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### Tax Innovations and Public Revenues in Sub-Saharan Africa

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# Tax Innovations and Public Revenues in Sub-Saharan Africa

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**ABSTRACT** *We study the effect of two tax innovations – value added taxes (VAT) and autonomous revenue authorities (ARA) – on tax revenues in sub-Saharan Africa. The dataset consists of 47 countries over 1980–2010. We find that VATs have no effect on total tax revenues, neither in the short- nor in the long-run. ARAs lead to higher tax revenues in the short- and medium-run, but the effect dissipates over time. The main conclusion is that tax innovations are not a panacea to overcome the revenue shortages in African countries, but they are helpful in the short- and medium-run.*

## 1. Introduction

Sub-Saharan Africa has become richer, more democratic, and less violent in the last few decades. Apart from coincidental developments such as surges in commodity prices, these desirable economic and political trends reflect the beneficial consequences of numerous institutional reforms. Many African countries have held elections, liberalised trade, and deregulated markets. However, one crucial development went almost unnoticed in the general public: the widespread reforms of tax systems.

Facing persistent revenue shortages<sup>1</sup> several sub-Saharan African countries adopted in the last 30 years measures to improve their ability to raise taxes. Much hope was vested in two particular tax innovations: value added taxes (VAT) and autonomous revenue authorities (ARA). A value added tax is essentially a general consumption tax but differs along a number of dimensions from traditional sales and turnover taxes (Bird & Gendron, 2006). Autonomous revenue authorities, on the other hand, are semi-private agencies that are tasked with revenue collection; in essence, countries with an ARA reallocate the task of tax administration from the finance ministry to a separate institution that is, to some extent, autonomous from the rest of the public sector (Fjeldstad & Moore, 2009).

Even though many African countries have by now had long experiences with both VATs and ARAs, it is unclear whether these two tax innovations have fulfilled their promise in this region of the world. Have tax revenues increased because of VATs or ARAs? Given that many African governments find it difficult to expand essential public services because they lack tax revenues, it is important to know whether and under what conditions VATs or ARAs are an effective means to raise tax revenues.

We therefore study in this paper, with country-level macroeconomic data, the link between the two tax innovations and various types of tax revenues (total, income, indirect, trade, and corporate) with a

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dataset consisting of 47 countries that is almost all sub-Saharan African countries, over the 1980–2010 period. In a second step, we also investigate whether the level of institutional quality matters for the effect of the tax innovations on revenues. This analysis is first conducted quantitatively by estimating interaction effects between the tax innovations and the degree of bureaucratic quality. While the results for the interaction models are suggestive, one problem with them is that data on bureaucratic quality are not available for all countries in our sample. Second, bureaucratic quality is only one dimension of institutional quality. Third, VATs and ARAs may have heterogeneous effects even within the same institutional environment depending on their specific setup or exogenous political and economic developments. To fully account for the heterogeneity between countries, we complement the quantitative analysis with case studies of how the VATs and ARAs in Kenya, Tanzania, and Uganda have affected revenues over time.

The first strand of the literature to which this paper is related is concerned with the VAT in developing countries. Many studies in this literature are of a qualitative nature and describe in a case-study fashion how VATs have affected revenues in selected countries (Bird & Gendron, 2007; Ebrill, Keen, Bodin, & Summers, 2001). There are, however, also a number of quantitative contributions. A recent paper by Keen and Lockwood (2010) studies both the causes for the introduction of a VAT and its consequences for gross government revenues. Our paper differs along three dimensions from Keen and Lockwood (2010). First, we focus exclusively on sub-Saharan African countries, and thus on a region for which they find ambiguous results. Second, rather than only gross government revenues we study various disaggregated tax revenues, thereby establishing which type of taxes are responsible for an overall increase in revenues.<sup>2</sup> Third, while their sample runs until 2000 only, ours runs until 2010, which allows us to take more recent developments into account.

This paper is also related to the strand of the literature that studies autonomous revenue authorities. Despite a large number of qualitative studies, the quantitative literature on ARAs is less developed than that on VATs. Kidd and Crandall (2006) evaluate the success of selected ARAs with data obtained through two questionnaires on the perceived efficiency of the tax administration, but they do not study revenue effects. Taliercio (2004a) finds with survey data that the more ‘autonomous’ a revenue authority is, the more citizens believe that the administrative capacity of the state is high. Taliercio (2004b) explores in a case-study fashion for six countries how revenues responded after the introduction of an ARA.<sup>3</sup> Von Haldenwang, Von Schiller, and Garcia (2014) is one of the few studies that offers quantitative evidence showing that in Peru, municipalities with an ARA collect more revenues than those with traditional tax administrations.

Finally, this paper is related to contributions concerned with tax effort in developing countries. Several authors study under what conditions developing countries manage to raise adequate revenues. Notable studies are Stotsky and Wolde-Mariam (1997), Gupta (2007), Bird, Martinez-Vazquez, and Torgler (2008), Le, Moreno-Dodson, and Rojchaichanthorn (2008), and Mkandawire (2010). In general, both economic and political factors are found to be important determinants of tax efforts. For example, Stotsky and Wolde-Mariam (1997) find that the economic structure of a country such as the share of agriculture in GDP is a significant determinant of the tax revenues share. Mkandawire (2010) finds that colonial heritage matters for today’s tax effort. To our knowledge, however, neither VATs nor ARAs have been systematically analysed within this literature.

The remainder of this paper is organised as follows. The next section describes institutional details, in particular the characteristics of VATs and ARAs, and discusses how the tax innovations might affect tax revenues. Section 3 introduces the data and the empirical model. The regression results are collected in Section 4. We present two case studies in Section 5. Section 6 concludes.

## 2. Institutional Details

### 2.1 Value Added Taxes

The VAT is a tax on consumption and, when introduced, typically replaces turnover or sales taxes. While VATs in different countries vary in the details, the characteristic features of this tax are (i) that it

is levied at each stage of the production chain and (ii) that producers at each stage can credit taxes paid in the previous stages against their overall value added tax obligations. The name ‘value added tax’ derives from this second feature since only the value added is subject to taxation at each stage of the production chain.

One aspect of the VAT that makes it a particularly attractive tax for developing countries is that, in contrast to traditional trade taxes, producers can credit the value added tax on imports. The VAT is hence less distortive with respect to international trade than traditional trade taxes. Second, value added taxes are a means to tax firms in the shadow economy (Keen, 2008). As taxes paid on inputs can only be retrieved if a firm is registered with the tax authorities, unregistered firms must bear a higher tax rate on their inputs. A consequence of this increased tax burden is that firms working in the shadow economy have an incentive to register with the tax authorities.

The first value added tax was introduced in 1948 in France.<sup>4</sup> Thereafter, the VAT witnessed a global spread. Early adopters in sub-Saharan Africa were many of the former French colonies. In the last three decades, however, ever more non-French speaking African countries introduced a VAT. Figure 1 indicates which countries had introduced a value added tax by 2010. Darker colours imply later introduction dates. As illustrated by Figure 1, most African countries adopted their VATs during the 1990s.

Value added taxes are in general introduced for two reasons in Africa. The first and obvious one is to raise revenues. The second reason is to improve the overall efficiency of the tax system, and in particular to allow governments to substitute inefficient trade taxes with a more efficient (that is less distortive) indirect tax. Both goals should result in a positive effect of a VAT on overall tax revenues. Second, the composition of tax revenues should change in that the importance of indirect taxes increases at the expense of trade taxes.

Despite this straightforward theoretical prediction, it is possible that VATs have no or even negative effects on tax revenues; or that they do not result in an increased reliance on more efficient taxes. On an abstract level, there might be political economy reasons why VATs do not have the intended

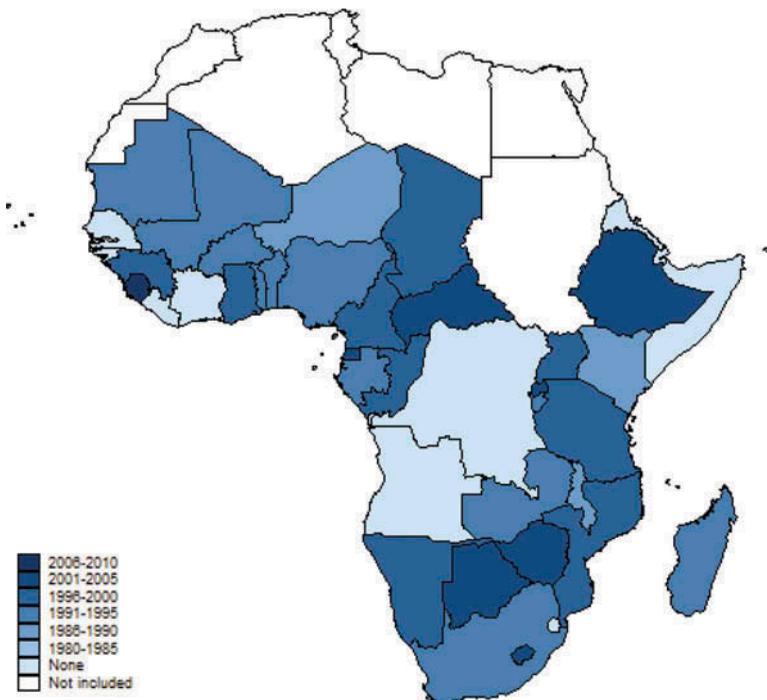


Figure 1. Spread of value added taxes in SSA.

revenue-increasing effects. Aizenman and Jinjark (2008), for example, develop a model where polarisation and political instability determine the ‘collection efficiency’ of a VAT. Emran and Stiglitz (2005) show that in the presence of a large informal sector, a revenue neutral replacement of trade taxes with a VAT reduces welfare. Consequently, a shift to a VAT might be accompanied by a reduction in raised revenues if the informal sector is large and has significant political power.

On a practical level, VATs might simply be badly designed.<sup>5</sup> If a VAT leads for example to very large compliance costs, then it is possible that firms prefer to remain in the shadow economy, which would make it harder for the government to raise revenues. Overall, therefore, it is an empirical question as to whether VATs lead to more or less revenues.

## 2.2 Autonomous Revenue Authorities

An autonomous revenue authority is a new development in public administration. Traditionally, the tasks of tax policy and tax administration were integrated in the finance ministry. Countries establish ARAs in order to separate the tax administration from the rest of the public sector, which was often perceived as corrupt, inefficient, and subject to political distortions. The idea, in short, is to give the task of collecting taxes to an agency that is less politicised and presumably more professional than the traditional public sector. Consequently, the defining features of an ARA are some degree of autonomy from the public sector, meritocratic recruitment, and private sector salaries (Fjeldstad & Moore, 2009).

The first autonomous revenue authority was introduced by Jamaica in 1981. Only a few years later, ARAs appeared in sub-Saharan Africa, initially 1985 in Ghana. ARAs are still less common than VATs. At the end of the sample period, 14 countries in Africa had introduced an ARA. As indicated by Figure 2, most of the ARA countries are clustered in the eastern part of the continent. Nevertheless, there are a few countries in the west as well.

In contrast to the VAT, we are not aware of any comprehensive theoretical treatments of the ARA. From a practical perspective, however, it is plausible that ARAs will result in higher revenues. Tax

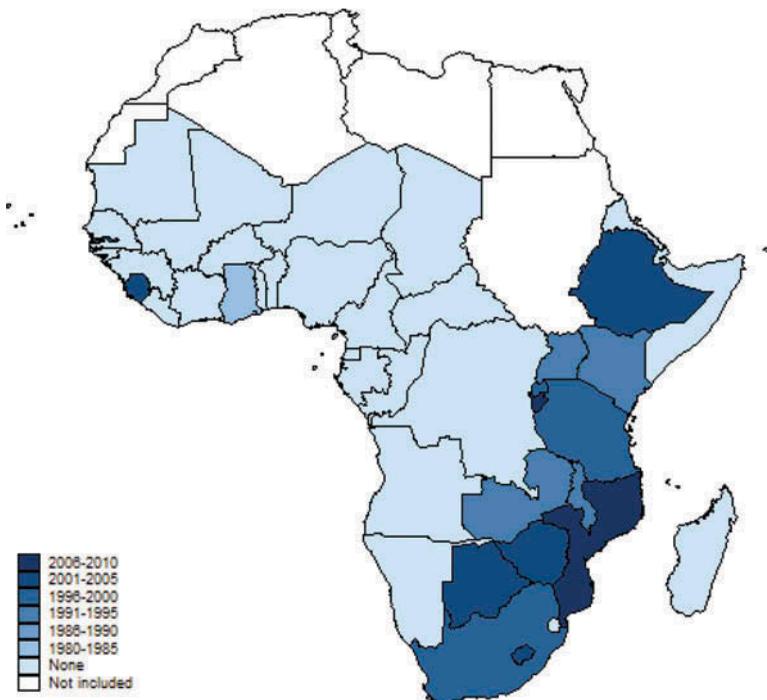


Figure 2. Spread of autonomous revenue authorities in SSA.

officials recruited on merit should be more competent than officials appointed because of political loyalties. They are likely to be more successful in detecting tax evasion and will be able to limit avoidance activities. A more professional administration also represents a bigger threat to potential tax evaders. Higher salaries should in addition reduce the probability that officials accept bribes in exchange for lenient tax treatments.

Case studies of ARA introductions point out that the reason why many African governments turned toward an ARA was because they were disappointed with current levels of revenue collection (Mann, 2004) and dissatisfied with high levels of tax evasion (Barbone, Das-Gupta, De Wulf, & Hansson, 1999). Consequently, most ARAs were introduced with the explicit goal of increasing revenues. Whether autonomous revenue authorities have really led to higher revenues is unclear, however.

### 3. Tax Innovations and Revenues

#### 3.1 Data

Data on tax revenues is taken from the International Centre for Taxation and Development's (ICTD) Government Revenues Dataset (Prichard, Cobham, & Goodall, 2014). While the quality of fiscal and economic data from sub-Saharan African countries can be questioned (Jerven, 2013), the ICTD data provide in all likelihood a reasonable picture of tax revenue developments in the countries in our sample. Building on previous attempts to improve the quality of tax revenues data for developing countries, for example by Keen and Mansour (2010a, b) who attempt to correct for natural resource revenues, the ICTD data comes with a number of advantages over alternative data sources. In particular, the most prominent alternative data source, the IMF's Government Finance Statistics database, exhibits many missing observations. The ICTD data, in contrast, covers almost all sub-Saharan African countries and exhibits almost no missing values. Prichard et al. (2014) give a more detailed description of the features and the advantages of the ICTD dataset.

One feature of the ICTD dataset is to provide information on various individual taxes. Of the available variables, we focus in this paper on the following: total taxes, income taxes, indirect taxes, (international) trade taxes, and corporate taxes. The data on these taxes are corrected for natural resource revenues or social security contributions in order to ensure that they only capture proper tax revenues (see Table A3 in the Online Appendix for more specific definitions). Note also that the tax items are not mutually exclusive. Obviously, total tax revenues includes revenues from all other taxes, but indirect taxes, too, includes revenues from trade taxes. Consequently, the sum of the individual tax items may be larger than total tax revenues (see Table A4 in the Online Appendix).

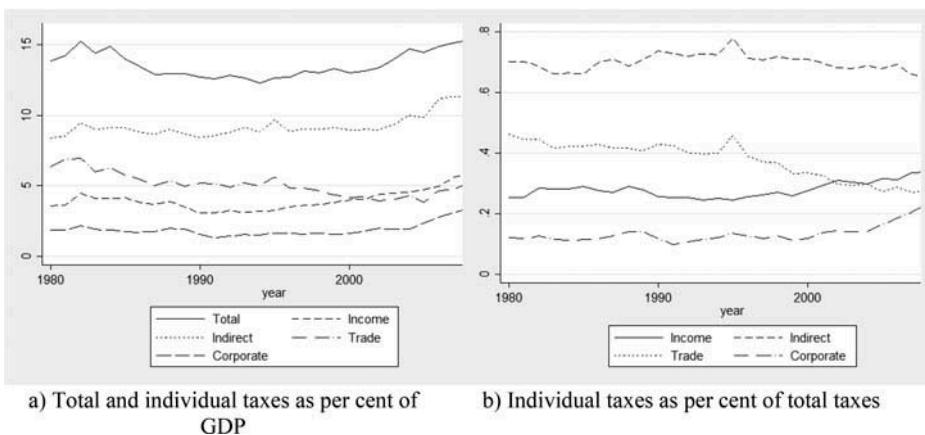


Figure 3. Evolution of tax revenues.

We provide some descriptive statistics on the tax data in Figure 3. In particular, we plot how average total tax revenues and revenues from the individual taxes have evolved over time in sub-Saharan African countries. These plots use data from all 47 countries in our sample, even though some will be dropped in the regressions, either due to missing control variables or because they are obvious outliers (see below for more details).

We observe, first, that all types of tax revenues have increased relative to GDP over time (Figure 3(a)). Second, income and corporate taxes have become more and trade taxes less important as a share of total tax revenues (Figure 3(b)). These changes take place mostly in the mid-1990s. It is hence plausible that the VATs and ARAs, which as described above were mostly introduced around the same time, are responsible for the changes in the size and the composition of tax revenues.

Data on the introduction dates of VATs is primarily taken from Bird and Gendron (2007). We complement missing information on the VAT with data provided by International Tax Dialogue (2005). For the end of the sample period (2005–2010), we collected the data ourselves. Data on the introduction dates of autonomous revenue authorities is taken primarily from Brautigam, Fjeldstad, and Moore (2008) and is complemented with information provided by Mann (2004) and Fjeldstad (2013).

### 3.2 Empirical Model

To study the effect of VAT and ARA introductions on revenues, we rely on a selection on observables approach. While a credible natural experiment would be preferable, the fact that VATs and ARAs are discretionary policy choices by countries makes the application of quasi-experimental methods difficult. Nevertheless, a selection on observables approach can result in unbiased estimates if all factors influencing both the introductions of VATs and ARAs and government revenues are controlled for.

We hence estimate the following baseline model:

$$\text{tax/gdp}_{i,t} = \alpha_i + \gamma_t + \delta_{VAT}VAT_{i,t} + \delta_{ARA}ARA_{i,t} + \beta X_{i,t} + \varepsilon_{i,t} \quad (1)$$

where *Tax/GDP* indicates various tax revenue items we consider in this paper (total, income, indirect, trade, and corporate).

*VAT* and *ARA* are dummy variables that indicate whether country *i* has a VAT or an ARA, respectively, in period *t*.<sup>6</sup> As it is possible that the effect of VATs and ARAs varies over time, we include separate dummies for the first two years (the year of the introduction and the next year), years 3–5, years 6–10, and all years after the tenth year. With these differentiated treatment dummies, we aim to explore the time trajectory of the effect of the tax innovations. Some authors argue that the short and long run effects of tax innovations might differ. Tax innovations might be successful in the short run, but corruption and inefficiency – that is institutional sclerosis (Olson, 1984) – might set in after a few years. In a case study of the Ugandan ARA, for example, Fjeldstad (2006) reports that while it was successful initially in raising revenues, corruption soon set in and the gains were eventually lost. Similar observations are made by Fjeldstad (2003) for Tanzania and Von Haldenwang et al. (2014) for Peru. However, it is also possible that any beneficial effect of the tax innovations only builds up gradually and that, therefore, the tax innovations have a more positive effect in the long than in the short run.

The  $\alpha_i$  are country fixed effects,  $\gamma_t$  year fixed effects, and *X* a set of time-varying control variables. The country fixed effects control for time-constant features of countries that are correlated with both tax revenues and the likelihood that either tax innovation is introduced, such as geography, colonial legacy, or ethnic fragmentation. The year fixed effects control for common shocks or trends that affect all African countries similarly. Finally, the time-varying control variables are: GDP per capita, openness, population size, the share of agriculture in value added, the share of over 65 year old (dependency share old), the share of under 15 years old (dependency share young), and dummy

variables for IMF crisis and non-crisis programmes Dreher (2006). The definition of these variables and their sources are in Table A3 in the Online Appendix.

We do not control in the baseline regressions for institutional quality even though some studies suggest that institutional quality might be an important determinant of tax revenues (Gould & Baker, 2002; Kenny & Winer, 2006; Timmons, 2010). The reason is that the primary institutional quality measures we employ further below are only available for a limited number of countries, and thus including them as control variables would reduce the sample size significantly. To some extent, the fixed effects should account for the quality of institutions. In any case, we control for institutional quality and their interaction with the tax innovations in robustness tests. We also explore this issue more fully with case studies.

The assumption in this selection of observables approach is that conditional on country and year fixed effects and the time varying control variables there are no further variables that influence both tax revenues and the likelihood that a VAT or an ARA is introduced. We cannot exclude this possibility, but given that we control for country fixed effects, such variables must vary within countries.<sup>7</sup> Since we have an extensive set of additional variables that vary within countries and presumably capture the most important determinants of tax revenues and the likelihood of introducing either of the two tax innovations, the assumption that the estimates for the two tax innovations are largely unbiased is defensible.

Nevertheless, following Keen and Lockwood (2010) we attempt to establish the robustness of our results to self-selection issues through a two-stage procedure: by explicitly modelling the adoption equation in a first stage and, based on these results, account for the propensity to introduce either of the tax innovations in a second stage. The procedure resembles the Heckman correction approach for sample selection, but in the spirit of Maddala (1983) is adapted here to address self-selection.

For the self-selection regressions, we estimate in the first stage a probit model that relates the likelihood that a country introduces either of the tax innovations to country-level variables:

$$\text{tax innovation}_{i,t} = a + \chi Z_{i,t} + \eta_{i,t} \quad (2)$$

We then calculate the Inverse Mills Ratio from these regressions and include them as separate control variables in the revenue equations (that is Equation (1)).

We implement two variants of this procedure: one without exclusion restrictions (where only the standard set of control variables,  $X_{it}$  from Equation (1), are included in the first stage and identification flows from the nonlinearity of the first stage) and one with two additional exclusion restrictions – the number of contiguous countries that have already a VAT and an ARA.<sup>8</sup> The idea underlying this exclusion restriction is that the more contiguous countries have had experience with a VAT or an ARA, the more likely it is that a given country adopts these tax innovations, for example due to imitation or peer effects.<sup>9</sup> That is, we propose that the number of neighbours with either a VAT or ARA is a significant predictor for whether a given country has a VAT or ARA, respectively.

Another potential problem for unbiased estimation is that the two innovations might systematically coincide with further reforms to the public sector, which would make it difficult to separately identify the effect of VATs and ARAs. However, controlling for IMF crisis and non-crisis programmes should account for this problem to some extent since these programmes are one of the most important reasons for comprehensive reforms to the public sector in developing countries. Moreover, on an anecdotal level, though other reforms often have accompanied the introduction of VATs or ARAs, we are not aware of specific reforms that would affect tax revenues and are systematically adopted at the same time as countries introduced VATs or ARAs.

Finally, while tax data for 47 countries are available (Somalia is the only major country in sub-Saharan Africa for which no tax revenue data are available), we only use 44 countries in the regressions. First, as noted above, we lack data for the control variables for some countries

(Equatorial Guinea and Cape Verde). Second, we exclude Zimbabwe as an extreme outlier during the crisis period (see Figure A1 in the Online Appendix); tax revenues decline steeply from 2004 and coincidentally Zimbabwe introduced ARAs and VATs around the same time. The actual reason for the decline in tax revenues, however, was presumably President Mugabe's disastrous economic policies, not the introduction of the VAT or ARA. However, note that the results are qualitatively similar when Zimbabwe is included.<sup>10</sup>

## 4. Results

### 4.1 Baseline Results

Table 1 collects the baseline results. In Models I to III, each of the tax innovations is included separately (Model I and II) and jointly (Model III). Model IV and V replicate Model III, but in these models we account for self-selection through the procedure outlined above. Model IV is estimated without the exclusion restrictions while Model V includes them. Note that we omit for all models both results for the control variables and diagnostic statistics (number of observations and so forth) for brevity, but they are available upon request (for total tax revenues, we present the full results in Table A6 in the Online Appendix). All regressions are estimated using Fixed Effects (FE), specifically the within-transformed FE estimator. Standard errors are robust to heteroscedasticity and autocorrelation (by using Newey-West standard errors).

Each panel of Table 1 presents results for different tax revenues. The first panel collects the results for the total tax to GDP ratio. In these regressions, the effect for VATs is largely insignificant both in the short and in the long run. The ARAs, on the other hand, seem to have a significant effect on total tax revenues already in the first two years. The results suggest that the introduction of an autonomous revenue authority immediately increases the tax revenues to GDP ratio by about 1.5 percentage points. After the first two years, ARAs continue to have positive effects.<sup>11</sup> However, the estimated effects for ARAs after 5 and 10 years, while continuing to be positive, become statistically insignificant once we account for self-selection. The coefficients also become slightly smaller in these models. These results suggest that there is some self-selection into introducing an ARA. It is possible that some countries that choose to introduce an ARA at a particular time have higher revenues for other reasons as well, for example because of favourable economic performance, and even if there is an initial ARA effect these would confound any ARA effects lasting into the long run.

Overall, this first set of regressions indicate that ARAs have a positive effect on total tax revenues almost immediately, the effect peaks in the medium term but disappears after about 10 years. In contrast, VATs seem to be largely irrelevant for tax revenues. It is, however, possible that while these two tax innovations have no long run effects on total tax revenues (and in the case of the VAT no effect), they may affect individual taxes. Thus, we explore next how the two tax innovations affected income, indirect, trade, and corporate tax revenues.

Regressions from estimating Equation (1) for individual tax revenues are reported in the lower panels of Table 1. The results indicate that value added taxes have increased only corporate tax revenues, and only after 10 years. This result may indicate that VATs encourage more firms to register with the tax authorities. None of the other tax revenues display a significant response to VAT introductions. In contrast, ARAs appear to lead to increasing income tax revenues even in the long run, which is reassuring as income taxes are considered to be advanced taxes (Aidt & Jensen, 2009), and to higher indirect and trade tax revenues in the medium term, but the effects do not persist for these two taxes.

### 4.2 Interactions with Institutional Quality

A possible concern with the baseline estimates is the presumption that the effect of the tax innovations is the same in all institutional environments. It is possible that VATs and ARAs are more

**Table 1.** Tax innovations and tax revenues to GDP, fixed effects regressions, sub-Saharan African countries, 1980–2010

	I	II	III	IV	V
<b>Total tax revenues</b>					
VAT, years 1–2	0.369 (0.351)		0.138 (0.347)	0.147 (0.343)	0.128 (0.349)
VAT, years 3–5	0.742 (0.474)		0.531 (0.427)	0.499 (0.430)	0.528 (0.428)
VAT, years 6–10	0.827* (0.485)		0.535 (0.449)	0.543 (0.448)	0.540 (0.445)
VAT, after year 10	0.433 (0.612)		0.296 (0.605)	0.345 (0.588)	0.318 (0.595)
ARA, years 1–2		1.622*** (0.475)	1.545*** (0.470)	1.514*** (0.463)	1.495*** (0.481)
ARA, years 3–5		2.576*** (0.687)	2.456*** (0.655)	2.340*** (0.656)	2.396*** (0.675)
ARA, years 6–10		1.389** (0.699)	1.240* (0.668)	1.101 (0.686)	1.150 (0.709)
ARA, after year 10		1.244* (0.656)	1.128* (0.632)	0.997 (0.623)	0.966 (0.710)
Countries	44	44	44	44	44
N	1171	1171	1171	1171	1171
<b>Income tax revenues</b>					
VAT, years 1–2	0.163 (0.167)		0.048 (0.152)	0.036 (0.146)	0.047 (0.152)
VAT, years 3–5	0.235 (0.147)		0.156 (0.131)	0.162 (0.128)	0.154 (0.129)
VAT, years 6–10	0.287* (0.173)		0.072 (0.158)	0.058 (0.158)	0.067 (0.154)
VAT, after year 10	−0.098 (0.228)		−0.265 (0.208)	−0.275 (0.202)	−0.272 (0.203)
ARA, years 1–2		1.132*** (0.228)	1.089*** (0.230)	1.098*** (0.230)	1.087*** (0.233)
ARA, years 3–5		1.293*** (0.178)	1.270*** (0.177)	1.313*** (0.176)	1.266*** (0.180)
ARA, years 6–10		0.968*** (0.247)	0.981*** (0.240)	1.072*** (0.250)	0.975*** (0.247)
ARA, after year 10		1.386*** (0.256)	1.427*** (0.253)	1.480*** (0.267)	1.412*** (0.261)
Countries	44	44	44	44	44
N	851	851	851	851	851
<b>Indirect tax revenues</b>					
VAT, years 1–2	0.280 (0.301)		0.130 (0.283)	0.116 (0.281)	0.113 (0.284)
VAT, years 3–5	0.696 (0.431)		0.573 (0.387)	0.528 (0.388)	0.585 (0.387)
VAT, years 6–10	0.796* (0.432)		0.649 (0.396)	0.632 (0.395)	0.696* (0.387)
VAT, after year 10	0.396 (0.563)		0.341 (0.550)	0.361 (0.542)	0.412 (0.531)
ARA, years 1–2		0.708 (0.444)	0.637 (0.439)	0.615 (0.438)	0.557 (0.440)
ARA, years 3–5		1.747** (0.710)	1.630** (0.683)	1.545** (0.698)	1.540** (0.694)
ARA, years 6–10		1.026 (0.670)	0.878 (0.632)	0.798 (0.666)	0.743 (0.657)
ARA, after year 10		0.599 (0.713)	0.484 (0.683)	0.425 (0.689)	0.285 (0.713)

(continued)

Table 1. (Continued)

	I	II	III	IV	V
Countries	44	44	44	44	44
N	938	938	938	938	938
Trade tax revenues					
VAT, years 1–2	0.002 (0.268)		-0.122 (0.262)	-0.034 (0.258)	-0.131 (0.259)
VAT, years 3–5	0.529 (0.406)		0.483 (0.368)	0.488 (0.363)	0.440 (0.367)
VAT, years 6–10	0.567 (0.425)		0.544 (0.404)	0.545 (0.404)	0.457 (0.397)
VAT, after year 10	0.374 (0.552)		0.525 (0.541)	0.451 (0.521)	0.404 (0.530)
ARA, years 1–2		0.664 (0.456)	0.686 (0.452)	0.532 (0.437)	0.719 (0.442)
ARA, years 3–5		1.516** (0.695)	1.484** (0.675)	1.202* (0.700)	1.502** (0.690)
ARA, years 6–10		0.146 (0.650)	0.066 (0.623)	-0.315 (0.680)	0.069 (0.653)
ARA, after year 10		-0.658 (0.546)	-0.726 (0.544)	-1.134** (0.557)	-0.784 (0.567)
Countries	44	44	44	44	44
N	938	938	938	938	938
Corporate tax revenues					
VAT, years 1–2	-0.069 (0.086)		-0.077 (0.084)	-0.081 (0.082)	-0.087 (0.083)
VAT, years 3–5	0.015 (0.107)		0.047 (0.112)	0.057 (0.110)	0.027 (0.110)
VAT, years 6–10	0.086 (0.151)		0.076 (0.154)	0.081 (0.149)	0.053 (0.147)
VAT, after year 10	0.389** (0.194)		0.415** (0.193)	0.428** (0.191)	0.406** (0.189)
ARA, years 1–2		0.221 (0.258)	0.254 (0.253)	0.269 (0.241)	0.279 (0.237)
ARA, years 3–5		0.005 (0.223)	-0.018 (0.220)	0.014 (0.208)	-0.004 (0.212)
ARA, years 6–10		-0.063 (0.291)	-0.174 (0.286)	-0.148 (0.294)	-0.243 (0.275)
ARA, after year 10		0.563 (0.459)	0.414 (0.443)	0.461 (0.455)	0.280 (0.409)
Countries	43	43	43	43	43
N	655	655	655	655	655
Control variables	Yes	Yes	Yes	Yes	Yes
Control for selection	No	No	No	Yes	Yes
Exogeneity restrictions	No	No	No	No	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes

Notes: The following variables (defined in Table A3 in the Online Appendix) are specified as dependent variables (always as share of GDP): total tax revenues, income tax revenues, indirect tax revenues, trade tax revenues, corporate tax revenues. All models include country and year fixed effects. Control variables: GDP per capita, openness, agriculture, population, dependency share old, dependency share young, IMF crisis programme, IMF non-crisis programme. Heteroscedasticity and autocorrelation (Newey-West) robust standard errors are in parentheses with significance levels indicated as 10 per cent (\*), 5 per cent (\*\*) and 1 per cent (\*\*\*)

effective in contexts where institutions are favourable, while being ineffective or even harmful in countries with low institutional quality. We therefore explore whether the quality of a country's bureaucracy matters for how the tax innovations affect tax revenues by estimating models where we interact the tax innovation dummies with a proxy for bureaucratic quality. We use the PRS Group's

**Table 2.** Tax innovations and tax revenues to GDP, fixed effects regressions, sub-Saharan African countries, 1980–2010, interactions with institutional quality (bureaucratic quality)

	Total tax	Income tax	Indirect tax	Trade tax	Corporate tax
VAT, years 1–5	–0.416 (0.528)	–0.204 (0.230)	–0.173 (0.447)	–0.559* (0.317)	–0.272* (0.151)
VAT, years 1–5 x Bureaucracy	0.253 (0.291)	0.228* (0.123)	–0.079 (0.244)	0.071 (0.168)	0.085 (0.082)
VAT, after year 5	–1.004* (0.603)	–0.367 (0.281)	–0.512 (0.581)	–1.229*** (0.428)	–0.194 (0.216)
VAT, after year 5 x bureaucracy	0.948*** (0.270)	0.394*** (0.136)	0.414 (0.256)	0.620*** (0.223)	–0.049 (0.113)
ARA, years 1–5	1.610*** (0.525)	0.701*** (0.239)	1.179** (0.470)	1.569*** (0.371)	0.406 (0.260)
ARA, years 1–5 x bureaucracy	0.031 (0.329)	0.157 (0.141)	–0.327 (0.299)	–0.749*** (0.239)	–0.398** (0.198)
ARA, after year 5	0.666 (0.723)	0.373 (0.350)	0.789 (0.626)	–0.917* (0.531)	–1.107*** (0.299)
ARA, after year 5 x bureaucracy	0.436 (0.404)	0.251 (0.165)	–0.227 (0.331)	–0.037 (0.287)	0.469** (0.215)
Control variables	Yes	Yes	Yes	Yes	Yes
Control for selection	Yes	Yes	Yes	Yes	Yes
Exogeneity restrictions	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Sample	All	All	All	All	All
Countries	30	29	30	30	29
N	716	512	585	584	377

Notes: As for Table 1; bureaucratic quality (BQ) as defined in Table A3 in the Online Appendix.

ICRG bureaucratic quality indicator as our proxy for the effectiveness and efficiency of a country's bureaucracy.

For brevity, we distinguish in the regressions only between effects observed in the first five years and all years after the fifth rather than between the four distinct periods considered in the previous regressions. In addition, we report for each tax item only the results for the model with the most complete specification (where we account for self-selection with the exclusion restriction). Note also that we do not report the estimates for the control variables, including the base effect of bureaucratic quality, but they are included in the regressions (and available upon request).

The results are reported in Table 2. We observe that the level of bureaucratic quality indeed matters for the effect of VATs. The significant negative association between VAT and trade tax revenues (reflecting that one reason to introduce VATs was to reduce the reliance on trade taxes and/or compensate for reductions in tariffs) is reduced in the long run in countries with better bureaucracies. It is possible that better bureaucratic quality increases the efficiency of collecting trade taxes and encourages more firms to register with the tax authorities following the introduction of a VAT. Thus, although there is a negative relationship between VAT and trade tax revenue, over time this is reduced when bureaucratic quality is higher. In the short run, VAT only appears to be associated with higher income tax revenues in countries with better bureaucratic quality. One possibility is that in such countries more corporate income tax payers register with the tax authorities immediately after a VAT is introduced, which would result in higher income tax payments even as other taxes are unaffected. For the long run, we find that total and income tax revenues are higher in countries with better bureaucratic quality. Such interaction effects seem plausible, as countries that have higher bureaucratic quality should be more capable to enforce tax payments.

For ARAs, we observe only a few significant interactions. In the short run, the positive association of ARAs with trade tax revenues appears to be lessened in countries with better bureaucratic quality. This may be because the additional effect of ARAs is lower in countries that have a more efficient bureaucracy

and/or that such countries are better able to reduce trade taxes (that is implement trade policy reforms). That corporate tax revenues are lower in the short run in countries with higher bureaucratic quality may be perceived as puzzling. One explanation is that countries with lower bureaucratic quality impose too high a tax burden on firms given poor collection efficiency for other taxes (or alternatively that with higher bureaucratic quality a broader range of taxes are utilised). Countries with higher bureaucratic quality may implement the ARA more effectively so that over time collection efficiency increases and the tax base broadens. This is consistent with observing that five years after the introduction of the ARA, the negative association with corporate tax revenues is lessened in countries that have high bureaucratic quality.

One shortcoming with these regressions is that bureaucratic quality is only one dimension of the institutional quality in a country. We have explored interactions between the tax innovations and other dimensions of institutional quality: the level of corruption and democracy. The results are reported in Tables A1 and A2 in the Online Appendix. The findings include that VATs in the first five years are associated with lower revenues in more democratic countries. Similarly, VATs are associated with lower trade tax revenues in less corrupt countries in both the short and the long run. ARAs also display several significant interactions with these two proxies for institutional quality. Nevertheless, these two indicators also only capture particular dimensions of institutional quality. Therefore, we adopt in the following a different approach to trace any heterogeneous effects of VATs and ARAs across institutional environments: through three short case studies.

## 5. Case Studies

### 5.1 Kenya

Kenya introduced its VAT in 1990 while the Kenya Revenue Authority (KRA) was established in 1995. The KRA describes the period 1995–2002 as a transition phase with considerable administrative problems. There were also extensive reforms during the period 2003–2009. Since the KRA is responsible for VAT collection, the impact of the VAT on revenues has also been dependent on what

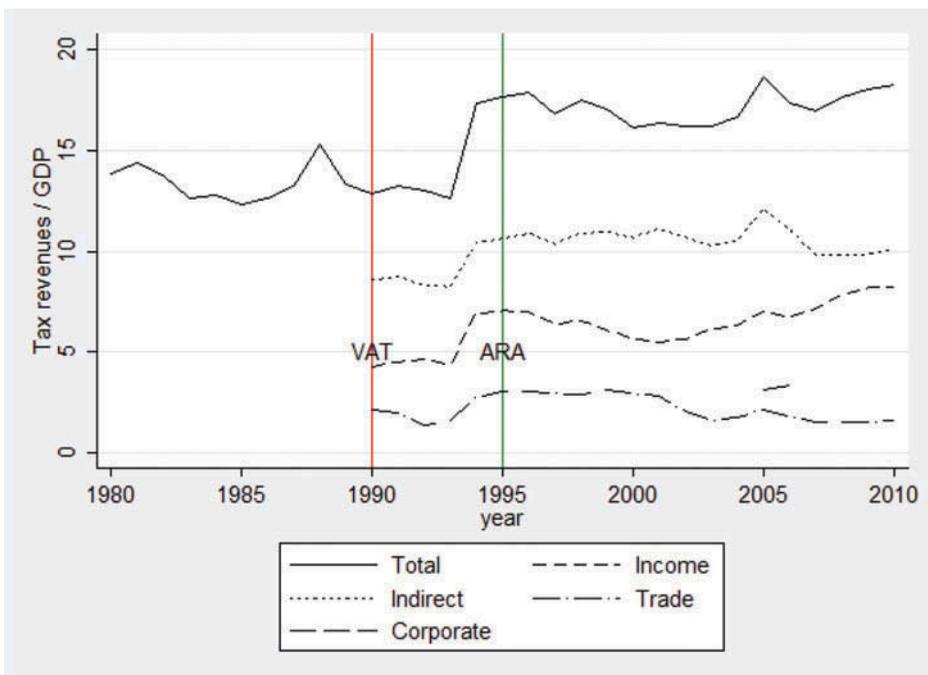


Figure 4. Development of tax revenues in Kenya.

has happened within the KRA. Indeed, the introduction of the VAT did not lead to any significant increase in total tax collection until 1994 (See Figure 4).

The modest start was probably due to the economic crisis that followed upon the withdrawal of donor support in 1991. In the run-up to the election in 1992 the government furthermore pursued an irresponsible policy including excessive money creation. There was political turmoil as well as ethnic clashes before and after the election, and this was followed by a period of uncertainty about government policies. Investors stayed away. Kenya mended fences with the donors in November 1993, and this led to some economic recovery. Still, growth recovered mainly in agriculture and services, while manufacturing growth (important for taxation) only saw slow progress. Tax collection grew at the same rate as GDP, although the contribution of VAT to total tax revenue actually declined (Muriithi & Moyo, 2003). VAT revenue was not responsive to growth during this period.

In the election of 2002 President Moi was replaced by the more reform-minded President Kibaki. Economic growth accelerated due to improved policies and better terms-of-trade. There was now a gradual but rather slow increase in the tax collection ratio. The ethnic clashes in connection with the 2007 election again led to a drop in growth and in revenue collection, followed by a recovery a few years later.

It is thus the case that the evolution of revenue collection in Kenya has been significantly affected by political and economic events. Periods of improved revenue collection have been interrupted by setbacks largely originating in the political arena. That is, tax revenues, as a share of GDP, did not show any clear trend after the introduction of the ARA in this case as its effects were superseded by political and economic events.

## 5.2 Tanzania

The Tanzania Revenue Authority (TRA) went into operation in 1996, and the VAT was introduced two years later. At this time the Tanzanian economy was in transition from 'African socialism' with extensive state interventions towards a more liberal market economy. Parastatals were privatised, import taxes were reduced, and investment incentives improved. During the 1990s the private sector expansion was not enough to compensate for the shrinkage of the state sector. There was also a rapid

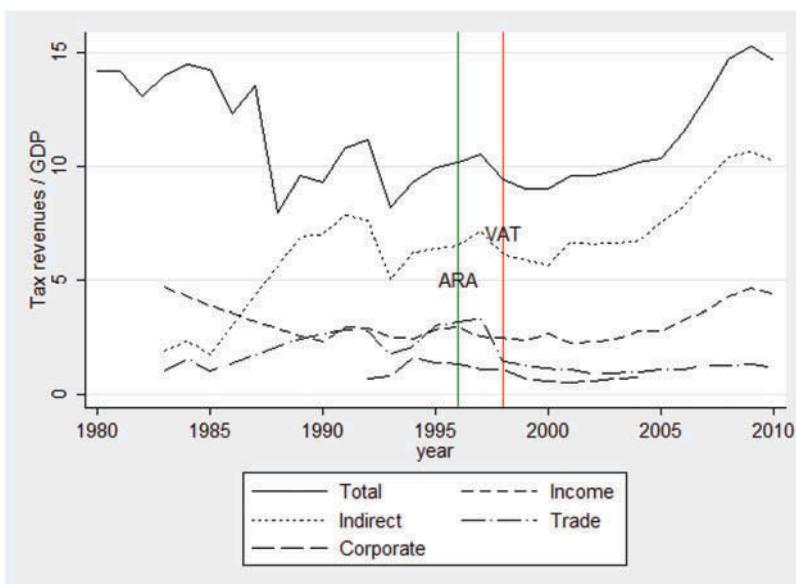


Figure 5. Development of tax revenues in Tanzania.

growth of the informal sector, which did not pay taxes. Economic growth remained modest at about 4 per cent per year and, as shown in Figure 5, tax revenues stagnated (Levin, 2005).

From about 2002 economic growth accelerated to about 7 per cent per year as economic reforms were extended. In 2004 Tanzania introduced a major income tax reform and in 2005 the Common External Tariff of the East African Community was established, which effectively reduced tariffs in Tanzania (Jones & Morrissey, 2008). There were also significant improvements of the functioning of the TRA contributing to an expansion of the tax base and improved revenue collection results (Fjeldstad & Heggstad, 2011). The TRA has received international awards for these reforms and its improved performance, so it seems clear that this has contributed to the improved revenue collection results. Therefore the period from about 2005 is characterised by a five percentage point increase in the revenue to GDP ratio at the same time as the economy has continued to grow at a fast rate. Tanzania seems to have been little affected by the global financial crisis.

### 5.3 Uganda

The Uganda Revenue Authority (URA) was set up in 1991, five years after the end of a drawn out civil war. The economy had still not stabilised, and the tax to GDP ratio was at a dismal 7 per cent. As shown in Figure 6, the tax ratio improved significantly in the first five years, but it is hard to decide to what extent this was due to improved efficiency in tax collection or due to the normalisation of the economy and other structural adjustment measures. Growth rates in Uganda have been high and over the last 10 years it has averaged 7 per cent. The period since the late 1990s until 2004 saw no trend in the revenue to GDP ratio. However, in 2004 a fairly comprehensive reform programme was started by the URA, seeking to rationalise the organisation, educate the personnel and enhance staff integrity. This was followed by a significant increase in the collection ratio over the period up to 2010. Nevertheless, Uganda's collection rate remains one of the lowest in the region in 2010 (Ali, Fjeldstad, & Hoem Sjørnsen, 2014). We may note, however, that Uganda has a very high share of the economy in the informal sector, which does not contribute significantly to revenues.

VAT was introduced in 1996 and it has contributed to revenue, but as a share of GDP it peaked in 1999. The subsequent decline could to some extent be due to the inefficiency of the URA, but the government has also introduced various tax exemptions (from VAT for example) to stimulate what it

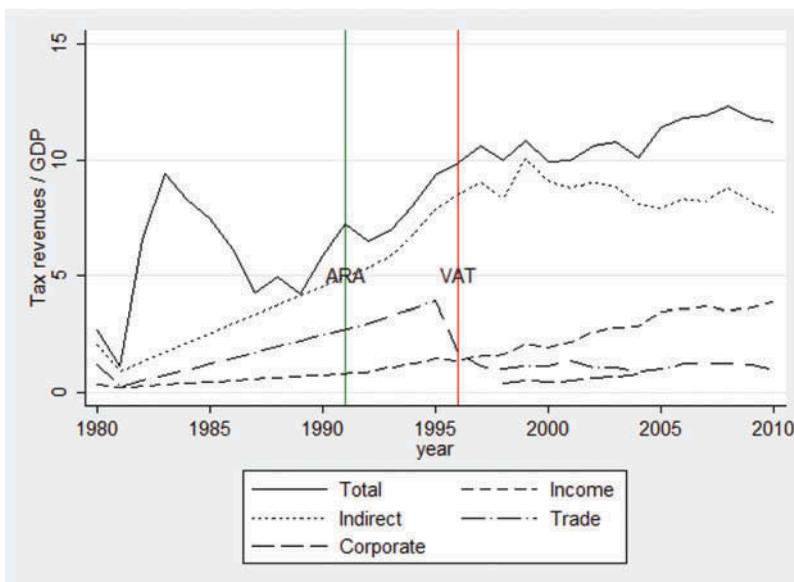


Figure 6. Development of tax revenues in Uganda.

regards as strategic investments. There has also been a public debate about irregularities in the URA, although it is still regarded as one of the least corrupt organisations in the country.

#### 5.4 Discussion

The comparison of the experiences of these three countries suggests that there is scope for increased revenue collection in African economies through tax reforms, although the progress may be hindered by political instability or adverse economic developments. We also know that Tanzania is ranked considerably better than Kenya or Uganda on corruption indicators. It may be that it was easier to maintain the integrity of the ARA in Tanzania than in the other countries. An institutional shock such as the introduction of an ARA may be expected to have a positive effect on the behaviour of revenue collectors in all systems, but it may well be that bad behaviour creeps back into the agency more easily in countries where corrupt practices are generally more prevalent.

Overall, the three cases imply that VATs and ARAs have to interact with an existing set of institutions, the political landscape, and economic developments. Under the right circumstances, they can be an effective tool to increase tax revenues in sub-Saharan Africa. In methodological terms, the case studies also suggest that it is difficult to identify the revenue effects of the tax innovations separately from concurrent political or economic developments by case studies alone. As such, developments may dominate the effects of the tax innovations, it is important to employ a method that can partial out concurrent developments. This difficulty in disentangling various simultaneous developments is one of the reasons why it is useful to combine findings from individual case studies with results from multivariate regressions.

## 6. Conclusion

We study the effect of two tax innovations, the introduction of VATs and ARAs, on tax revenues in sub-Saharan Africa. Our findings suggest that ARAs have on average a positive effect on tax revenues in the short- and medium-run. In the long-run, the effect on total tax revenues seems to dissipate or at least become somewhat muted. We do observe, however, significant long-term effects on income tax revenues. The effect of VATs is negligible or non-existent on average, but we observe some significant effects in models where the VAT dummy is interacted with indicators for institutional quality. The effect of ARAs, too, varies for some taxes depending on the level of institutional quality.

Overall, it appears that introduction of ARAs is an example of an institutional reform in Africa that has delivered on its promises at least for the short to medium term. For some tax revenues, notably income tax revenues, it has even led to permanent increases. Thus, ARAs have increased the reliance on more efficient taxes. VATs, on the other hand, have been less successful in raising revenues. One reason for the small effect on revenues may be that the main purpose of introducing VATs was not to increase revenues but to have a less distorting system of taxation. In particular, the VAT was often introduced to compensate for potential revenue losses due to lower tariff revenue after trade reforms. Thus, if VAT revenue is intended as a substitute for lower tariff revenue it is to be expected that we do not observe any effects on total revenue. While the overall institutional quality of a country is an important moderating factor, the specific design of the tax innovations themselves might be important for their revenue effects as well. VATs vary, for example, in the overall burden they impose on tax payers (considering rates and all exemptions). ARAs vary in their degree of autonomy from the public sector. One interesting and important avenue for future research is to explore how such details of the tax innovations affect revenues.

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### Disclosure statement

No potential conflict of interest was reported by the author(s).

### Notes

1. According to our data, many African countries had average tax revenues to GDP ratios of less than 10 per cent of GDP during the sample period. Countries like Chad, Nigeria, or Angola even had ratios of only 5–6 per cent.
2. Another recent study that explores the link between VATs and public revenues is Baskaran (2014). However, he neither focuses exclusively on sub-Saharan Africa nor allows for effect heterogeneity. Other related contributions are Keen and Lockwood (2006) who show that the VAT is associated with higher revenues in OECD countries, Ebeke and Erhart (2011) who find that VATs reduce tax revenue instability in developing countries, and Desai and Hines (2005) who show that the VAT is associated with lower exports.
3. Baskaran (2014) conducts a rudimentary quantitative assessment of how ARAs affected revenues. However, as for the VAT he neither focuses on sub-Saharan Africa only nor allow for heterogeneous effects. Fjeldstad and Moore (2009) provide a comprehensive qualitative description of the ARA model.
4. There is some ambiguity in the literature about the date of the French VAT introduction. The VAT in its original form was introduced in 1948 (Bird & Gendron, 2007); the modern variant was introduced in 1954.
5. A theoretical discussion of various design elements of a VAT is offered by Agha and Haughton (1996).
6. This specification is the regression analogue of the difference-in-difference approach.
7. To be more specific, country fixed effects cleanse out systematic differences between, say, Francophone and Anglophone countries. This is essential considering that francophone countries were early adopters of VATs and Anglophone countries where early adopters of ARAs.
8. Note that given the incidental parameters problem in probit models, we do not include country and year dummies in the first stage of either model.
9. The results from the first stage are collected in Table A5 in the Online Appendix. They show, in particular, that the exclusion restrictions perform reasonably: The number of contiguous countries with a VAT is positively related to the probability that a given country introduces a VAT but has no effect on the probability for an ARA, and vice versa. An alternative approach to account for self-selection would be to follow Ebeke and Erhart (2011) and use the exclusion restrictions as instruments in an IV approach. This is a less desirable approach in our setting because we are interested in effect heterogeneity, which would require additional instruments for the endogenous interaction variables.
10. Results are available upon request.
11. Another way to evaluate the economic significance of the effect is to compare standardised beta coefficients. This would give an impression of the relative importance of the tax innovations compared to other controls. Standardised beta regressions suggest that ARAs are in the short to medium run as effective in increasing revenues as IMF non-crisis programmes. More important covariates for tax revenues, however, are the share of agriculture in GDP and GDP per capita. These results are available upon request.

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