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Financial Development and Tax Revenue: How Catalytic Are Political Development and Corruption?

John Bosco Nnyanzi[1], John Mayanja Bbale[2] & Richard Sendi[3]

[1] Department of Economic Theory and Analysis, School of Economics, Makerere University, Kampala, Uganda

[2] Department of Policy and Development Economics, School of Economics, Makerere University, Uganda

[3] Head Planning and Strategy Standard Gauge Railway, Ministry of Works and Transport, Kampala, Uganda.

Correspondence: John Bosco Nnyanzi, Department of Economic Theory and Analysis, School of Economics, College of Business and Management Sciences, Makerere University, Kampala, Uganda. E-mail: jbnnyanzi@yahoo.com

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Abstract

Increasing domestic revenue mobilization remains a challenge for many governments, particularly in low-income countries. Using a sample of East African countries, the study sets off to investigate the impact of financial development from a multi-dimensional perspective on tax revenues for the period 1990 to 2014, and how political development and the control of corruption would enhance the observed nexus. The dynamic panel results from the system GMM estimation approach indicate a significant role of financial development overall and the financial institutions and financial markets in particular. A disaggregation of the duo suggests that it is the depth of financial institutions that greatly matters for tax revenue, with a one per cent change expected to yield about 0.26 per cent change in tax collections. It is then followed by their level of accessibility, financial market depth and efficiency. We fail to find significant evidence in support of financial market access and financial institutions efficiency although the possibility for the latter seems indismissible. Further evidence points to the catalytic nature of a good institutional and political environment in pursuit of higher tax-GDP ratio via financial development. Policies to promote the depth and accessibility of financial institutions as well the depth and efficiency of financial markets in East Africa alongside well-focused anti-corruption programs and democratic governance are likely to yield better fiscal outcomes in terms of domestic tax revenues critically needed to achieve the United Nations Sustainable Development Goals. We also confirm the positive role played by the lagged tax revenue, per capita GDP, trade openness, debt-to-GDP ratio and population density in the tax effort.

Keywords: finance, tax, political rights, civil liberties, corruption, EAC

1. Introduction

According to the 2015 Addis Ababa Action Agenda (UN, 2015b) domestic public revenue mobilization are central to achieving the United Nations Sustainable Development Goals on increasing productivity levels and making growth more inclusive. It has indeed received great attention in many developing countries as it reinforces a country's ownership of public policy and allows it to move towards financial autonomy. Taxes are one form of revenue mobilization, critical for public investment, for social services, or for debt and deficit financing. These advantages notwithstanding, African countries still face formidable challenges raising more and better taxes including economic and institutional factors but also the prevalence of the informal sector. Over the last three decades, several reforms have been adopted for purposes of enhancing tax revenue mobilization in order to reduce dependence on foreign aid and increase creditworthiness for official and private non-concessional loans. There is no question that once used productively, tax revenues would be critical in improving the citizens' welfare and spur development. Nevertheless, increasing domestic revenue mobilization remains a challenge for many governments, particularly in low-income countries, where a notably low tax-to-GDP ratio of about 13% dominates in comparison to an average of 34% for rich countries. In order to raise the low tax-to-GDP ratios in these countries, one important area in need of reconsideration is the financial sector; for it can rightly be argued that a combination of strong financial system and solid fiscal policy, and taxation in particular, is a prominent tool to spur growth.

While there is plenty of literature that investigates the extent to which economic growth has or has not benefited from the financial sector development, empirical evidence on how the latter affects tax revenue mobilization is scanty and mixed. Unfortunately, most of the existing studies (e.g. Akçay et al., 2016; Taha et al., 2013) that examine the issue use either one of two limited measures of financial depth – the ratio of private credit to GDP or stock market capitalization to GDP. As Cihák et al. (2012) argue, the ratio of private credit to GDP captures the size of a bank's loan book relative to the economic output, but it says nothing about financial sector components beyond banks, about quality of financial services, efficiency of the financial sector, and its stability. By intuition, considering solely private credit may not provide a sufficient basis for assessing the impact of a multi-dimensional process of financial development to which credit is only a subset. Arguably, the use of an aggregate index of financial development can mask the true characteristics of the link that can exist between financial development and tax revenue. Therefore, any recommendations to raise tax revenues based on studies which limitedly do not take into consideration the multidimensional nature of financial development leave a lot to be desired; for they ignore the fact that different components of financial development are likely to affect tax revenue differently. As such, it is not illogical to argue that the concerned papers offer conclusions that lead to inappropriate policy packages.

The main objective of this paper is to investigate the quantitative impact of financial development on the revenue-generating capacity of taxes with focus on a broad-based definition of financial development suggested by Svirydzenka (2016) (Note 1). In doing so, we are able to determine the susceptibility of tax revenue to each of the indicators of financial development thereby capturing all the important aspects of the financial system. The definition incorporates a nine-indicator summary on how developed financial institutions and financial markets are, in terms of their depth, access, and efficiency. A complementary rather than a substitution role characterizes these indicators. For example, as emphasized in Čihák et al. (2012), while credit depth matters, large amounts of credit do not always correspond to broad use of financial services, since it is possible that the credit can be concentrated among the largest firms and wealthiest individuals. We argue that the different indicators influence tax revenue differently and therefore a blanket policy based on an analysis which fails to consider this heterogeneity might not be realistic. Our study would allow for policy conclusions to be drawn on how to increase the static tax-to-GDP ratios of the developing countries more effectively, and may in turn inform government with policy choices by identifying the appropriate financial system indicators that matter most for this fiscal avenue. This is the novel contribution of the current study.

It is however inconceivable that the financial system would maximally perform this hypothesized role to influence the tax effort without any influence. Theory supports both a direct and an indirect linkage between financial development and tax revenue. The indirect channel operates via economic growth based on three hypotheses from literature. First, the supply-leading hypothesis holds that financial development promotes long-run economic growth by facilitating the allocation of resources, capital accumulation and diffusion of technology. On the other hand, the demand-pulling hypothesis ascertains that economic growth causes financial development. Third, according to the feedback hypothesis a complementary role is indismissible given the mutual influence between financial development and economic growth. On the other hand, financial development may potentially influence direct tax revenue in several ways. First, economic growth leads to an expansion of taxable economic activities, which in turn, increases direct tax revenue. Second, economic growth brings prosperity and boosts the demand for goods and services which raises new investments. As a result, the income tax base may increase which contributes to direct tax revenues. Third, both financial development and economic growth might discourage the spread of shadow economy. Finally, financial development could directly increase tax revenues as it facilitates tracking and collection of taxes (Bose et al., 2012; Capasso & Jappeli, 2013).

In lieu of the above theoretical underpinnings, the paper argues that the marginal impact of financial development on tax revenue further depends on political development in terms of civil liberties and political rights, but also on corruption. The choice of these interventions is not without justification. Besides the fact that these are lively issues in developing countries in need of attention by economists and politicians since they affect the welfare of citizens with spillovers to the economy, they are neither spared by empirical evidence. For example, studies show that corruption reduces tax revenues (see Abed & Gupta, 2002, for a summary of explanatory studies). Elsewhere the level of political development is associated with tax revenue (e.g. Gupta, 2007; Dioda, 2012; Ajaz & Ahmad, 2010). The missing link in such studies, however, is that they focus solely on the direct effects of corruption or political development without cognizance of their indirect impacts. Would the impact of financial development on the revenue mobilization capacity of taxes be altered in the presence of corruption or even political development? Unfortunately, such questions attract less focus (if any) in the existing

literature. We bridge this gap by specifically bringing to the fore a quantitative analysis of the extent to which civil liberties, political rights and corruption determine the financial-development-tax-revenue nexus. Moreover, the protagonist for the FD index we adopt in the study already observes as a caveat in the design of his index that it only captures the characteristics of the financial systems, viz., depth, access, and efficiency, but does not include their underlying drivers such as the institutional, regulatory, and legal frameworks, or outcomes, viz., financial stability measures (Svirydzenka, 2016). There is no doubt that these forces, viz., political development and corruption, are at the forefront in determining, whether directly or indirectly, the current macroeconomic dynamics and direction of economic growth and poverty in developing countries.

The study therefore contributes to literature via three specific objectives: First, we examine the effect of financial development, both as a whole and as disaggregated, on tax revenue. Second, we analyze the possibility of a threshold above which financial development might no longer have a positive effect (if any) on tax revenue. Third, we investigate the extent to which political development or corruption individually influences the aforementioned linkage. The results provide confirmation of the earlier hypothesis that for tax revenue, financial development does not matter per se. A disaggregation of financial development seems to offer a better picture of the specific type relevant for tax revenue mobilization. More specifically, while it is the depth of financial institutions, access to financial institutions, and, the efficiency of financial markets that positively influence tax revenue at different significance levels, the depth of financial markets, their access, and the efficiency of financial institutions are not significantly important, though the possibility is not dismissible given the positive economic signs attached to the relevant coefficients. Particularly important is the observation that the extent to which financial institutions and financial markets are developed in terms of their depth, access, and efficiency provides an enhanced understanding of the role of financial development in tax revenue. The study findings reinforce the need for financial development policies that focus on financial institutions access, depth and financial markets efficiency, all of which ought to be facilitated by additional strategies and programs to improve the political environments as well as promoting anti-corruption combatants given the finding that both an improvement in civil liberties and political rights as well as the control of corruption positively stimulate the role of financial development in the tax-revenue-generating capacity.

In what follows, Section 2 reviews the relevant empirical literature. While Sections 3 and 4 respectively present the empirical specification and estimation results, Section 5 provides a sensitivity analysis, and Section 6 concludes.

2. Empirical Studies

To our knowledge, this is the first study to look at the effect of financial development on revenues from a multidimensional perspective, rather than from the limited traditional measure of financial depth. Nevertheless, several existing works do relate to our paper on the empirical front. For example, a recent work by Akçay et al. (2016) explores the nexus between financial development, categorized into banking and non-banking, and direct tax revenue in a multivariate framework in Turkey for the period 2006 to 2014, employing monthly data. While the long run equilibrium relationship between financial development and tax revenue using two different co-integration tests namely Johansen and Juselius, and Hatemi-J, produce results indicative of a co-integration between direct tax revenue and financial development, the Vector Error Correction Model (VECM) reveals that banking and non-banking financial development Granger cause direct tax revenue in the long run. In their findings, only the banking sector Granger causes direct tax revenue in the short run.

A closely related study by Petrescu (2013), constructs a financial indicator that encompasses measures from five areas of the financial system, using a panel of data from 72 countries and from 14 years. The results show that an increase in the quality of financial intermediaries increases total tax revenue and income tax revenue as shares of GDP but the quality of the financial sector does not affect the revenue collected from sales, property or gift taxes. Similarly, using a panel data set of 96 countries over the period 1990-2008, Ilievski (2012) finds that stock markets positively influence government's ability to raise tax revenue. However, when compared to the effect of bank deposits, the author finds that the banking sector has a greater explanatory power consistent with the paper of Gordon and Li (2009). Similarly, Taha et al. (2013) investigated the causal relationship between financial system activities and direct tax revenue for Malaysia and found that stock market activities Granger causes direct tax revenue.

Capasso and Jappeli (2013), using an Italian microeconomic data that allows them to construct a micro-based index of the underground economy, show that financial development can not only reduce the size of the underground economy but also tax evasion and therefore increase tax revenues. Support to these findings can be traced in the previous study by Dabla-Norris et al. (2008) who use a survey of registered firms in 41 countries to

find an adverse impact of financial constraints on the tax-to-GDP ratio by inducing informality among small firms but not among large ones. The possibility that financial development could directly increase tax revenue, as it facilitates tracking and collection of taxes, is further emphasized by Bose et al. (2012) and Capasso and Jappeli (2013).

The link between political development and tax revenue is an empirical question. For example, Dioda (2012) documents a significant influence of civil liberties on tax revenue, whereas Mahdavi (2008) fails to find any significant relationship between civil liberties and political rights on the tax-revenue-generating-capacity. Relatedly, Profeta, et al. (2010) explore the relation between political variables and tax revenue for the period 1990-2005 covering selected countries from Asia, Latin America, America and Europe Union that have recently experienced a democratic as well as economic transition. The results indicate that the strength of democratic institutions and civil liberties are not significantly related to tax revenue, except for trade and property taxes. Elsewhere, Castro and Camarillo (2014), using static and dynamic panel data techniques, and a sample of 34 countries from the Organization for Economic Co-operation and Development over the period 2001-2011, show that civil liberties, alongside gross domestic product per capita, and the industrial sector have positive impact on the dependent variable, while the agricultural sector and the share of foreign direct investment in gross fixed capital formation have an adverse effect. Additionally, the lagged value of the dependent variable is found to positively related to tax revenue and its effect is larger in high income countries. By contrast, Salatin and Eslambolchi (2013), find evidence that runs counter to Castro and Camarillo (2014). The former, using data for the period 1990-2010 from selected Middle East countries, estimate a dynamic model in a panel framework with the system generalized method of moments (GMM) technique, and find a significant negative relation between civil liberties and tax revenue, but a positive impact of political rights. Other studies (e.g. Bird et al., 2008; Martin-Mayoral & Uribe, 2010) have considered government efficiency and institutional factors such as voice and accountability, political stability, and civil and political rights, as drivers of tax revenue. Gupta (2007) investigates revenue performance of a large set of developing countries over the past 25 years and zeros down to corruption as the most significant factor among institutional indicators to adversely affect revenue performance. In the same study, political and economic stability are effective factors, but only across certain specifications.

One important observation is that the existing empirics above appear to agree on the principle importance of financial system as a crucial driver of tax revenue mobilization. However, branding all indicators of financial development in one measure that is in reality only one indicator of the same may mask several important details necessary for policy focus. As Svirydzenka (2016) argues, the diversity of financial systems across countries implies that one needs to look at multiple indicators to measure financial development. In addition, the channels through which financial development affects (or does not affect) the tax-to-GDP ratios of developing countries need to be established in order to determine how the financial sector would better be improved, based on the importance of each aspect, if it is to achieve its desirable role of enhancing the tax-revenue-mobilization-capacity. These missing links in literature are the focus of our study.

3. Empirical Specification

There is no question, significant work has been done on both the theoretical and empirical arena on taxation (e.g. Tanzi & Zee, 2000, presents a good summary). The main independent variables, drawn out of this and related literatures, hypothesized in our study to drive the revenue-generating capacity of taxes in an economy include: real income per capita, the share of agriculture in an economy, the share of manufacturing in an economy, trade openness, inflation, population density, foreign aid, external debt, lagged tax revenue, political development and corruption.

Based on the above factors, we specify a panel regression model of the form:

$$TAXREV_{it} = \alpha_1 TAXREV_{i,t-1} + \delta_i \sum_{1}^{m} POLDEV_{it} + \beta_i \sum_{i=1}^{n} X_{it} + u_{it} \quad (1)$$

and

$$TAXREV_{it} = \alpha_1 TAXREV_{i,t-1} + \alpha_2 CORRCTRL_{it} + \beta_i \sum_{i=1}^{n} X_{it} + u_{it} \quad (2)$$

where u_{it} consists of the unobserved country-specific effects, v_i, and the observation-specific errors, e_{it}: $u_{it} = v_i + e_{it}$; i = country, t = year. X_{it} are all the other independent variables described above. In the first model, we include all variables except corruption whereas the second model includes political development and all others except corruption.

$$\begin{aligned}\ln TAXREV_{it} &= \alpha_1 \ln TAXREV_{it-1} + \alpha_2 \ln GDPPC_{it} + \alpha_3 \ln POPDENS_{it} + \alpha_4 INFL_{it} \\ &+ \alpha_5 \ln ExtDEBT_{it} + \alpha_6 \ln AID_{it} + \alpha_7 \ln MANSHA_{it} + \alpha_8 \ln AGRISHA_{it} \\ &+ \alpha_9 \ln OPEN_{it} + \beta_i \sum_{i=1}^{n} \ln FINDEV_{it} + \delta_i \sum_{i=1}^{m} \ln POLDEV_{it} + u_{it}\end{aligned} \tag{3}$$

In the second model, we include corruption and all other variables except political development. This model also acts as a sensitivity analysis model since corruption is one form of political development.

$$\begin{aligned}\ln TAXREV_{it} &= \alpha_1 \ln TAXREV_{it-1} + \alpha_2 \ln GDPPC_{it} + \alpha_3 \ln POPDENS_{it} + \alpha_4 INFL_{it} \\ &+ \alpha_5 \ln ExtDEBT_{it} + \alpha_6 \ln AID_{it} + \alpha_7 \ln MANSHA_{it} + \alpha_8 \ln AGRISHA_{it} \\ &+ \alpha_9 \ln OPEN_{it} + \beta_i \sum_{i=1}^{n} \ln FINDEV_{it} + \delta_{it} CORRCTRL_{it} + u_{it}\end{aligned} \tag{4}$$

In order to find out whether the financial development effect depends on political development or the control of corruption, we introduce interaction terms as follows:

$$\begin{aligned}\ln TAXREV_{it} &= \alpha_1 \ln TAXREV_{it-1} + \beta_i \sum_{i=1}^{n} \ln FINDEV_{it} + \delta_i \sum_{i=1}^{m} \ln POLDEV_{it} \\ &+ \kappa_i (\ln FINDEV_{it} * \ln POLDEV_{it}) + u_{it}\end{aligned} \tag{5}$$

$$\begin{aligned}\ln TAXREV_{it} &= \alpha_1 \ln TAXREV_{it-1} + \beta_i \sum_{i=1}^{n} \ln FINDEV_{it} + \delta_i CORRCTRL_{it} \\ &+ \theta_i (\ln FINDEV_{it} * CORRCTRL_{it}) + u_{it}\end{aligned} \tag{6}$$

In the presence of political development, proxied by civil liberties (CLIBERTY) and political rights (PRIGHTS), we deduce the marginal impact of financial development on tax revenue from equations (3) and (4) to get:

$$\frac{\partial \ln TAXREV_{it}}{\partial \ln FINDEV_{it}} = \alpha_1 + \kappa_i \ln POLDEV_{it} \tag{7}$$

$$\frac{\partial \ln TAXREV_{it}}{\partial \ln FINDEV_{it}} = \alpha_1 + \theta_i CORRCTRL_{it} \tag{8}$$

Given the nature of our model, characterized by a lagged variable, $TR_{i,t-1}$, and possible endogeneity issues, the first-differenced GMM (generalized method of moments) estimator would be preferred to the simple fixed effects estimator, since the latter fails in the presence of lagged variable. However, the former also performs poorly in finite samples and produces biased coefficients if the sample size is small or if the time series is highly persistent (Bond, et al., 2001; Blundell & Bond, 1998). In order to overcome these hurdles, we employ the systems GMM developed by Arellano and Bover (1995) and Blundell and Bond (1998) that also controls for possible specification bias when variables are highly persistent over time and for possible simultaneity bias besides its capacity to increase both consistency and efficiency.

The dataset puts together 25 years of annual data between 1990 and 2014 for 5 East African countries. The study draws on a number of data sources: The World Development indicators (WDI), World Governance Indicators (WGI), Freedom House (FH), and, Financial Development Indicators by Svirydzenka (2016) (Note 2). In Table 1, we present a description and source of the variables used in the study. A summary statistic of the same can be found in Table 2. To further clarify on the characteristics of our data, we carry out a pairwise correlation of the explanatory variables in Table 3. Some of the variables are evidently correlated but correlation does not necessarily mean causality. Highly correlated variables are not included in the same model to avoid spurious effects and multicollinearity problems.

Table 1. Variable description

Variable	Description and expected sign
Tax revenue	Tax revenue divided by GDP; Following Castro and Camarillo (2014), the lagged dependent variable can either be positive or negative. The positive sign would, by the Keynesian approach, imply that a high tax-to-GDP ratio in the previous period encourages public expenditure and economic growth, resulting into further tax revenue, but the reverse is true when the tax collection is low. On the other hand, a negative sign indicates a neoclassical approach in which high levels of tax collection would discourage the economic activity and eventually reduce the tax-GDP ratio. In the latter case, low tax rates are linked to a better performance of the economy. As noted in Á ngeles-Castro (2006), a coefficient close to one, is evidence that the dependent variable changes slowly, attracts less vulnerability to variations in the explanatory variables, and depends more on the lagged dependent variable. Source: WDI
FD	Financial development. Source: Svirydzenka (2016)
FI	Financial Institutions. Source: Svirydzenka (2016)
FM	Financial Markets. Source: Svirydzenka (2016)
FID	Financial Institutions Depth, indicated by: Private-sector credit to GDP; Pension fund assets to GDP; Mutual fund assets to GDP; Insurance premiums, life and non-life to GDP. Source: Svirydzenka (2016)
FIA	Financial Institutions Access, indicated by: Bank branches per 100,000 adults; ATMs per 100,000 adults. Source: Svirydzenka (2016)
FIE	Financial Institutions Efficiency, indicated by: Net interest margin; Lending-deposits spread; Non-interest income to total income; Overhead costs to total assets; Return on assets; Return on equity. Source: Svirydzenka (2016)
FMD	Financial Markets Depth, indicated by: Stock market capitalization to GDP; Stocks traded to GDP; International debt securities of government to GDP; Total debt securities of financial corporations to GDP; Total debt securities of nonfinancial corporations to GDP. Source: Svirydzenka (2016).
FMA	Financial Markets Access, indicated by: Percent of market capitalization outside of top 10 largest companies; Total number of issuers of debt (domestic and external, nonfinancial and financial corporations). Source: Svirydzenka (2016)
FME	Financial Market Efficiency, indicated by: Stock market turnover ratio (stocks traded to capitalization). Source: Svirydzenka (2016)
Real GDP per capita	All else being equal, a higher income per capita level is likely to lead to higher revenues from all taxes. Source: WDI
Agriculture share in GDP	Agriculture in poorer countries is generally a subsistence activity, so countries dominated by this sector may be expected to raise less revenue. Source: WDI
Manufacturing share in GDP	The manufacturing sector tends to be more formal than the agricultural sector in developing countries. So, it becomes easier to collect taxes from the former. Countries dominated by this sector are likely to raise more revenue. Source: WDI
Population density	Population density (people per sq. km of land area). A positive sign is expected. Source: WDI
Trade Openness	Calculated ratio of exports to imports. An economy that is open may be expected to raise more taxes because an economy with a large international trade sector tends to be one that is well organized and monetized, so the costs of tax administration is likely to be lower. Source: WDI
Foreign aid	The amount of official development assistance (grants plus concessional loans, measured in U.S. dollars) divided by Gross National Income. Source: WDI.
Inflation	Inflation is a proxy for the effect of macroeconomic policies. The worse the macroeconomic situation, the lower the revenues from different taxes. Source: WDI
External debt	External debt stocks (% of GNI). An increase in debt is expected to result into higher tax revenue. Source: WDI
Corruption	Corruption Index; More corruption will result in lower revenue from all taxes. Source: WGI
Civil liberties	Proxy for political development. We expect a positive effect because the presence of a liberties is likely to translate into better perception of the government, willingness and compliance of citizens to pay taxes and less tax evasion. Source: FH
Political rights	Proxy for political development. We expect a positive effect because the presence of a high level of democracy is likely to translate into better perception of the government, willingness and compliance of citizens to pay taxes and less tax evasion. Source: FH

Note. WGI is world governance indicators; WDI is world development indicators; FH is freedom house.

Table 2. Summary statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
lntax_gdp	2.552329	0.273641	1.256186	3.020148	116
lndebt_gni	3.879094	0.697214	2.577492	5.169631	167
lnGDPPC	5.717117	0.448345	4.917459	6.490276	165
lnpopn_dens	4.68294	0.908549	3.04898	6.13064	175
infl_cpi	17.071	28.41166	-2.40593	200.026	172
lnexp_~p	-0.68296	0.520445	-2.28845	0.336514	145
lnManu_gdp	2.218567	0.330729	0.627359	2.907173	164
lnaid_gni	2.488639	0.635978	0.892079	4.553308	166
lnAgric_gdp	3.638709	0.261574	3.12403	4.277072	165
lnpr	1.668848	0.227075	1.098612	1.94591	175
lncl	1.582263	0.23608	1.098612	1.94591	175
lnFD	-2.29338	0.513302	-3.48454	-1.09354	170
lnFI	-1.80194	0.322953	-2.87221	-1.0077	170
lnFM	-4.69361	2.041656	-8.22714	-0.81322	170
corr_ctrl	-0.77758	0.410215	-1.46374	0.655002	88
lnprclib	2.282423	.2297989	1.791759	2.639057	124

Table 3. Pairwise correlation

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
A	1														
B	0.00	1.00													
C	0.25	-0.46	1.00												
D	-0.12	-0.15	-0.65	1.00											
E	-0.01	0.32	-0.03	-0.28	1.00										
F	0.42	0.00	0.67	-0.66	0.19	1.00									
G	0.18	0.17	-0.04	-0.10	0.01	0.16	1.00								
H	-0.34	0.39	-0.71	0.48	0.13	-0.63	-0.22	1.00							
I	-0.19	0.64	-0.72	0.25	0.27	-0.48	-0.09	0.58	1.00						
J	-0.27	0.29	-0.40	0.42	0.07	-0.27	-0.09	0.39	0.40	1.00					
K	-0.12	0.47	-0.57	0.47	0.21	-0.32	0.05	0.49	0.57	0.82	1.00				
L	0.43	0.05	0.45	-0.51	0.32	0.36	0.29	-0.28	-0.23	-0.17	-0.14	1.00			
M	0.46	-0.15	0.49	-0.28	0.07	0.39	0.45	-0.43	-0.46	-0.20	-0.15	0.75	1.00		
N	0.51	0.00	0.45	-0.67	0.28	0.43	0.20	-0.39	-0.25	-0.43	-0.38	0.78	0.43	1.00	
O	-0.24	-0.37	0.26	0.22	-0.27	-0.10	-0.72	0.20	-0.15	0.15	-0.04	-0.34	-0.23	-0.50	1.00

Note. Letters A-O respectively stand for lntax, lndebt, lnGDPPC, lnpopn_dens, infl_cpi, lnexp_imp, lnManu_gdp, lnaid_gni, lnAgri_gdp, lnpr, lncl, lnFD, lnFI, lnFM, corr_ctrl.

4. Econometric Results

Table 4 reports results of regression analyses for tax revenue in consideration of several specifications. From Specification (1), the overall impact of financial development is significantly positive at 5% conventional level. The relevant coefficient of 0.0995 suggests that if financial development improves by 100%, we would expect an increase in tax revenue of about 9.95%, a finding in support of our earlier hypothesis but which is in no way uncommon in literature (e.g. Petrescu, 2013; Dabla-Norris et al., 2008). By implication, the removal of financial constraints and an overall improvement in the financial system would reciprocate into an increase in the tax-to-GDP ratio. The catalytic role of financial development is however only significantly noticeable up to some limit. As evident in Columns (2) and (3), Table 4, countries with above-average mark of financial development appear to gain much significantly from an improvement in the financial system in terms of tax revenue relative to those below the average level of financial development. Specifically, in the above-average subsample, in Column (2), a 10% increase in financial development culminates into a 1.8% increase in tax revenue. On the other hand, the below-average group in Column (3) exhibits a positive but insignificant coefficient. Perhaps for the latter group, tax-to-GDP ratio might be driven by factors other than financial development (Note 3). It suffices to note however that the relevant coefficient still holds an economically meaningful sign, justifying the need to prioritize financial development if the tax effort is to improve in the East African countries. But which

type of financial development matters most? We address this question in Column (4) where both the financial institutions and financial markets appear to be helpful at different levels of significance. The results in Column (4) indicate that an increase in financial institutions by 100% is likely to lead to an improvement of the tax-to-GDP ratio by about 4%; whereas an equal increase in financial markets would yield a 5% increase in tax revenue. While the former outcome is significant a 5% statistical level, the latter is weakly significant at 10% conventional level.

In a further analysis, we look at the impact of the different indicators of financial markets and financial institutions in order to pinpoint the most relevant component for policy purposes. Table 5 exhibits the results of this analysis. The depth of financial institutions is found to be most significant factor in enhancing tax-revenue-mobilization capacity in the East African countries, as evident in Column (4) where a 10% increase in the same would increase tax revenue by about 2.6% at 1% level of significance. Access to financial institutions follows in importance but the magnitude is comparatively smaller than that of financial institutions depth. Specifically, as Column (5) reports, we would expect a 100% increase in the former to translate into about 8% increase in tax-to-GDP ratio at 5% statistical level, an impact lower by almost 1.8 percentage points in relation to the latter. Surprisingly, the efficiency of financial institutions portrays no significant effect to tax revenue at any conventional level. On the other hand, the efficiency of financial markets as well as their depth facilitates tax-revenue-mobilization-capacity of the East African countries though the level of significance is noticeably weak. Columns (1) and (3) provide evidence to that effect. The coefficient on the financial market access is expectedly positive but insignificant.

Table 4. Impact of financial development on tax revenue

	(1) FD	(2) FD>Average	(3) FD<Average	(4) FI&FM
L.lntax_gdp	0.5486***	0.5026***	0.8056***	0.4895***
	(0.0566)	(0.0898)	(0.0926)	(0.0541)
lndebt_gni	-0.0053	0.0497*	0.0524	0.0328
	(0.0295)	(0.0224)	(0.0409)	(0.0466)
lnGDPPC_05	0.0731	0.0264	0.0646	0.1368**
	(0.0542)	(0.0408)	(0.1416)	(0.0479)
lnpopn_dens	0.0422*	0.1407***	0.0051	0.1137*
	(0.0160)	(0.0153)	(0.0241)	(0.0416)
infl_cpi	-0.0032	0.0005	-0.0024	-0.0031
	(0.0021)	(0.0017)	(0.0015)	(0.0019)
lnexp_imp	0.0914*	0.0738**	-0.0469	0.0760*
	(0.0343)	(0.0263)	(0.0533)	(0.0324)
lnManuf_gdp	0.1298	0.0381	-0.0599	0.1123
	(0.1156)	(0.0742)	(0.0406)	(0.0953)
lnaid_gni	0.0672	0.0009	-0.0093	0.0504
	(0.0352)	(0.0181)	(0.0215)	(0.0381)
lnAgric_gdp	0.0441	0.0266	-0.1257	0.0689*
	(0.0236)	(0.0600)	(0.2076)	(0.0275)
lnpr	-0.0826	-0.1960**	-0.0418	
	(0.0592)	(0.0691)	(0.1829)	
lncl	0.0825**	-0.0691	0.0575	
	(0.0237)	(0.0843)	(0.1725)	
lnFI				0.0435**
				(0.0143)
lnFM				0.0523*
				(0.0222)
lnFD	0.0995**	0.1791***	0.0494	
	(0.0279)	(0.0380)	(0.0592)	
lnprclib				0.0082
				(0.0540)
Observations	102	49	53	102
AR2 Test (p-value)	0.741	0.268	0.365	0.821
Sargan-Hansen Test(p-value)	0.425	0.730	0.132	0.294

Note. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Impact of financial development on tax revenue - components

	(1) FMD	(2) FMA	(3) FME	(4) FID	(5) FIA	(6) FIE
L.lntax_gdp	0.5000***	0.4663*	0.2785	0.2670	0.5145***	0.5945***
	(0.0799)	(0.1564)	(0.1520)	(0.1374)	(0.0591)	(0.0172)
lndebt_gni	0.0454	0.1276	0.0417	-0.0179	0.0275	-0.0139
	(0.0373)	(0.0804)	(0.0314)	(0.0381)	(0.0297)	(0.0287)
lnGDPPC_05	0.0499	0.3817*	0.5693**	-0.2386*	0.0274	0.1282
	(0.0380)	(0.1267)	(0.0847)	(0.0907)	(0.0576)	(0.0748)
lnpopn_dens	0.0707**	0.1951*	0.1161	-0.0367	0.0289	0.0224
	(0.0221)	(0.0584)	(0.0495)	(0.0476)	(0.0200)	(0.0179)
infl_cpi	-0.0031	-0.0002	-0.0013	-0.0018	-0.0024	-0.0026
	(0.0018)	(0.0028)	(0.0013)	(0.0015)	(0.0018)	(0.0016)
lnexp_imp	0.0534	-0.1000**	0.0458	0.0444	0.0991**	0.0950**
	(0.0357)	(0.0191)	(0.0898)	(0.0326)	(0.0327)	(0.0330)
lnManuf_gdp	0.0517	-0.0917	-0.0543	-0.1129	0.1594*	0.1990
	(0.0987)	(0.1968)	(0.1280)	(0.0868)	(0.0606)	(0.1108)
lnaid_gni	0.0195	-0.0244	-0.0235	0.0259	0.0493	0.1001*
	(0.0254)	(0.0158)	(0.0190)	(0.0218)	(0.0399)	(0.0428)
lnAgric_gdp	-0.0226	-0.0734	0.0994	0.0020	0.0568	0.0603
	(0.0691)	(0.2451)	(0.0704)	(0.0470)	(0.0507)	(0.0908)
lnpr	-0.0912	0.0721	0.0457	-0.0476	-0.0178	-0.0601
	(0.0452)	(0.1229)	(0.1093)	(0.1133)	(0.0777)	(0.0717)
lncl	0.0811	0.0092	0.0732	0.0353	0.1030	0.1120**
	(0.0449)	(0.0484)	(0.0500)	(0.0776)	(0.0532)	(0.0274)
lnFMD	0.0493*					
	(0.0191)					
lnFMA		0.0456				
		(0.0886)				
lnFME			0.0393*			
			(0.0099)			
lnFID				0.2638***		
				(0.0435)		
lnFIA					0.0768**	
					(0.0184)	
lnFIE						-0.0463
						(0.0314)
Observations	102	58	66	102	102	102
AR2 Test (p-value)	0.794	0.467	0.963	0.477	0.392	0.344
Sargan-Hansen Test (p-value)	0.238	0.271	0.221	0.156	0.379	0.430

Note. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

From the above foregone analysis, the depth of financial institutions stands out to be the most significant driving factor of tax revenue in relation to other indicators. But as we pointed out earlier, the environment in which it operates is critical in enabling it to achieve the observed outcome in catalyzing tax revenue. On this basis, we investigate how it behaves in the presence of the political development and institutional quality, the former being proxied by civil liberties and political rights while the latter by the control of corruption. Note that in Table 4, the signs of the coefficients on civil liberties and political rights are positive and highly significant for the former, a finding consistent with previous literature (e.g. Castro & Camarillo, 2014), while negative and insignificant for the latter. However, for countries with above-average level of financial development, the coefficient on political rights becomes significance with a positive effect (negative sign) on the tax-to-GDP ratio. For such countries with an above-average level of financial development, the negative sign on the political-rights-index means that a democratic system is important for tax revenue (Note 4); tax payers consider their government accountable and a protector of their rights, a trust and confidence in the government that translates into less tax evasion, higher tax compliance and more tax revenues. On the other hand, a positive coefficient on the civil-liberties-index implies that an increase in civil-liberties-index (Note 5) (or negative effect) by 1 per cent would translate into an

increase in tax revenue by about 0.08 per cent. Arguably, when a country adopts high income tax rates in order to collect more revenue, civil liberties are likely to suffer much more than is necessary to raise the needed funds due to the resultant inequities that violate the spirit of equal protection under member state constitutions.

The introduction of interaction terms in the model results into several interesting observations as presented in Table 6. Overall, we find critical the presence of improving political and institutional environment in the financial-development-tax-revenue-nexus. Specifically, the marginal impact of financial institutions depth on tax revenue in the presence of civil liberties and political rights, reported in Columns (3) and (4) is 0.30519 (i.e. 0.0416+0.1666(1.5822)) and 0.3107 (i.e. -0.0034+0.1882(1.6688)), respectively (Note 6). The marginal impact of the overall political development is 0.2964 (i.e. -0.1014+0.1743(2.2824)), implying that in the presence of a good political environment in terms of civil liberties and political rights, an improvement in financial development by 10% is likely to result into 2.9 per cent increase in tax revenue after controlling for factors such GDP per capita, population density, openness, inflation, and, agricultural share in GDP *inter alia*. Similarly, in Column (6), the presence of controlled corruption, the marginal impact of the financial institutions depth on tax revenue is 0.2664 (i.e. 0.2487-0.0228(-0.7776)), emphasizing the importance of good institutional quality for better fiscal outcomes.

Additional findings in Table 4 confirm the role of the traditional variables identified in literature as handy in tax revenue collections. For example, in Column (4) a 1% increase in real per capita GDP is found to result into 0.14% in tax revenue at 5% level of significance. Consistent with the previous findings, (e.g. Salatin & Eslambolchi, 2013; Castro & Camarillo, 2014), the lagged value of the dependent variable enters positively in the equation and its effect is larger in countries with below-average levels of financial development. From the Keynesian perspective, it is likely that high levels of tax collection are catalytic to public expenditure and economic growth, a scenario likely to resonate into further tax revenue. Population density also exhibits a highly positive significant effect, in line with Dioda (2012) but in contrast to the finding in Ilievski (2012). Other factors that appear to impact positively on the tax-to-GDP ratios of the East African countries include debt and openness, whereas the relevant coefficients on inflation, aid, manufacturing share and the agricultural share in GDP are not significant at any conventional level.

Table 6. Impact of financial development on tax revenue in the presence of political development and corruption

	(1)	(2)	(3)	(4)	(5)	(6)
	FID	CORR	FID*CIV	FID*POL	FID*FREE	FID*CORR
L.lntax_gdp	0.2670	0.2065	0.1906	0.1620	0.1950	0.2329
	(0.1374)	(0.2193)	(0.1826)	(0.1660)	(0.1649)	(0.2015)
lndebt_gni	-0.0179	-0.0139	-0.0171	-0.0001	-0.0113	-0.0112
	(0.0381)	(0.0415)	(0.0423)	(0.0415)	(0.0434)	(0.0355)
lnGDPPC_05	-0.2386*	-0.2638**	-0.2532*	-0.2387*	-0.2537*	-0.2534*
	(0.0907)	(0.0762)	(0.1007)	(0.0897)	(0.0943)	(0.0920)
lnpopn_dens	-0.0367	-0.0555*	-0.0254	-0.0159	-0.0261	-0.0521**
	(0.0476)	(0.0202)	(0.0538)	(0.0538)	(0.0569)	(0.0179)
infl_cpi	-0.0018	0.0019	-0.0009	-0.0005	-0.0007	0.0021
	(0.0015)	(0.0014)	(0.0017)	(0.0018)	(0.0018)	(0.0014)
lnexp_imp	0.0444	0.0377	0.0213	0.0178	0.0190	0.0373
	(0.0326)	(0.0499)	(0.0292)	(0.0328)	(0.0295)	(0.0498)
lnManuf_gdp	-0.1129	-0.1062	-0.1168	-0.1268	-0.1169	-0.1050
	(0.0868)	(0.0943)	(0.0784)	(0.0817)	(0.0796)	(0.0946)
lnaid_gni	0.0259	0.0508	0.0086	0.0109	0.0101	0.0492
	(0.0218)	(0.0433)	(0.0330)	(0.0343)	(0.0368)	(0.0420)
lnAgric_gdp	0.0020	-0.0147	0.0227	-0.0192	0.0005	-0.0191
	(0.0470)	(0.1026)	(0.0652)	(0.0711)	(0.0539)	(0.0956)
lnpr	-0.0476		-0.0685	0.4286		
	(0.1133)		(0.1133)	(0.2013)		
lncl	0.0353		0.4504	-0.0014		
	(0.0776)		(0.3385)	(0.0424)		
lnFID	0.2638***	0.2800**	0.0416	-0.0034	-0.1014	0.2487*
	(0.0435)	(0.0618)	(0.1286)	(0.1188)	(0.2260)	(0.0983)

corr_cotrl		0.0395				-0.0300
		(0.0446)				(0.2262)
lnFID_cl			0.1666			
			(0.1052)			
lnFID_pr				0.1882*		
				(0.0854)		
lnprclib					0.4091	
					(0.2614)	
lnFID_clpr					0.1743	
					(0.1121)	
lnFID_corr						-0.0228
						(0.0856)
Observations	102	84	102	102	102	84
AR2 Test (p-value)	0.477	0.270	0.602	0.522	0.644	0.230
Sargan-Hansen Test (p-value)	0.156	0.0716	0.0938	0.125	0.111	0.0739

Note. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

5. Sensitivity Analysis

Our regression analyses were based on tax revenue in a log form with robust standard errors. We repeat the same analysis using the level form and difference log-levels (as in Ilievski, 2012) but the results are not substantially altered. One other important issue is whether or not our results are not driven by apparently stronger or weaker countries in the sample as far as economic growth is concerned. We remove one by one of the member states but document similar findings. Finally, we use different estimation techniques to test the sensitivity of our output to these approaches. Similarly the regression results out of the different approaches, viz., the OLS, the fixed effects and difference GMM, exhibit ignorable differences from the original system GMM results. Due to the much similarity in the output of all these sensitivity analyses with the main stream analysis, and to spare space, we do not present these results, but they are available on request.

6. Concluding Remarks

We set out to examine the role of financial development in the tax-revenue-mobilization capacity of East African countries using a broad-based definition of the financial system. There is ample evidence in the data to confirm the influential catalytic role of the same on the tax-to-GDP ratio. Both the financial institutions and financial markets impact positively and significantly the tax revenue collections in these countries. A further disaggregation of these indicators reveals very important findings crucial for governments in the design of relevant policy packages for their countries. The most outstanding evidence flowing out this analysis is that the depth of financial institutions inhibits the greatest impact on tax revenue both in terms of magnitude and significance. This is followed by accessibility to financial institutions, and then, the depth and efficiency of financial markets in that order of importance. A further analysis underscores the importance of civil liberties, political rights, and, the control of corruption, in the financial-development-tax-revenue-nexus. Consequently, any policy design that gives priority to an improvement in the depth of financial institutions without sidelining political development and institutional quality stands to promote tax revenue mobilization efforts in the East African countries. However, attention should also be given to policies that advance access to financial institutions as well as depth and efficiency of financial markets if countries wish to achieve the tax-to-GDP ratio target of 20% and beyond. While policies in line with access to financial markets and efficiency of financial institutions might be complementarily good for tax revenue, evidence suggests that they should be accorded less priority in relation to the other indicators.

The paper provides further evidence of the importance of the political and institutional environment in orchestrating the role of financial systems in tax revenue. This suggests that the promotion of democratic governance via political rights and the fight against corruption are no longer issues of choice but should be at the core of government programs if the tax-mobilization capacity of the East African countries is to be improved to drive the economies towards the planned growth levels and sustainable development characterized by reduced poverty and aid-dependence. A comprehensive policy package that focuses on financial development as an essential driver of tax revenue might be devoid of practical meaning if the pro-political-rights and anti-corruption measures are not accorded ardent attention and good will. These, coupled with practical strategies to increase openness, per capita GDP, population density via urbanization, and external debt for productive purposes, but also macroeconomic stability, would unquestionably spur a high tax-to-GDP ratio that consequently, in the

Keynesian approach, be a fiscal channel to economic growth via an increase in public investment.

There is no doubt that our analysis would give rise to additional questions outside the scope of the current study. As data becomes more available, one such area of interest for further research would be a repeat of a similar investigation where the dependent variable is multifold, that is looking at different types of taxes and how each is affected by financial development and its indicators. Moreover we focused our study on the East African countries given their homogeneous nature. The study would be extended to the other regions in the world, but in order to draw relevant and sound policies, it would be appropriate to take into consideration the issue of heterogeneity.

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Notes

Note 1. We consider this source superior to the only other available alternative source, FinStas by Čihák et al. (2012), as it includes additional data from the Bank of International Settlements (BIS) debt securities database, Dealogic corporate debt database, and IMF Financial Access Survey. It then provides sub-indices and the final index that pull together the various indicators - 105 distinct indicators in Global Finance Development Data (GFDD) and 46 indicators in the World Bank Financial Statistics (FinStats) to allow a comprehensive assessment of particular features of financial systems and the overall level of financial development.

Note 2. Of course, as noted by Svirydzenka (2016), the construction of the index is not without challenges but it is so far, the most comprehensive available in measuring financial development.

Note 3. Testing this hypothesis requires a separate study.

Note 4. The quantitative amount is lower and closer to 1, this indicates positive value and favorable conditions in political rights.

Note 5. The quantitative amount is higher than and closer to 7, this indicates negative value and unfavorable conditions in civil liberties.

Note 6. The calculations follow from Equations (7) and (8) in the text.

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