of large tax revenue increases in LICs and EMs. The paper identifies and takes stock of reform episodes marked by such increases, describing the main tax policy and revenue administration measures undertaken, without inferring causality. The analysis shows that, despite the challenges that some countries have in enhancing their tax performance, significant increases in tax revenue are achievable and, in some cases, within reach over relatively short periods of time. A few common observations emerge from the country cases:

- Sustained and large revenue gains are usually accompanied by a comprehensive strategy that interlinks tax policy reforms *and* revenue administration reforms. In other

words, what and whom to tax will go hand in hand with how to go about collecting these taxes. Combining several tax instruments (e.g., increasing the VAT rate and reducing the PIT rate; reducing VAT rates while broadening the tax base by lowering exemptions) was observed to be the norm. In only a few cases, revenue administrative and tax policy measures where not used in combination during the revenue mobilization episode.

- Rate increases in indirect taxation and broadening the tax base for both direct and indirect taxation were the most frequently observed tax policy instruments. Rate increases in especially excises and GST were most common, followed by the elimination of exemptions and tax holidays. In some episodes the system of taxation was simplified, for example by reducing the number of taxes to be paid or by introducing a broad-based VAT. Property taxes have played a limited role during the identified episodes in both LICs and EMs, likely due to legal loopholes (for instance, the absence of cadaster to define property rights) and weak tax administration capacity, especially at the local level.

- Capacity enhancing measures in revenue administration were most frequently observed in risked-based audits, management, governance and human resource strategies, as well as through enhancements to the IT system.

Future research could use and extend the revenue dataset presented and used here, to: (i) similarly analyze episodes of tax reform failures to draw conclusions on the likelihood of certain measures being (or not) associated with increased revenue, (ii) inform the discussion on the relative importance of revenue administration versus tax policy changes, as well as measures within the two categories; (iii) explore if there are any systematic differences in revenue mobilization and its sustainability between IMF program and non-program countries, as well as the impact of IMF and other donors' technical assistance; and (iv) analyze the drivers of sustainability, such as the role of international assistance or growth acceleration (see for example, Hausmann et al. 2004).

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Appendix I. Country Classification[25]
Table AI.1. Development Classification

Low Income Country (LIC): 65		Emerging Market (EM): 71		Resource Rich: 35	Fragile: 31
Afghanistan	Marshall Islands	Albania	Lebanon	Algeria	Afghanistan
Bangladesh	Mauritania	Algeria	Macedonia, FYR	Angola	Angola
Benin	Micronesia	Angola	Malaysia	Bahrain	Bosnia & Herzegovina
Bhutan	Moldova	Antigua & Barbuda	Mauritius	Bolivia	Burundi
Burkina Faso	Myanmar	Argentina	Morocco	Botswana	Central African Republic
Burundi	Nepal	Armenia	Namibia	Cameroon	Chad
Cabo Verde	Nicaragua	Bahamas	Nigeria	Chad	Comoros
Cambodia	Niger	Bahrain	Oman	Congo, Republic of	Congo, Republic of
Cameroon	Papua New Guinea	Barbados	Pakistan	Côte d'Ivoire	Côte d'Ivoire
Central African Republic	Rwanda	Belarus	Palau	Ecuador	Eritrea
Chad	Samoa	Belize	Panama	Gabon	Guinea
Comoros	St. Lucia	Bolivia	Paraguay	Ghana	Guinea-Bissau
Congo, Republic of	St. Vincent & the Grenadines	Bosnia & Herzegovina	Peru	Guinea	Haiti
Côte d'Ivoire	São Tomé & Príncipe	Botswana	Philippines	Guyana	Iraq
Djibouti	Senegal	Brazil	Poland	Indonesia	Kiribati
Dominica	Sierra Leone	Bulgaria	Qatar	Iran	Liberia
Eritrea	Solomon Islands	China	Romania	Iraq	Madagascar
Ethiopia	Sudan	Costa Rica	Russia	Kazakhstan	Malawi
Gambia, The	Tajikistan	Croatia	St. Kitts & Nevis	Kuwait	Mali
Ghana	Tanzania	Dominican Republic	Saudi Arabia	Mali	Marshall Islands
Grenada	Togo	Ecuador	Serbia	Mauritania	Micronesia
Guinea	Tonga	Egypt	Seychelles	Nigeria	Myanmar
Guinea-Bissau	Tuvalu	El Salvador	Sri Lanka	Oman	Nepal
Guyana	Uganda	Fiji	Suriname	Papua New Guinea	São Tomé & Príncipe
Haiti	Uzbekistan	Gabon	Swaziland	Peru	Sierra Leone
Honduras	Vanuatu	Georgia	Thailand	Qatar	Solomon Islands
Kenya	Yemen	Guatemala	Trinidad & Tobago	Russia	Sudan
Kiribati	Zambia	Hungary	Tunisia	Saudi Arabia	Togo
Kyrgyz Republic	Zimbabwe	India	Turkey	Sudan	Tuvalu
Lao P.D.R.		Indonesia	Turkmenistan	Suriname	Yemen
Lesotho		Iran	Ukraine	Trinidad & Tobago	Zimbabwe
Liberia		Iraq	United Arab Emirates	United Arab Emirates	
Madagascar		Jamaica	Uruguay	Venezuela	
Malawi		Jordan	Venezuela	Yemen	
Maldives		Kazakhstan	Vietnam	Zambia	
Mali		Kuwait			

Sources: WEO, IMF Fiscal Monitor, and IMF (2017).

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[25] Country classification is reported only for those countries for which tax revenue data are available.

Table AI.2. Regional Classification

Africa (AFR): 40	Asian Pacific (APD): 26	Europe (EUR): 14	Middle East & Central Asia (MCD): 27	Western Hemisphere (WHD): 29
Angola	Bangladesh	Albania	Afghanistan	Antigua & Barbuda
Benin	Bhutan	Belarus	Algeria	Argentina
Botswana	Cambodia	Bosnia & Herzegovina	Armenia	Bahamas
Burkina Faso	China	Bulgaria	Bahrain	Barbados
Burundi	Fiji	Croatia	Djibouti	Belize
Cabo Verde	India	Hungary	Egypt	Bolivia
Cameroon	Indonesia	Macedonia, FYR	Georgia	Brazil
Central African Republic	Kiribati	Moldova	Iran	Costa Rica
Chad	Lao P.D.R.	Poland	Iraq	Dominica
Comoros	Malaysia	Romania	Jordan	Dominican Republic
Congo, Republic of	Maldives	Russia	Kazakhstan	Ecuador
Côte d'Ivoire	Marshall Islands	Serbia	Kuwait	El Salvador
Eritrea	Micronesia	Turkey	Kyrgyz Republic	Grenada
Ethiopia	Myanmar	Ukraine	Lebanon	Guatemala
Gabon	Nepal		Mauritania	Guyana
Gambia, The	Palau		Morocco	Haiti
Ghana	Papua New Guinea		Oman	Honduras
Guinea	Philippines		Pakistan	Jamaica
Guinea-Bissau	Samoa		Qatar	Nicaragua
Kenya	Solomon Islands		Saudi Arabia	Panama
Lesotho	Sri Lanka		Sudan	Paraguay
Liberia	Thailand		Tajikistan	Peru
Madagascar	Tonga		Tunisia	St. Kitts & Nevis
Malawi	Tuvalu		Turkmenistan	St. Lucia
Mali	Vanuatu		United Arab Emirates	St. Vincent & the Grenadines
Mauritius	Vietnam		Uzbekistan	Suriname
Namibia			Yemen	Trinidad & Tobago
Niger				Uruguay
Nigeria				Venezuela
Rwanda				
Senegal				
Seychelles				
Sierra Leone				
Swaziland				
São Tomé & Príncipe				
Tanzania				
Togo				
Uganda				
Zambia				
Zimbabwe				

Source: WEO.

Appendix II. Summary Statistics

Table AII.1. Summary Statistics, as a percent of GDP, 2000-2015

	Obs	Mean	Median	Std. Dev	Min	Max
Non-Resource Rich						
Emerging Markets						
Tax Revenue	737	18.7	18.6	5.6	7.0	39.3
PIT	604	2.5	2.1	1.8	0.0	8.3
CIT	604	2.9	2.5	1.7	0.0	9.9
G&S	648	6.4	6.5	3.5	0.0	19.3
Trade	651	2.7	1.6	3.3	0.0	24.3
LIC						
Tax Revenue	773	15.0	14.4	6.9	1.7	58.1
PIT	377	2.1	1.6	1.6	0.0	8.7
CIT	378	2.0	1.7	1.3	0.0	9.0
G&S	430	4.4	3.9	2.9	0.0	14.5
Trade	456	4.4	2.8	4.9	0.0	39.9
Resource-Rich						
Emerging Markets						
Non-Commodity Revenue	341	12.6	12.4	7.2	0.9	31.5
PIT	201	1.7	1.4	1.4	0.1	9.2
CIT	278	5.0	3.7	5.0	0.1	25.5
G&S	282	4.6	4.5	3.5	0.0	25.9
Trade	291	1.8	1.1	2.2	0.0	12.6
LIC						
Non-Commodity Revenue	184	12.2	12.3	4.0	4.2	24.9
PIT	84	2.0	1.7	1.3	0.1	5.8
CIT	85	2.0	1.7	1.3	0.1	7.3
G&S	92	3.5	3.1	1.9	0.2	8.1
Trade	95	2.9	2.1	2.1	0.2	7.9

Source: WoRLD.

Table AII.2. Tax Revenue Average by Region (EMs and LICs), 2000-2015, as a percent of GDP

	AFR		APD		EUR		MCD		WHD	
	RR	Non-RR	RR	Non-RR	RR	Non-RR	RR	Non-RR	RR	Non-RR
Tax Revenue	11.9	15.8	14.5	14.9	26.4	22.4	8.4	16.1	18.5	17.4
PIT	2.1	2.6	2.0	1.7	3.5	3.4	1.5	2.3	1.4	1.8
CIT	4.5	2.3	4.3	3.1	4.6	2.2	3.7	2.7	4.5	2.4
G&S	3.2	4.8	4.7	3.6	6.0	9.4	4.0	6.6	5.4	5.0
Trade	3.2	5.6	1.6	2.7	6.2	1.1	1.4	1.7	1.1	4.2

Notes: RR (resource rich) countries use noncommodity revenue less grants. Non-RR (non-resource rich) countries use tax revenue.

Sources: WEO and WoRLD.

Appendix III. Method of Identification of Episodes (continued)

Country	Period	Above Average Increase	3 Years or More Subsequent Increases	von Halden-wang and Ivanyna
Low Income Countries				
Afghanistan	2009-2010	√		
Burkina Faso	2009-2013		√	√
Burundi	2009-2011		√	
Cabo Verde	2004-2007		√	√
Cambodia	2012-2015	√	√	√
Central African Republic	2008-2010		√	
Comoros	2001-2003	√	√	
Dominica	2004-2006		√	
Gambia, The	2006-2007	√		
Gambia, The	2011-2015	√		√
Guinea-Bissau	2009-2015	√		√
Kyrgyz Republic	2004-2007		√	
Kyrgyz Republic	2011-2012	√		√
Lao P.D.R	2007-2009		√	
Liberia	2006-2007	√		
Liberia	2009-2012	√	√	
Malawi	2012-2014	√		√
Maldives	2011-2015	√	√	√
Moldova	2003-2006		√	
Nepal	2007-2010		√	√
Nicaragua	2002-2006		√	
Rwanda	2010-2014		√	
St. Vincent & the Grenadines	2005-2008	√		
Senegal	2010-2015			√
Sierra Leone	2010-2011	√		
Solomon Islands	2002-2013	√		
Solomon Islands (subinterval)	2003-2004	√	√	
Solomon Islands (subinterval)	2007-2008	√	√	
Solomon Islands (subinterval)	2009-2010	√	√	
Tonga	2005-2006		√	
Tuvalu	2013	√		
Uganda	2013-2015		√	

Method of Identification of Episodes (end)

Country	Period	Above Average Increase	3 Years or More Subsequent Increases	von Haldenwang and Ivanyna
Emerging Markets				
Antigua & Barbuda	2006-2007	√		
Armenia	2013-2014	√		√
Bahamas	2015			√
Barbados	2010-2011	√		
Belize	2013-2014	√		
Bosnia & Herzegovina	2005-2006	√		
Bulgaria	2003-2006		√	
Georgia	2004-2008	√	√	
Jamaica	2012-2015			√
Morocco	2004-2008	√		
Namibia	2005-2007	√	√	
Paraguay	2003-2005		√	
Philippines	2010-2015			√
Seychelles	2002-2003	√		
Seychelles	2008-2011	√	√	√
Turkey	2009-2013			√
Ukraine	2005-2006	√		√
Uruguay	2003-2006		√	
Low Income Countries - Resource-Rich Economies				
Congo, Republic of	2011-2015	√		
Guinea	2007-2009	√		
Guinea	2011-2012		√	
Guyana	2004-2010	√		
Guyana	2014-2015	√	√	
Mauritania	2010-2013	√		
Emerging Markets - Resource-Rich Economies				
Algeria	2008-2011	√		
Ecuador	2010-2014	√		

Note: "Above average increase" and "3 years or more subsequent increases" are identified under Strategy 1, "von Haldenwang and Ivanyna" corresponds to the analyzed episodes under Strategy 2.

Source: IMF staff estimates.

Appendix IV. Tax Policy Measures (continued)

Country	Period	PIT				CIT				General GST				VAT				Trade Taxes				Excise				Property	
		New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate
Low Income Countries																											
Afghanistan	2009-2010												√														
Burkina Faso	2009-2013					√							√										√			√	
Burundi	2009-2011													√											√		
Cabo Verde	2004-2007									√(-)			√	√			√		√(-)								
Cambodia	2012-2015																										
Central African Republic	2008-2010															√(-)	√				√		√				
Comoros	2001-2003								√		√		√						√		√		√				
Dominica	2004-2006													√								√					
Gambia, The	2006-2007										√								√				√				
Gambia, The	2011-2015		√(-)				√(-)			√(-)				√									√				
Guinea-Bissau	2009-2015																						√		√		
Kyrgyz Republic	2004-2007	√	√(-)				√(-)										√						√				
Kyrgyz Republic	2011-2012					√				√							√						√				
Lao P.D.R	2007-2009																						√				
Liberia	2006-2007												√														
Liberia	2009-2012		√(-)				√(-)			√												√	√				
Malawi	2012-2014																										
Maldives	2011-2015					√				√	√									√							
Moldova	2003-2006		√(-)				√(-)										√										
Nepal	2007-2010																√		√				√			√	
Nicaragua	2002-2006														√								√				
Rwanda	2010-2014	√									√(-)			√(-)			√		√			√	√,√(-)				
St. Vincent & the Grenadines	2005-2008												√	√							√						
Senegal	2010-2015	√(-)															√						√(-)				√(-)
Sierra Leone	2010-2011																										
Solomon Islands	2002-2013																		√,√(-)		√	√	√		√		
Solomon Islands (subinterval)	2003-2004																										
Solomon Islands (subinterval)	2007-2008																		√(-)				√		√		
Solomon Islands (subinterval)	2009-2010																		√				√				
Tonga	2005-2006									√																	
Tuvalu	2013													√													
Uganda	2013-2015		√													√	√						√				

Tax Policy Measures (end)

Country	Period	PIT				CIT				General GST				VAT				Trade Taxes				Excise				Property	
		New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate	Thresh-old	Exemp-tions	New	Rate
Emerging Markets																											
Antigua & Barbuda	2006-2007	√								√																	
Armenia	2013-2014		√		√	√			√							√(-)							√			√	
Bahamas	2015													√	√(-)		√		√(-)				√,√(-)				√,√(-)
Barbados	2010-2011														√								√				
Belize	2013-2014										√		√										√				
Bosnia & Herzegovina	2005-2006									√(-)				√													
Bulgaria	2003-2006		√(-)				√(-)																√				
Georgia	2004-2008		√(-)		√				√							√(-)	√		√(-)		√		√,√(-)		√		
Jamaica	2012-2015			√			√,√(-)		√	√	√		√				√		√,√(-)		√		√				
Morocco	2004-2008				√				√								√										
Namibia	2005-2007														√(-)												
Paraguay	2003-2005					√			√								√					√	√				
Philippines	2010-2015								√														√				
Seychelles	2002-2003								√	√			√														
Seychelles	2008-2011	√	√,√(-)		√		√(-)	√(-)	√	√			√	√							√		√			√	
Turkey	2009-2013														√								√				
Ukraine	2005-2006												√		√(-)		√						√				
Uruguay	2003-2006																						√				
Low Income Countries - Resource-Rich Economies																											
Congo, Republic of	2011-2015																										
Guinea	2007-2009																						√				
Guinea	2011-2012		√																								
Guyana	2004-2010			√					√	√			√	√									√,√(-)				
Guyana	2014-2015																										
Mauritania	2010-2013						√		√														√				
Emerging Markets - Resource-Rich Economies																											
Algeria	2008-2011						√(-)										√										
Ecuador	2010-2014						√																				

Source: IMF staff estimates.

Appendix V. Revenue Administration Measures (continued)

Country	Period	Revenue Administration Categories							
		Management, governance & HR	Large taxpayers' office & segmentation	IT system	Registration & filing	Audit & verification program	Management of payment obligations	Improving compliance	Customs clearance
Low Income Countries									
Afghanistan	2009-2010	√	√			√			√
Burkina Faso	2009-2013	√	√	√	√	√	√	√	√
Burundi	2009-2011	√		√	√	√	√		√
Cabo Verde	2004-2007		√	√		√		√	√
Cambodia	2012-2015		√		√	√	√		√
Central African Republic	2008-2010	√	√	√	√	√	√	√	√
Comoros	2001-2003					√	√	√	√
Dominica	2004-2006	√					√		
Gambia, The	2006-2007	√	√	√	√				
Gambia, The	2011-2015			√		√		√	
Guinea-Bissau	2009-2015	√	√	√	√	√			√
Kyrgyz Republic	2004-2007	√		√		√			√
Kyrgyz Republic	2011-2012		√	√		√			
Lao P.D.R	2007-2009	√							√
Liberia	2006-2007	√	√		√	√		√	
Liberia	2009-2012	√	√	√	√	√	√		√
Malawi	2012-2014	√	√	√	√	√			
Maldives	2011-2015	√		√		√		√	
Moldova	2003-2006				√	√			
Nepal	2007-2010	√	√	√	√	√	√	√	√
Nicaragua	2002-2006	√	√	√	√	√		√	√
Rwanda	2010-2014	√		√	√	√	√	√	√
St. Vincent & the Grenadines	2005-2008								
Senegal	2010-2015	√	√	√	√	√	√		
Sierra Leone	2010-2011	√		√	√	√	√		
Solomon Islands	2002-2013	√		√	√	√		√	√
Solomon Islands (subinterval)	2003-2004	√					√	√	
Solomon Islands (subinterval)	2007-2008	√				√		√	
Solomon Islands (subinterval)	2009-2010			√		√	√	√	√
Tonga	2005-2006	√	√	√		√		√	
Tuvalu	2013					√		√	
Uganda	2013-2015	√	√	√				√	
Emerging Markets									
Antigua & Barbuda	2006-2007								
Armenia	2013-2014			√	√	√		√	
Bahamas	2015	√		√				√	
Barbados	2010-2011								
Belize	2013-2014	√	√	√		√		√	
Bosnia & Herzegovina	2005-2006	√							
Bulgaria	2003-2006	√	√	√		√	√		
Georgia	2004-2008	√		√	√	√	√	√	√
Jamaica	2012-2015	√	√	√	√	√	√	√	√
Morocco	2004-2008	√	√	√	√	√	√		
Namibia	2005-2007			√		√		√	
Paraguay	2003-2005	√				√		√	√
Philippines	2010-2015	√	√	√	√	√	√	√	
Seychelles	2002-2003	√	√			√	√		
Seychelles	2008-2011	√				√		√	
Turkey	2009-2013								
Ukraine	2005-2006	√				√	√		√
Uruguay	2003-2006	√	√			√			

Revenue Administration Measures (end)

Country	Period	Management, governance & HR	Large taxpayers' office & segmentation	IT system	Registration & filing	Audit & verification program	Management of payment obligations	Improving compliance	Customs clearance
Low Income Countries - Resource-Rich Economies									
Congo, Republic of	2011-2015	√			√				√
Guinea	2007-2009					√			
Guinea	2011-2012	√				√	√		√
Guyana	2004-2010	√		√	√		√		
Guyana	2014-2015				√	√			
Mauritania	2010-2013		√	√		√			
Emerging Markets - Resource-Rich Economies									
Algeria	2008-2011	√	√	√	√	√	√		
Ecuador	2010-2014								

Note: The revenue administration measures were categorized in line with IMF's Results-Based Management (RBM) Framework for Revenue Administration.

Source: IMF staff estimates.