Regional Economic Integration and Tax Revenue: East African Community

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Abstract

The ultimate goal of regional integration is the long-term high economic growth for member states. Tax revenues are critical to achieving this objective, given the high dependence of developing countries on this fiscal revenue. However, empirical studies have been unable to determine whether regional integration improves or impedes the mobilization of taxes. We use data from 1980 to 2014 in order to estimate a tax model; the results based on the generalized method of moments technique reveal that East African regional integration has had a significant impact on tax revenue owing to the presence of good institutions. We advocate any policy agenda aimed at improving institutional environment, financial sector, macroeconomic stability, and manufacturing and trade, as well as a well-integrated approach to reduce a shadow economy. Finally, given the deleterious nature of capital account liberalization, we believe that cautiously designed capital control policies are likely to enhance tax collections in East Africa.

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I. Introduction

Tax revenues are critical to sustainable development since they are almost the only resource in development, poverty reduction and delivering public services, in addition to increasing state capacity, accountability, and responsiveness to their citizens (OECD 2014). However many sub-Saharan African countries face difficulties in raising tax revenue for public purposes, perhaps owing to low per capita incomes, an economic base in subsistence agriculture, poorly structured tax systems, and weak tax and customs administrations. Of course, an automatic increase in tax revenues generated by a larger tax base, which reduces the deficit or even produces a surplus, is welcomed to the public balance. Nevertheless, East African countries have embraced an approach to economic integration that risks a loss of revenue for the member countries. Statistical evidence reveals that, while the proportion of customs revenue to total tax in Burundi declined from 53.3% in 2007 to 52.0% in 2008, the proportion of international trade taxes to total revenue in Kenya declined from 38.6% in 2007 to 37.8% in 2008. On the other hand, in Tanzania, the share of customs revenue to total revenue marginally declined from 44.2% in 2007 to 44.0% in 2008. In Uganda, the ratio of trade-related taxes to total revenue increased from 50.8% in 2007 to 51.7% in 2008. In Rwanda, the proportion of customs revenue to total tax revenue increased from 35.2% in 2007 to 37.5% in 2008 owing to a general increase in imports in 2008 (EAC 2010). Given such observations, scholars such as Davood (2013), argue that the major limitation of the East African Community (EAC) is the fear among member countries of losing tax revenues as a result of tariff reductions, especially given that tax is the main source of revenue in developing countries. On the other hand, however an equally convincing argument is that economic integration has a positive impact on revenue over time, particularly if trade liberalization leads to better resource allocation, thereby stimulating growth and, in turn, tax revenues.

There are numerous empirical studies on the drivers of tax revenue (Drummond *et al.* 2012, Nnyanzi 2015, Profeta and Scabrosetti 2010, Hisali and Ddumba 2013, Mahdavi

2008, Agbeyegbe *et al.* 2004, Dioda 2012) that present diverse findings. The question of whether regional integration improves or impedes the mobilization of taxes is still open to discussion. Using the EAC's developments from 1980 to 2014 as a sample of regional integration, the present study replicates previous findings in addition to tracing the role of economic integration in tax revenue mobilization and as a catalyst for the observed nexus. An important note to remember is that the EAC entered into a full-fledged Customs Union in 2010—a first step in the EAC regional integration. By implication, the abolition of all tariffs on goods and services produced by member states and the charging of a common tariff on goods from non-member states became a necessity. For example, Othieno and Shinyekwa (2011) report that the reduction in tariffs between Kenya and other EAC member states was implemented over time under the principle of asymmetry with a 2% reduction for a period of five years—a transition arrangement that ended in June 2010. Since then, all the five EAC countries have zero tariff lines in effect: Tariff rates were set at zero percent between Uganda and Tanzania in 2005 and between Uganda and the other partner states and Rwanda and Burundi in July 2007. The economic performance of the entire EAC region appears to have greatly improved in terms of growth of output, trade and per capita income of the member states, although the annual and underlying inflation rates were higher in all partner states (e.g., in 2011) compared with the figures in previous years (EAC 2012). The value of intra-EAC trade increased steadily and more than doubled in 2011, as reflected in the share of total EAC trade, which improved from 7.8% in 2005 to 11.4% in 2011. Economists have not been able to arrive at a consensus on the reasons for the such observed phenomenon, with some attributing it to the increased market size, economies of scale, and free movement of factors of production across member states and others emphasizing the role of other factors such as the elasticity of supply and demand of the commodities traded and the behavior of exchange rates in the region (Stegurescu 2009). However, it is evident that overall domestic resource mobilization via taxation in the EAC partner states is still below its potential (EAC 2012). For example, between 2003 and 2011, the respective tax-to-GDP ratios of the Sub-Saharan Africa Region (SSA) and the EAC sub-region were, on average, 16.6% and 14.2%, respectively. From 1992 to 2011, the ratio reduced from 20.5% to 15.9% in Kenya and 16.7% to 13.7% in Burundi, whereas it increased from 5.7% to 13% in Rwanda, 15.1% to 15.6% in Tanzania, and 7.6% to 16% in Uganda. As presented in Table 1, over the 2008~2012 period, after the implementation of the Customs Union, the tax-to-GDP ratio remained static in Kenya (approximately 15.9%); fell in Uganda, Tanzania, and Burundi from 12.9% to 11%, 14.9% to 11.7%,

and 16.5% to 14.2%, respectively; and increased in Rwanda from 12.2% to about 13.7%. Economists (e.g., Gupta 2007, Botlhole 2010, Diod 2.012, Eltony 2012, Hisali and Ddumba 2013, Nnyanzi 2015) have been attempting to explain the drivers of tax revenue collection for years and the debate continues to this day.

Table 1. Tax revenue

Year	Burundi		Kenya		Rwanda		Tanzania		Uganda	
	US dollar	GDP (%)	US dollar	GDP (%)	US dollar	GDP (%)	US dollar	GDP (%)	US dollar	GDP (%)
2008	200	16.5	6932	15.9	649	12.2	3352	14.9	1898	12.9
2009	227	18.1	6908	15.5	639	12.1	3355	14.8	2073	12.2
2010	295	13.7	7760	15.7	708	12	3696	14.8	2201	12.0
2011	350	14.3	7923	15.9	905	13.1	3944	15.6	2398	16.1
2012		14.1	6766	15.9	6062	13.7	7178	11.7	6528	11.0

(Notes) (i) GDP: Gross Domestic Product, EAC: East African Community, US: United States.
       (ii) The values are in million US dollars, except for percentages.
(Source) World Development Indicators (various years)

We contribute to the debate by showing that the role of economic integration in East African tax revenue is driven by institutional quality. The theoretical rationale for regional integration includes the benefits of trade creation, greater economies of scale from profitable competition, increased investment leading to increased employment opportunities and division of labor, and improved bargaining power (Shinyekwa and Mawejje 2013). All these work together to help achieve the ultimate goal of regional integration, which is the attainment of long-term high economic growth and sustainable development. Logically, it is inconceivable that this can happen without an increase in the revenues of member states. Although the general conclusion flowing out of the empirical studies that have assessed the performance of regional blocs in Africa (Longo and Sekkat 2001, Njuguna 2000) is that member countries have failed to achieve their objectives of increasing intra-regional trade, in particular, and fostering general policy coordination, the contribution of such integration efforts to revenue mobilization is still an open-ended issue. We bridge this gap by investigating the extent to which the nexus could be quantifiably relevant and how institutional quality does or does not explain the

final outcome. Note that the relevance of institutions is not unambiguous. There have been noticeable changes in the institutional environment in East Africa in the past last two decades, during which tax revenues have been volatile in the presence of economic integration. Based on trade theory and given that the EAC is a trade bloc, the theoretical underpinning of the relationship between institutions and trade can be found in the lack of enforcement of contracts that may serve as the customs duties on risk-neutral traders and decrease in trade (Anderson and Young 1999). Since weak institutions act as significant barriers to trade, belonging to a trade bloc is equally likely to be affected by the quality of institutions. However it is possible that institutions are weakly related to trade (Rodrik *et al*. 2002). Countries with good quality of institutions may be more likely to facilitate economic integration and trigger other factors that could positively affect tax revenue, although the opposite is also possible, particularly in the case of trade-related goods that are scarce worldwide, such as minerals and precious metals.

This study makes three main contributions to literature. First, it is the pioneering study to assess the impact of economic integration on the tax revenues after the implementation of the East African Community Customs Union (EACCU). Second, we examine the quantitative significance of the role played by institutional quality in the nexus between tax revenue and economic integration. This is a novel analysis that would be handy in the design of relevant policy packages aimed at enhancing tax revenue. Third, to gain a deeper understanding of the main catalysts of tax revenue in the EAC countries, we focus on the size of the shadow economy, capital account liberalization, and financial development without sidelining the traditional drivers of the same. The results of this study could be used to design integration-oriented programs and policies, in terms of tax changes and institutional improvements. Moreover, the study is timely given the present situation in the EAC; There is currently a bid in the region to harmonize tax policies, reform tax structures and continue with the structural adjustment process in order to ease the cost of doing business, eradicate poverty, rationalize the budget, and encourage private investments These efforts are ultimately intended to foster competitiveness, employment and sustainability of public finances for investment promotion and the free movement of goods and services in the EAC. As member states grapple with improving scores in the business environment in their countries, a comprehensive analysis on the quantitative benefits or detriments of such institutions and in particular, a method of identifuing these institutions may provide an insight into which policies that are likely to be relevant for the region as it embraces deeper integration while sustaining its only stable source of revenue, i.e., tax.

Our analysis is related to those propunded by Othieno and Shinyekwa (2011), Semkunde (2012), and Shinyekwa and Mawejje (2013). However, none of these studies endeavors to explain the observed linkage between revenue mobilization and economic integration after the implementation of the EACCU. We cover a relatively longer period (1980~2014) that includes the time before and after implementation of Custom Union. Moreover the inclusion of the quality of institutions as an important factor in explaining the tax revenue-regional integration nexus makes our analysis different from the previous works. We explore the role of capital account liberalization, the shadow economy and financial development, separately, to better capture the most significant variables informing policy without sidelining the traditional drivers of tax revenue. In addition, the current study focuses on East Africa, a region that has received less attention in empirical literature. We believe a disaggregation of institutional quality in the region will yield relevant policies that directly or/and indirectly impact on tax revenues. Overall, our study findings reinforce the need for a policy agenda that is aimed at improving the institutional environment and the financial sector while discouraging an increase in the underground economy. It also points to the need for a cautious undertaking of capital account liberalization as it may be to the disadvantage of the much depended-upon tax revenue in the member states.

The rest of the paper is organized as follows: Section II presents an overview of the East African Community while Section III is the empirical literature. Section IV explains the methodology of the study and the data used in the analysis. Section V discusses the estimation results, whereas Section VI presents the summary and conclusions.

II. The East African Community

The EAC is a regional integration bloc consisting of Burundi, Kenya, Rwanda, Uganda and Tanzania, which houses its secretariat. Originally founded in 1967, the EAC collapsed in 1972 but was officially revived on 7th, July 2000 with a vision to create wealth, raise the living standards in East Africa, and enhance the international competitiveness of the region through increased production, trade and investments (Mugisa 2009). Integration efforts started with the signing of the agreement for the establishment of the permanent Tripartite Commission for East African Co-operation in

1993 by Kenya, Uganda and Tanzania. Economic cooperation was considered the basis of political cooperation in the long run. Although, it comprised only three countries (Kenya, Uganda and Tanzania), its membership was expanded in 2007 with the accession of Burundi and Rwanda. In 2005, the EAC became a Customs Union with the primary objective of creating more trade within the region and, in turn, enhancing growth. Under this arrangement, the EAC partner states adopted a Common External Tariff (CET), in addition to the elimination of internal tariffs on all goods and services from member states (Othieno and Shinyekwa 2011).

According to the World Trade Organization (WTO 2012) the implementation of the customs union led to a steady increase in the value of intra-EAC trad; it more than doubled from 1.8 billion US dollars in 2005 to 4.9 billion US dollars in 2011 an improvement from 7.8 percent to 11.4 percent-although There are significant differences among member states. In spite of the growth in intra-EAC trade performance, impediments like poor infrastructure and insufficient domestic revenues still persist (Buigut 2012). With regard to differences among member states. In Uganda for example, the share of international trade tax revenue in total government revenue, which stood at 20% in 2000, declined over time and has stagnated at 9% since 2006; Similarly, in Burundi, the proportion of customs revenue to total tax declined from 53.3% in 2007 to 52.0% in 2008. In Kenya, the proportion of international trade taxes to total revenue declined from 38.6% in 2007 to 37.8% in 2008. In Tanzania, the share of customs revenue to total revenue marginally declined from 44.2% in 2007 to 44.0% in 2008. In Uganda, the ratio of trade related taxes to total revenue increased from 50.8% in 2007 to 51.7% in 2008. In Rwanda, the proportion of customs revenue to total tax revenue increased from 35.2% in 2007 to 37.5% in 2008 due to general increase in imports in 2008 (EAC 2010, Othieno and Shinyekwa 2011). The question as to whether the EAC regional integration contributed to the observed increase or fall in the tax revenue of member states continues to be a subject of empirical research.

III. Literature Review

Few studies have examined the nexus between tax revenue and economic integration. Hansson and Olofsdotter (2004) studies the effect of integration on capital taxation in a

number of countries from the Organisation for Economic Co-operation and Development (OECD) over several decades and found out that increased integration leads to lower corporate tax rates. On the other hand, Haufler *et al.* (2006) investigated the relationship between economic integration and redistributive taxation in OECD countries using a simple political economy model. Among their major findings, economic integration increases the efficiency cost of capital taxation, but also increases the redistributive benefits of the tax from the perspective of the median voter mulling on a redistributive income tax rate. Gastaldi *et al.* (2013) used a sample of OECD countries to addresses the issues of whether and how the degree of economic integration affects central government tax revenues and the decentralization of the public sector. Its main finding was that an increase in economic integration generates a downward pressure on implicit tax rates on mobile capital, which is growing at increasing rates amid economic integration, and that the process of tax erosion appears to contribute positively to increased public sector decentralization.

From the perspective of developing countries, Hamilton (2009) examined the impact of complete tariff liberalization on imports from Southern Africa Customs Union members using the Tariff Reform Impact Simulation Tool model. The results projected a short-term fall in tariff revenue by 38.3% as well as a reduction in total revenue by 13.5%. In the case of Burundi for example, the short-term impact of complete tariff liberalization on imports was projected to involve tariff revenue losses of 8.1% and a reduction in total revenue of about 3.4%, though imports were expected to increase marginally by 0.5%. In a related study, DeRosa *et al.*, (2002) noted that not all EACCU partner countries would realize net economic gains unless the Common External Tariffs (CET) was set appreciably below the average tariff level of Uganda, whose Most Favored Nations (MFN) tariff line was far below that of other partner states. If the CET were set above Uganda's average MFN, say at about 11%, the country's economic welfare and the progress of its structural reform program, to which trade reform has been central since the early 1990s, would be significantly compromised. Castro, DeRocha and Kraus (2004) in a later study on the trade and revenue impacts of the EACCU using a partial equilibrium model and 2002 data, suggested that the whole region would likely experience modest decline in customs revenue. This was confirmed by Khorana *et al.* (2009), who observed a notable loss of revenue and a lower welfare effect caused by reduction and eventual elimination of tariffs with Kenya. Unfortunately their study is limited to Kenya and Uganda and ignores the other member states, perhaps due to data availability corstraints. The inclusion of the missing countries is likely to offer a different

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overall impact of the bloc on tax revenue, especially given the different times each of these countries joined the bloc and engaged in the Customs Union.

Besides regional integration, the current study focuses on four strategic variables: the quality of institutions, the size of the shadow economy, capital account liberalization and financial development. The empirical studies on institutions offer conflicting results on governance indicators and tax revenue. For example, Bird *et al.* (2004), using a sample of 110 developing countries for 1990~1999, found that in addition to per capital GDP, civil liberties and political rights, political stability, rule of law and the relative absence of corruption were positively related to tax revenue. Meanwhile, demographic growth, the degree of inequality, the size of the shadow economy, the regulation of entry and the share of agriculture in GDP are associated with lower levels of tax revenue. Trade openness showed an insignificant influence. Similarly, Gupta (2007) investigated revenue performance for 105 developing countries over 25 years and found that corruption had a significantly negative effect on revenue performance. Additional findings indicated that several structural factors like share of agriculture in the GDP had a strong negative and significant relationship with revenue performance. In addition, per capita GDP and trade openness were positively significant, and foreign aid improved revenue performance significantly, but debt did not. A later related study, Dioda (2012) examined the determinants of tax revenue in Latin America and the Caribbean between 1990 and 2009, using panel data econometric methodologies from 32 countries. Dioda concluded that degree of political stability, in addition to civil liberties, female labor force participation, the age composition of the population, the level of education, the population density as well as the size of the shadow economy, exerted a statistically significant influence on tax revenue. Similarly, Ajaz and Ahmed (2010) studied the effects of corruption and governance on tax revenue in developing countries, using a panel data set for 25 developing countries during 1990~2005 and a Generalized Method of Moments (GMM) framework. They showed that corruption had a negative effect on tax collection, while good governance contributed to better tax collection. In the same study, it was also found out that in developing countries, tax collection depends on efficiency of government and that the voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption are important factors in determining tax revenues. It recommended that developing countries should strive to reduce the opportunities for corruption in tax administration and change the incentive structure for tax officials if they are to increase their tax revenue collection. These results are corroborated by Botlhole (2010), who investigated the role

of institutional environment and other factors on tax effort in Sub-Saharan Africa over 1990~2007. However, Mahdavi (2008), in his analysis of 43 developing countries over the period 1973~2002, found that civil liberties and political rights were statistically insignificant just as the share of agriculture in the GDP, female labor force participation, and economic volatility. Unsurprisingly a positive correlation between tax revenue and openness of the economy, literacy rate and GDP per capital growth rate was found to be strong, whereas an increase in foreign aid, population aging, in population density, and in inflation had a negative relationship with tax revenue. Nawaz (2012), concluded that corruption had a significant negative impact on the levels of tax revenue collection and caused long-term damage to the economy by discouraging investment, increasing the size of the informal economy, distorting tax structures and corroding the tax morality of taxpayers, though he failed to dismiss a Granger causality. It appeared that higher tax rates could induce more corruption in an economy by incentivizing tax evasion.

We deem the shadow economy, here defined as the part of the economy involving goods and services which are paid for in cash but not declared for tax, to be equally critical in understanding the drivers of tax revenue in the EAC. Recent estimates indicate that it represents 10%~15% of the GDP in developed countries, and about 30%~40% in developing countries (Schneider 2010). Compared with SSA, which attracts almost 40.2% in underground economic activities, the EAC averaged about 42.8% from 1990 to 2008. The empirical evidence on the relationship between tax revenue and the shadow economy is mixed. For example, Kodila-Tedika and Mutascu (2013) explored the effects of the shadow economy on tax revenues for several African countries, on the basis a panel-model approach applied to a data-set from 1999 to 2007. The main finding was that the shadow economy had a significant and negative impact on tax revenues. On this basis, the authors suggested a control of shadow economy if African governments were to maximize the tax collections. On the other hand, Johnson *et al*. (1998), and Schneider and Enste (2000) pointed to a positive linkage between the two variables. The argument made was that since the collection of taxes involved an increase in regulations to enable governments collect additional tax revenue, it adds to the tax burden which was cited as one of the main causes of the growth of the underground economy. Giles and Tedds (2002) held a similar view. In this regard, Williams (2014) observed that reducing the shadow economy may not necessarily lead to increased tax revenue. Given these polar conclusions, in the current study, we re-evaluate the role of the shadow economy in tax revenue in the case of East Africa.

The other important variable of interest in our study is capital account liberalization.

While plenty of studies have concentrated on trade liberalization with regard to goods and services (Adam *et al.* 2001, Agbeyegbe *et al.* 2004), there is scant literature on the removal of capital controls on tax revenue. The recent financial crisis, also named the Great Recession, is said to have spurred a reconsideration of the appropriate role of capital controls for several macroeconomic variables. The few available studies that consider capital account liberalization as impacting tax revenue are equally inconclusive. For example, Devereux *et al.* (2003) studied whether exchange controls, particularly on the capital account, affect the choice of corporate tax rates. They used a panel of 21 OECD countries over the period 1983~1999, and they find some evidence that the level of a country's tax, other things equal, is lowered by a unilateral liberalization of exchange controls, and that strategic interaction in tax-setting among countries is increased by liberalization. They, however, note that although the effects are stronger if the country has high tax rates, and if the tax is the statutory or effective average one, there is also evidence that countries' own tax rates are reduced by liberalization of exchange controls in other countries. On the other hand, Ilievski (2012) used panel data on 126 countries over the period 1990~2008, and found that capital account openness positively impacts the level of tax revenue. More specifically, the impact of financial liberalization was predominant in countries where the depth of the banking sector was greater.

To enable comparisons with the previous studies, we also identify several other factors generally considered in the existing literature for inclusion in our model. These variables must be controlled if we are to capture the impact of the aforementioned variables of interest. On this basis, factors such as share of agriculture and manufacturing in the GDP, aid, public debt, *inter alia*, are accorded space in the model. Interestingly, a mix of findings characterizes the direct effect of the selected variables. For example, Agbeyegbe *et al.* (2004) used a panel data set of 22 sub-Saharan countries and found a positive influence of trade liberalization, agricultural share, industrial share, government consumption, and terms of trade on total tax revenue and a negative effect of inflation. On the link between aid and taxation, Bhushan and Samy (2012) used more recent data as well as a new and more detailed dataset and found that aid had no significant impact on taxation in sub-Saharan African Africa. Their results are robust to different specifications and time periods, as well as thresholds. However, Hisali and Ddumba (2013) documented a negative association between grants and tax revenue though the authors noted that the result was offset by the positive association of loans that resulted in some modest increases in tax revenue in the long run. The coefficient on the per capita

income variable suggested that the tax system was inelastic.

Elsewhere, Profeta and Scabrosetti (2010) analyzed the determinants of the tax revenue of 39 developing countries over the period 1990~2004, including 11 Asian, 19 Latin American and nine countries recently inducted into European Union (EU) and identified statistically significant differences in the regional determinants of tax revenue. For instance, GDP per capita and the debt ratio were not statistically significant determinants of tax revenues in Asian economies included in the sample, but were positively statistically significant determinants for Latin American countries. The share of agriculture in the GDP was found to influence tax revenue negatively in Latin America but was not significant in Asia; the openness of the economy had a positive impact on tax revenue in Asia and Europe, but a negative in Latin America. Nnyanzi (2015) used time series data for the period from 1987/88 to 2010/11 to analyze the main drivers of tax revenue in Uganda with particular focus on the agricultural sector. The major findings from the two models adopted - the Error Correction Model (ECM)/ Short-run Model and Long-run model - show in varying degrees contractionary and expansionary effects of the structural, macro and external policy variables on the share of tax revenue in Uganda. While in the short-run period, all the variables selected in the model – agriculture, manufacturing, GDP per capita, inflation, real exchange rate, fiscal deficit, grant and debt - were found to be significant determinants of Uganda's tax effort, in the long-run, only agriculture share in the GDP, budget deficit-to-GDP ratio and the underlying inflation that were important in determining Uganda's tax-to-GDP ratio and had contractionary effects.

The empirical literature is dominated by studies on what drives tax revenue and less by those that seek an explanation of that nexus. Evidence of the perceived linkage between regional economic integration and tax revenue is scanty, conflicting almost non-existent for the EAC, a region that badly needs relevant coherent policies based on empirical evidence to facilitate full economic integration. The imprecise findings could be attributed to the sensitivity of the set of countries selected and the period of analysis. The current study endeavors to bridge the gaps by examining the tax revenue implications of EAC regional integration as a single regional bloc from 1980 to 2014.

IV. Methodology

A. The model

In order to establish the impact of the EAC regional integration on the tax revenue of the partner states besides identifying other determinants of tax revenue in the EAC region, this study extends the prominent tax framework developed by Heller (1975). According to the workhorse model, the public decision maker's utility function is given by:

$$U = (Y - T, G, D, F + L) \tag{1}$$

where, U_{Y-T} and $U_g \succ 0$; U_D and $U_{F+L} \prec 0$, if D and $F+L \succ 0$; U_D and $U_{F+L} \succ 0$ if D and $F+L \prec 0$. Y-T (GDP, Y less tax revenue, T) is the private sector's disposable income; D is net domestic government borrowing (non - tax revenue); G is total government expenditure; and $(F+L)$ is net foreign financing comprising of grants (F) and loans (L) including external arrears accumulation or decumulation (net amortization). The variables D and $(F+L)$ can either be positive or negative, thus, the first derivatives of U with respect to D and $(F+L)$ are either negative or positive. All variables in the model are in real per capita terms.

The budget constraint faced by the decision maker is given by:

$$T + (F + L) + D = G \tag{2}$$

The desired tax revenue is determined by maximizing (1) subject to (2). It is assumed that the utility function takes the following quadratic form:

$$U = \alpha_1 (Y - T - T_s) - \frac{\alpha_2}{2}(Y - T_s)^2 + \alpha_3 (G - G_s) - \frac{\alpha_4}{2}(G - G_s)^2 - \alpha_5 D - \frac{\alpha_6}{2}D^2$$
$$- \alpha_7 (F + L) - \alpha_8 (F + L)^2 \tag{3}$$

Where the α's are positive constants. Ys and Gs are subsistence levels of income and government expenditure respectively. Since Ys and Gs are not observable, it is assumed

that they are simple linear functions of income such that $G_0 = g_0 + g_1 Y$ and $Y_s = y_0 + y_1 Y$. Maximizing (3) with respect to T, G, and D after substituting for Gs and Ys subject to the budget constraint (2), yields the following reduced form for the desired equation for the tax revenue-GDP ratio $(T/Y)^*$ after simultaneously solving the optimal equations:

$$\left(\frac{T}{Y}\right)^* = \left(\frac{\alpha + \alpha_4 g_0 - \beta y_0}{\beta + \alpha_4}\right)\left(\frac{1}{Y}\right) - \left(\frac{\alpha_4}{\beta + \alpha_4}\right)\left(\frac{F+L}{Y}\right) + \left(\frac{\alpha_4 g_1 - \beta y_1}{\beta + \alpha_4}\right) \qquad (4)$$

Where

$$\alpha = \left(-\alpha_1 + \alpha_3 - \frac{\alpha_1 \alpha_4}{\alpha_6} + \frac{\alpha_4 \alpha_5}{\alpha_6}\right) \quad \text{and} \quad \beta = \frac{\alpha_2(\alpha_4 + \alpha_6)}{\alpha_6}.$$

Variable D, disappears while solving for the desired tax revenue GDP ratio. Let us now assume that the actual tax revenue to GDP ratio (T/Y) is a function of the desired tax revenue to GDP ratio $(T/Y)^*$ and certain tax bases (B) as well as the status of macroeconomic policies (M) and the degree of openness of the economy. In this study, the degree of openness of an economy to other economies is captured by the EAC regional integration dummy variable (EAC), given from the literature that regional integration increases the degree of openness of an economy (Mclntyre 2005). That is:

$$\left(\frac{T}{Y}\right) = f\left\{\left(\frac{T}{Y}\right)^*, B, M, EAC\right\} \qquad (5)$$

Substituting forin Equation (6) yields

$$\left(\frac{T}{Y}\right) = f\left\{\frac{1}{Y}\left(\frac{F+L}{Y}\right), B, M, EAC\right\} \qquad (6)$$

Since β is positive and α could be either be negative or positive, the actual tax revenue to GDP ratio (T/Y) is a negative function of $(F+L)/Y$ and an uncertain function of the inverse of per capita income $(1/Y)$. Equation (6) identifies per capita income (Y),

foreign financing as a ratio of GDP $\dfrac{F+L}{Y}$, elements of the country's tax bases (B) also known as tax handles, macroeconomic policies (M) and the degree of openness of an economy captured by EAC regional integration as the major factors that influence the tax revenue to GDP ratio in the EAC.

From Equation (6), the empirical EAC tax revenue model is specified as follows:

$$TR_{it} = \alpha + \theta EAC_{it} + X'_{it}\beta + u_{it} \tag{7}$$

$$i = 1,2,...,5; \; t = 1,2,...,T; u_{it} \sim iid(0,\sigma^2)$$

Where TR_{it} is tax revenue expressed as a percentage of the GDP in a country i at time t; EAC_{it} is the EAC regional integration dummy variable taking on the value 1 for the year when the country i joined the EAC and zero otherwise; X'_{it} = the set of control variables; θ is the coefficient of the EAC regional integration dummy variable; β is vector of coefficients of the set of control variables; and, u_{it} is the error term, assumed to be independent and identically distributed with mean zero and variance σ^2, that is, $u_{it} \sim iid(0,\sigma^2)$

Using panel data, we postulate a first-order dynamic panel model of the following form that includes all variables of interest in the study:

$$\begin{aligned}
TR_{it} = {} & \beta_1 TR_{it-1} + \beta_2 EAC_{it} + \beta_3 GDP_{it} + \beta_4 \ln GDPPC_{it} + \beta_5 \ln POP_{it} + \beta_6 INFL_{it} \\
& + \beta_7 DEBT_{it} + \beta_8 \ln AID_{it} + \beta_9 \ln LFPR_{it} + \beta_{10} \ln MAN_{it} + \beta_{11} \ln AGRIC_{it} \\
& + \beta_{12} TRADE_{it} + \beta_{13} \ln INST_{it} + \beta_{14}(EAC*INST)_{it} + u_i + \gamma_t + \varepsilon_{it}
\end{aligned} \tag{8}$$

Where *GDP* is the growth rate of the GDP; *GDPPC* is real Per Capita GDP; *POP* is the urban population; *INST* is institutional quality; *INFL* is the annual inflation rate, and *DEBT* is the Public debt, while *AID* is foreign aid, *TRADE* is proxy for trade liberalization, *MAN* is the share of agriculture in the GDP, *AGRIC* is a share of manufacturing in the GDP, *LFPR* is the labor force participation rate, $u_i, \gamma_t \, \& \, \varepsilon_{it}$ are the unobserved country effect, unobserved time effect, and, unobserved random effect error term, respectively; where i represents the i-th country and t is the t-th time period. (i=1, 2, ..., 5; t=1, 2, ..., T; u_{it}~$iid(0,\sigma^2)$).

In Equation (8) we control for the bias that would result from the inclusion of a lagged dependent variable and the possible endogeneity of several of the explanatory

variables. Therefore, we decided to use the Arellano – Bond (1991) difference GMM estimator first proposed by Holtz-Eakin, Newey and Rosen (1988) and later popularized by Arellano and Bond (1991). Instead of using only the exogenous instruments, the first differenced lagged dependent variable is also instrumented with its past levels. This eliminates the autocorrelation that would arise from the lagged variable TR_{it-1} in the model. However, it is possible that the lagged levels of the regressors are poor instruments for the first-differenced regressors. In this case, it is recommended to use the augmented version known as the system GMM to increase efficiency. We present the final results from the system GMM, though the we also estimate the model using the difference GMM. As the results do not vary substantially, we do not present them here; however, they are available on request.

B. Data

Data covers a period 1980~2014. The main variables are tax revenue expressed as a percentage of the GDP, the EAC dummy and institutional quality, capital account liberalization, the size of the shadow economy and financial development. The EAC regional integration variable is measured as a dummy variable taking on a value of one for the year when country i joined the EAC regional integration bloc and zero otherwise. Data on the other explanatory variables identified in the literature and included in our model are obtained from various sources as shown in Table 2. All variables are logged with the exception of the EAC dummy, inflation, institutions and capital openness, to help us deal with potential outliers in our dataset (Leibrecht and Scharler 2010, Corcoran 2007). Table 2, Table 3 and Table 4 display the summary statistics, the pairwise correlation matrix, and the variable definitions, measurement and source, respectively. However, the pair wise correlation matrix can be spurious, reflecting the effect of the presence of unobserved country effects, so we need to investigate these relationships in a multivariate regression analysis. The list of abbreviations can be found in the Appendix 1.

Table 2. Variables and data source

Variable	Description	Source
lnTax_gdp	Log of tax revenue as a percentage of GDP. It was used after failure to obtain data on customs revenue as share of total revenue for the member states.	WDI
EAC	Dummy variable; 1 for the year when country *i* joined the EAC regional integration bloc and zero otherwise. A negative relationship is expected.	
INST	Average sum of the six governance indicators: voice and accountability, regulatory quality, rule of law, control of corruption, government effectiveness and political stability.	WGI
voice_acc	Voice and accountability index captures perceptions about how the citizens participate in selecting their governments, freedom of expression, freedom of association and a free media. A positive sign is expected.	WGI
reg_qlty	Regulatory quality index captures the ability of the government to formulate and implement sound policies aimed at promoting the private sector. A positive sign is expected.	WGI
corr_contr	Corruption index measures the extent to which public power is exercised for private gains. A positive sign is expected.	WGI
gov_eff	Government Effectiveness index measures the quality of public and civil services and the ability to formulate and implement good policies. A positive sign is expected.	WGI
rule_law	Rule of law index captures not only the quality of contract enforcement but also the likelihood of crime and violence. A positive sign is expected.	WGI
pol_stab	Political stability and absence index measures the likelihood that the government will be destabilized either through domestic violence or overthrown by unconstitutionally means. A positive sign is expected.	WGI
Kaopen_norm	Capital openness index is scaled in the range between −2.5 and 2.5, with higher values standing for larger degrees of financial openness.	Chinn-Ito
L.lnGDPPC	It is a logged real GDP per capita in US dollars; expected to be positive.	WDI

Variable	Description	Source
L.GDP_gr	It is a logged annual percentage growth rate of GDP at market prices based on constant local currency; expected to be positive.	WDI
Lndebt_gni	Public debt measured as external debt stocks (% of GNI); positive relationship is expected since a large debt requires the government to raise the revenues necessary to service it.	WDI
Infl_cpi	Annual Inflation, a proxy variable for the macroeconomic policy environment; measured by the consumer price index. A negative relationship is expected.	WDI
lnUrban_pop	Urban population (% of total); either positive or a negative	WDI
lnshad	Log of the shadow economy; A negative impact on tax revenue is expected.	Schneider *et al.* (2010); Elgin and Oztunah (2012).
lnManuf_gdp	Manufacturing share (% of GDP)	WDI
lnAgric_gdp	Agriculture share (% of GDP)	WDI
lnCREPRI_gd	Domestic credit to the private sector (% of GDP).	WDI
LnM2_gdp	Money and quasi money (% of GDP).	WDI
lnnaid_gni	Net official development assistance (ODA)	WDI
lnTrade	Trade (% of GDP) – in logs; it is a proxy for trade liberalization	WDI
lnLFPR	Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)	WDI

Table 3. Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
lntax_gdp	2.552329	0.273641	1.256186	3.020148	116
EAC	0.348571	0.477885	0	1	175
L.GDP_gr	4.262095	6.348586	-50.2481	35.22408	158
lndebt_gni	3.879094	0.697214	2.577492	5.169631	167
L.GDPPC_05	5.707829	0.442753	4.917459	6.464808	160
lnUrban_pop	2.569945	0.523426	1.467644	3.430789	174
infl_cpi	17.071	28.41166	-2.40593	200.026	172
lnTrade	3.688423	0.300858	2.979814	4.288519	164
lnManu_gdp	2.218567	0.330729	0.627359	2.907173	164
lnaid_gni	2.488639	0.635978	0.892079	4.553308	166
lnLFPR	4.400418	0.096858	4.175924	4.506454	124
lnAgric_gdp	3.638709	0.261574	3.12403	4.277072	165
INST	-0.79681	0.38147	-1.75004	-0.12175	88
Kaopen_norm	0.28896	0.281821	0	1	165
lnshadow	3.749869	0.244817	3.36557	4.205289	162
corr_control	-0.7775771	0.4102154	-1.463737	0.6550024	88
gov_effect	-0.6760702	0.4037119	-1.726857	0.07444	88
pol_stab	-1.162528	0.653465	-2.513828	0.0692917	88
reg_qlty	-0.5344961	0.4862262	-1.672969	0.2496185	88
rule_law	-0.8230594	0.418715	-1.727859	-0.1477047	88
Voice_Account	-0.8071182	0.4665139	-1.750095	-0.1315184	88

(Note) lnTax_gdp: log of tax revenue share in gross domestic product; EAC: East African Community; INST: institutional quality; voice_acc: voice and accountability; reg_qlty: regulatory quality; corr_contr: control of corruption; gov_eff: government effectiveness; rule_law: rule of law; pol_stab: political stability; Kaopen_norm: capital account liberalization; L.lnGDPPC: lagged log of gross domestic product; L.GDP_gr: lagged growth rate of gross domestic product; lndebt_gni: log of external debt as percentage of gross national income; Infl_cpi: inflation rate; lnUrban_pop: log of urban population; lnshad: log of shadow economy; lnManuf_gdp: log of manufacturing share; lnAgric_gdp: log of agriculture share; lnCREPRI_gd: log of domestic credit to private sector; lnM2_gdp: log of money and quasi money; lnnaid_gni: log of net official development assistance; lnTrade: log of trade share in gross domestic product.

(Source) Authors calculations

Table 4. Pairwise correlation of explanatory variables

	EAC 1	L.GDP_gr	lndebt_gni	infl_cpi	lnTrade	lnManuf_gdp	lnaid_gni	lnLFPR	lnAgric_gdp	INST	kaopen_norm	lnshad
EAC	1											
L.GDP_gr	0.1958	1										
lndebt_gni	-0.4847	-0.2191	1									
infl_cpi	-0.2207	-0.2024	0.0288	1								
lnTrade	0.4067	0.0712	-0.0765	-0.1713	1							
lnManuf_gdp	-0.0786	-0.1774	0.0729	-0.339	0.157	1						
lnaid_gni	-0.2318	-0.0867	0.3809	-0.1788	-0.2038	-0.1219	1					
lnLFPR	-0.275	-0.0156	0.2756	0.0116	-0.4593	-0.4095	0.6699	1				
lnAgric_gdp	-0.6508	-0.1633	0.3394	0.3356	-0.5119	-0.2392	0.3643	0.5339	1			
INST	0.542	0.2174	-0.6211	-0.2303	0.5879	-0.4178	-0.2668	-0.0366	-0.6608	1		
kaopen_norm	0.497	0.0731	-0.2737	-0.165	0.2489	0.0388	-0.3728	-0.4994	-0.5639	0.3385	1	
lnshad	-0.1328	0.1016	0.1578	0.2895	-0.3412	-0.5581	0.3122	0.766	0.417	0.2657	-0.2369	1

(Note) INST: institutional quality; Kaopen_norm: capital account liberalization; L.GDP_gr: lagged growth rate of gross domestic product; lndebt_gni: log of external debt as percentage of gross national income; Infl_cpi: inflation rate; lnshad: log of shadow economy; lnManuf_gdp: log of manufacturing share; lnAgric_gdp: log of agriculture share; lnnaid_gni: log of net official development assistance; lnTrade: log of trade share in gross domestic product; lnLFPR : log of labor force participation rate.

(Source) Author's calculations

V. Results

A. Integration and institutional quality

As presented in Table 5, we initially fail to find significant evidence of the impact of EAC regional integration on tax revenue despite the inclusion of other control variables in the model, such as, the natural logarithm of per capita income, the natural logarithm of urban population, public debt as a percentage of Gross National Income (GNI) and the GDP growth rate. It is interesting to note that when tax revenues are below

average, the impact of integration is still insignificant but potentially helpful in revenue mobilization given the positive sign of the relevant coefficient that is economically meaningful. In contrast, when tax revenues are above average, the opposite holds. A further critical analysis also reveals that dividing the sample into the before and after EACCU implementation results into a negative and positive sign for the relevant coefficient, respectively. Column (2) and Column (3) in Table 5 present this important finding. Although the coefficient is not significant at any conventional level, the sign is economically meaningful, pointing to the potentiality of economic integration to positively influence tax revenues. We propose that the quality of institutions matter in this relationship. Table 6 provides evidence for this hypothesis. When overall institutions are included in the model together with their interaction with the EAC dummy, the coefficient for EAC turns significant and positive. Specifically, it is important to report that in the presence of good institutional quality, economic integration is conducive to tax revenue mobilization. Although our results are contrary to previous findings (Shinyekwa and Mawejje 2013, Malugu 2014) that document an inverse relationship between the regional integration and the partner states' tax revenue, Ajaz and Ahmed (2010), Botlhole (2010) and Nawaz (2012), *inter alia*, corroborate our findings.

Table 5. Impact of EAC integration, liberalization, underground economy and financial depth

(on tax revenue)

Variable	(1) ALL	(2) Before EACCU	(3) After EACCU	(4) Tax below Average	(5) Tax above Average	(6) KAOPEN	(7) Shadow	(8) Credit	(9) M2
L.lntax_gdp	0.3941*** (0.0910)	0.3941*** (0.0910)	-0.3728 (0.2300)	0.4379*** (0.1189)	0.5999*** (0.1302)	0.4979*** (0.0856)	0.3260*** (0.0931)	0.3264*** (0.0929)	0.3312*** (0.0990)
EAC	-0.0085 (0.0348)	-0.0085 (0.0348)	0.0176 (0.0634)	0.0520 (0.0650)	-0.0546 (0.0538)	0.0014 (0.0333)	0.0445 (0.0371)	-0.0125 (0.0372)	-0.0295 (0.0393)
L.GDP_gr	-0.0097*** (0.0032)	-0.0097*** (0.0032)	-0.0088 (0.0090)	-0.0034 (0.0042)	-0.0154** (0.0057)	-0.0051 (0.0032)	-0.0103*** (0.0032)	-0.0053* (0.0030)	-0.0067** (0.0032)
lndebt_gni	0.0086 (0.0249)	0.0086 (0.0249)	0.0616 (0.0442)	0.0320 (0.0596)	-0.0298 (0.0358)	0.0129 (0.0224)	0.0524* (0.0308)	0.0549 (0.0333)	0.0155 (0.0355)
L.lnGDPPC_05	-0.1387** (0.0699)	-0.1387** (0.0699)	-0.3457 (0.2094)	-0.0677 (0.1020)	-0.2527* (0.1359)	-0.0919 (0.0667)	-0.1815** (0.0749)	-0.1245* (0.0691)	-0.1220* (0.0716)
lnUrban_pop	0.1546*** (0.0571)	0.1546*** (0.0571)	0.4346** (0.1872)	-0.1335 (0.1098)	0.2467** (0.1170)	0.0580 (0.0629)	0.2410*** (0.0623)	0.0897 (0.0557)	0.0827 (0.0606)
infl_cpi	-0.0032** (0.0013)	-0.0032** (0.0013)	0.0035 (0.0032)	-0.0031* (0.0016)	0.0008 (0.0024)	-0.0032** (0.0012)	-0.0035*** (0.0013)	-0.0026** (0.0013)	-0.0026* (0.0013)
lnTrade	0.1969*** (0.0673)	0.1969*** (0.0673)	0.3522* (0.1778)	0.5661*** (0.1365)	0.0170 (0.0970)	0.1971*** (0.0655)	0.2381*** (0.0694)	0.1818*** (0.0675)	0.0615 (0.0802)
lnManuf_gdp	0.1579*** (0.0596)	0.1579*** (0.0596)	0.1990 (0.1766)	0.0763 (0.1076)	0.1841 (0.1153)	0.1137* (0.0628)	0.1591*** (0.0590)	0.0660 (0.0616)	0.1055 (0.0707)
lnaid_gni	0.0536 (0.0398)	0.0536 (0.0398)	0.0375 (0.1133)	-0.1325* (0.0715)	-0.0346 (0.0669)	0.0235 (0.0412)	0.0361 (0.0373)	-0.0083 (0.0378)	0.0618 (0.0412)

Variable	(1) ALL	(2) Before EACCU	(3) After EACCU	(4) Tax below Average	(5) Tax above Average	(6) KAOPEN	(7) Shadow	(8) Credit	(9) M2
lnLFPR	-0.4741** (0.1999)	-0.4741** (0.1999)	-0.6865** (0.2932)	0.3250 (0.3174)	0.0027 (0.3614)	-0.4325** (0.1938)	0.2858 (0.2611)	0.2150 (0.2097)	-0.1528 (0.2088)
lnAgric_gdp	0.0128 (0.0949)	0.0128 (0.0949)	0.0609 (0.2251)	0.1854 (0.1727)	-0.1856 (0.1695)	-0.0232 (0.0941)	0.0433 (0.0958)	-0.0312 (0.0948)	-0.0171 (0.0973)
kaopen_norm						-0.0879* (0.0506)			
lnshadow							-0.4320*** (0.1130)		
lnCREPRI_gd								0.1908*** (0.0369)	
lnM2_gdp									0.3215*** (0.1023)
Constant	2.8165*** (0.9074)	2.8165*** (0.9074)	5.1013** (1.8408)	-1.9754 (1.5324)	2.3321 (1.6444)	2.6515*** (0.9033)	0.8566 (0.9774)	-0.0520 (0.9296)	1.3362 (0.9320)
Observations	108	108	36	51	57	103	100	99	100
Number of country_id	5	5	5	5	5	5	5	5	5
AR1 Test (*p*-value)	4.57e-06	4.57e-06	0.0755	0.0667	0.000849	3.22e-05	6.86e-05	2.75e-06	2.59e-06
AR2 Test (*p*-value)	0.703	0.703	0.600	0.895	0.476	0.710	0.957	0.581	0.576
Sargan statistic	75	75	33	53	60	72	75	75	75
Sargan-Hansen Test (*p*-value)	0.0730	0.0730	0.0998	0.282	0.485	0.0786	0.0583	0.0862	0.0937

(Note) Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6. Role of institutions in the nexus between integration and tax revenue

Variable	(1) All	(2) INST	(3) Corruption	(4) Effectiveness	(5) Stability	(6) Regulation	(7) Law	(8) Voice
L.lntax_gdp	0.4207*** (0.1012)	0.4207*** (0.1019)	0.4408*** (0.1055)	0.3574*** (0.1024)	0.3519*** (0.1093)	0.4094*** (0.1078)	0.4312*** (0.1016)	0.4340*** (0.1030)
EAC	-0.0006 (0.0364)	0.1658** (0.0758)	-0.0201 (0.0774)	0.0374 (0.0540)	0.1758*** (0.0635)	0.0225 (0.0494)	0.1317* (0.0753)	0.1279* (0.0736)
L.GDP_gr	-0.0072* (0.0037)	-0.0069* (0.0037)	-0.0070* (0.0039)	-0.0076** (0.0036)	-0.0075** (0.0037)	-0.0073* (0.0038)	-0.0071* (0.0038)	-0.0079** (0.0038)
lndebt_gni	-0.0084 (0.0275)	-0.0054 (0.0278)	-0.0000 (0.0305)	-0.0066 (0.0258)	0.0122 (0.0290)	-0.0094 (0.0280)	0.0023 (0.0271)	-0.0019 (0.0286)
L.lnGDPPC_05	-0.0968 (0.1407)	-0.2174 (0.1500)	-0.1184 (0.1463)	-0.1372 (0.1326)	-0.2580* (0.1389)	-0.1123 (0.1610)	-0.2401 (0.1550)	-0.1047 (0.1410)
lnUrban_pop	0.1795** (0.0883)	0.2143** (0.0901)	0.1074 (0.1145)	0.2403*** (0.0855)	0.1762* (0.0900)	0.1536 (0.1018)	0.2385** (0.1027)	0.1502 (0.0909)
infl_cpi	0.0007 (0.0020)	0.0008 (0.0020)	0.0016 (0.0021)	-0.0002 (0.0019)	0.0020 (0.0020)	0.0005 (0.0021)	0.0012 (0.0020)	0.0004 (0.0020)
lnTrade	0.1221 (0.0896)	0.1757* (0.0947)	0.0695 (0.0858)	0.1752* (0.0887)	0.1213 (0.1066)	0.1032 (0.0882)	0.1528* (0.0906)	0.1794* (0.1020)
lnManuf_gdp	0.0800 (0.0690)	0.0780 (0.0696)	0.1683** (0.0803)	0.0247 (0.0682)	0.0672 (0.0705)	0.0875 (0.0705)	0.0679 (0.0686)	0.1213 (0.0783)
lnaid_gni	0.0545 (0.0579)	0.0367 (0.0586)	0.0346 (0.0605)	0.0496 (0.0552)	0.0537 (0.0585)	0.0485 (0.0596)	0.0256 (0.0577)	0.0635 (0.0594)

Variable	(1) All	(2) INST	(3) Corruption	(4) Effectiveness	(5) Stability	(6) Regulation	(7) Law	(8) Voice
lnLFPR	-0.4690 (0.2819)	-0.6826** (0.2975)	-0.5384* (0.2968)	-0.6601** (0.2518)	-1.2349*** (0.4209)	-0.6248** (0.2727)	-0.6929** (0.3241)	-0.4821 (0.3012)
lnAgric_gdp	-0.0120 (0.1233)	-0.0234 (0.1246)	0.0445 (0.1304)	-0.0687 (0.1179)	-0.0565 (0.1265)	0.0211 (0.1229)	-0.0062 (0.1240)	0.0082 (0.1283)
INST	-0.1158 (0.0814)	-0.1456* (0.0829)						
eac_inst		0.2353** (0.0958)						
corr_cotrl			0.1095 (0.1178)					
eac_corr			-0.0319 (0.0969)					
gov_effiness				-0.2321*** (0.0650)				
eac_gov_effiness				0.1029 (0.0781)				
pol_stab					-0.0317 (0.0577)			
eac_polstab					0.1821*** (0.0529)			
reg_qlty						-0.0730* (0.0433)		
eac_regqlty						0.0502 (0.0727)		

Variable	(1) All	(2) INST	(3) Corruption	(4) Effectiveness	(5) Stability	(6) Regulation	(7) Law	(8) Voice
rule_law							-0.1083* (0.0565)	
eac_rule							0.1690* (0.0877)	
Voice_acc								-0.1451* (0.0753)
eac_voice								0.1475* (0.0745)
Observations	85	85	85	85	85	85	85	85
Countries	5	5	5	5	5	5	5	5
AR1 Test (p-value)	1.64e-06	2.70e-06	1.47e-06	3.28e-06	6.80e-06	1.06e-06	2.15e-06	2.48e-06
AR2 Test (p-value)	0.249	0.215	0.356	0.283	0.381	0.288	0.238	0.317
Sargan statistic	61	62	63	62	62	62	62	62
Sargan-Hansen Test(p-value)	0.0101	0.0228	0.0175	0.0117	0.0386	0.0183	0.0171	0.0298

(Note) Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Disaggregating the institutions in Table 6 yields novel findings about the most important indicators in the revenue-integration nexus. Of note is our finding that the influence of regional integration greatly depends on institutions in member states but the effect varies with institutional quality. While the total marginal impact of control of corruption, regulatory quality, and voice and accountability is positive, that of government effectiveness, rule of law, and political stability is negative. Specifically, the values as derived from Equation (10), after a partial differentiation with respect to the corresponding indicators evaluated at the sample mean, are 0.0038 (i.e., −00201 +0.2353(−0.7775)), 0.0493, 0.0089, −0.0322, −0.007, and, −0.0359, respectively. By implication, regional integration gains more from policies that battle corruption and improve regulatory quality as well as voice and accountability in terms of its influence on tax revenue collections.

B. Liberalization, underground economy and finance

In Table 5, we also document a significant relation between capital account liberalization and tax revenue—a finding consistent with previous studies (Devereux *et al.* 2003) and in confirmation with our earlier hypothesis. Specifically, Column (6) demonstrates that an increase in capital account liberalization by one unit would generate a reduction in tax revenue by 9%, suggesting that the removal of capital controls in East Africa, such as the exchange rate controls, may have come at a cost. Note that trade openness, on the other hand, is positively related to tax revenue (Column 1~9)—a finding in line with several previous empirical studies (e.g., Profeta and Scabrosetti 2010, Agbeyegbe *et al.* 2004). Similarly, as expected, the coefficient for the underground economy is negative and strongly significant. As evident in Column (7) in Table 5, we expect about a 4% decrease in tax revenue when the size of the shadow economy increases by 10%. This is in line with previous findings (Bird *et al.* 2004). An additional noteworthy observation here is that when we control for either the shadow economy or capital account liberalization, the coefficient for the economic integration proxy turns out to be positive, although it is still not statistically significant. On the other hand, both the proxies of financial development—private credit and money supply sophistication (M2)—are conducive to revenue mobilization, but their inclusion in the model does not change the status quo observed in Column (1) for the role of economic integration; that is, the sign is still negative. In Columns (8) and (9) in Table 5, a 10% increase in either

credit to the private sector leads or in money supply is expected to lead to about a 2% and 3% increase, respectively, in tax revenue. As argued by Capasso and Jappeli (2013), the capacity of financial development to facilitate the tracking and collection of taxes could explain the observed outcome.

C. Additional findings

In Table 5, the lag of GDP growth rate is significant at the 1% level of significance but unexpectedly negative. A similar result is found for the lag of real per capita income. The latter can be explained by the inelastic nature of tax systems in those countries— an argument also advanced by Hisali and Ddumba (2013). On the other hand, inflation, which was introduced in the model as a measure of macroeconomic stability of the EAC economies, is significantly negative, as evident in Column (1), thereby confirming previous findings (Nnyanzi 2015). The theoretical justification for the inverse link is that a high inflation rate in an economy reduces the real value of the tax revenue collected.

Regarding public debt, the relevant coefficient is positive but weakly significant at the 10% level, as is evident in Column (7) in Table 5. Most previous studies have not been conclusive on this issue (Nnyanzi 2015). We are aware that the reported evidence is in contrast with some other research findings that established a negative relation between the two variables (Eltony 2002), arguing that when some countries take on debt, they tend to relax on tax revenue collections since they can now rely on this debt to finance their budgets—a system known as deficit financing. However, our findings are not uncommon; they are, for example, supported by other documented findings that report a similar relation between tax revenue and the public debt (Teera and Hudson 2004). Moreover, the positive relation observed here is not a theoretical surprise since an increase in public debt requires increased revenue to service the debt in terms of paying the interest on the principal and repaying the debt. One way to achieve this objective is for the country to increase tax rates or introduce other tax sources (tax bases) in order to generate a primary surplus budget to service the debt.

The other variable deserving attention is urban population, which has a coefficient that is highly positive and highly significant at the 1% level. Specifically, a 10% increase in urbanization is likely to lead to a 15.5% increase in tax revenue on average (Table 5, Column (1))—a finding consistent with economic theory and other previous studies (Teera and Hudson 2004). It can be argued that since a high urban population is likely

to increase the taxable base, it could reduce the cost of tax collection and consequently lower tax avoidance and evasion as compared with sparsely populated areas. On the other hand, a high population size also requires increased resources to cater to increased demand for social services such as hospitals, schools, and roads, thereby necessitating increased tax revenue collections in order to provide the required level of social services. Hence, as corroborated by Dioda (2012), high population size has a positive relation. Aid is insignificant in all specifications in Table 5 but is not uncommon, as evidenced by Bhushan and Samy's (2012) findings. However, for countries with below-average tax revenue, the coefficient turns significant and negative (Table 5, Column (1)) and is related to the findings by Hisali and Ddumba (2013), who document a negative association between grants and tax revenue. The coefficient for labor force participation rate is similarly negative and highly significant (Table 5, Columns (1) and (4))—a finding that would suggest less dependency on income taxes but could also imply that a large part of the labor force in involved in the informal sector or in the agricultural sector that is not easy to tax.

The results with respect to sectoral composition are also informative. As expected from the literature, the share of manufacturing in the GDP is positively related to tax revenue. It can be argued that higher shares of manufacturing in the economy are likely to indicate a relatively higher formal sector, which is easier to tax than the informal sector, and therefore yield higher tax revenues. From another perspective, formal firms are more likely to export than the informal ones. The coefficient for share of agriculture in the GDP is, however, insignificant—a finding in line with some previous studies (Nnyanzi 2015, Profeta and Scabrosetti 2010, Mahdavi 2008). Finally, the results from the dynamic panel model also reveal that the EAC partner states' tax revenue positively depends on previous tax revenue collections since the relevant coefficient is positive and significant at the 1% level. Intuitively, if partner states collected high tax revenue in the previous year, they are likely to collect high tax revenue in the current year.

VI. Conclusions

The major objective of this study was to analyze the impact of EAC regional integration on partner states' tax revenues. The finding that the contribution of regional

integration to tax revenues in the EAC is conditional on institutional quality is critical for designing policies to promote tax revenues . On the other hand, the negative contribution of the shadow economy to tax revenue is suggestive of the need for a well-balanced, integrated approach that incorporates compliance in order to reduce the underground economy. We concur with Williams (2014) that increasing penalties may not necessarily lead to increased revenue but instead exacerbate the problem, as noted by Schneider and Enste (2000), who discourage the sole use of regulatory policies to counter a growing shadow economy. They argue that it is possible that as penalties are introduced and implemented, purchasers of shadow commodities may not consume the services or might rather resort to do-it-yourself activities—a phenomenon that does not lead to increased tax revenue. Therefore, we would emphasize the complementary nature of policies. For example, as governments embrace policies to reduce the shadow economy, price differentials between the declared and shadow labor need to be abolished (Profeta and Scabrosetti 2010). A more effective policy should be prioritized that is comprehensive and includes efforts to redesign the individual countries' tax systems, harmonize domestic taxes, reform tax laws, and introduce procedures to reduce distortions and smuggling. Similarly, capital account liberalization policies need to be designed with caution as they could be disastrous to revenue mobilization efforts, whereas countries could benefit from strategies designed to enhance financial development. Such measures, once accompanied by a stable macroeconomic environment in terms of lower inflation, well-planned urbanization programs, and pro-trade and pro-manufacturing sector reforms, would likely be a step in the right direction if taxes are to be a sustainable source of revenue for member states in the EAC.

In our analysis, a few questions arose that were beyond the scope of our study and require a separate investigation. For example, it would be of interest to establish the welfare implications of the implementation of the EACCU Protocol on individual member countries. A deeper analysis of the contributory role of EAC regional integration on employment creation in the EAC region and the possible link between customs revenue and EAC regional integration, once data become available, would be valuable.

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Appendix 1: List of Abbreviations

CET	Common External Tariff
EAC	East African Community
EACCU	East African Community Customs Union
EU	European Union
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GNI	Gross National Income
MFN	Most Favored Nation
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
SSA	Sub-Saharan Africa
WDI	World Development Indicators
WGI	World Governance Indicators
WTO	World Trade Organization