Regional Economic integration, Governance Quality and Tax Revenue in Sub-Saharan African Countries: Linkages and Pathways

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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 1998 to 2015 in order to estimate a tax model; the results based on the generalized method of moments technique reveal that Sub-Saharan Africa regional integration has had a significant impact on tax revenue owing to the presence of good governance. We advocate for 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 highly inflated 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 Sub-Saharan Africa.

1.   Background

Regional development and governance are leading items on the African development agenda as poorer countries are concentrated in Africa and the continent continues to engage at the periphery of the global economy. This is evident from the continent's declining share in global production and trade. According to UNCTAD (2007), the majority of Sub-Saharan Africa's (SSA) 47 countries are small and least developed. Adverse world market conditions and internal structural rigidities on their own do not adequately explain Africa's stagnation and decline. Meanwhile, the changes in relative prices central to the structural adjustment programmes controversially prescribed by the International Monetary Fund and the World Bank have, whatever their merits, proved insufficient to generate sustained growth and development (Collier & Gunning 1999; Lewis 1996; Ravenhill 1993). By the late 1980s, limitations of African states – reflected in weak policy formulation, ineffective public administration, and corruption – featured prominently in official diagnoses from both sides of the structural adjustment debate (UNECA 1989; World Bank 1989). Consensus emerged that dysfunctional political institutions and governance bear much of the blame for the region's disappointing economic performance, hindering the successful pursuit of any development strategy – whether oriented towards capitalism or socialism, self-reliance or global integration (Mkandawire & Soludo 1999; Ndulu & O'Connell 1999; Sandbrook 1986; van de Walle 2001).

In addition to SSA's poor performance on regional economic integration, the International Monetary Fund in its (December 5th, 2017) blog stated that tax revenues play a critical role for countries to create room in their budgets to increase spending on social services like health, education and public investment. At a time when public debt levels in SSA have increased sharply, raising tax revenues is the most growth-friendly way to stabilize debt. More broadly, building a country's tax capacity is at the center of any viable development strategy to meet the ongoing needs for expanding education and health care, and filling significant infrastructure gaps. The SSA region remains the world's lowest ratio of revenue to GDP despite making substantial progress in revenue mobilization over the past two decades. Its average tax frontier - or the highest level of tax income that a country could achieve given certain underlying macroeconomic and institutional conditions - is about 7.5% points of GDP lower than the average for the rest of the world (IMF, 2018).

Westræus (2016) opined that the agenda of how good (quality) governance is concerned with development is stressed as crucial and also constitutes the basis for how policies are formulated and development efforts are targeted, thus, good governance has been considered as a necessity for development in the past decade and a half. A generic consensus in policy-making is evident: no good governance – no development (Weaver, 2010). Thus, the linkages and pathways to regional economic integration, tax revenue and governance quality in Sub-Saharan African

countries are therefore subjected to further evaluation, and is the main research problem of this paper.

2. Motivation

According to Weiss (2000), power is exercised in the management of a country's economic and social resources, thus the transformation of SSA can only be achieved through good governance. Further, Collier (2007) also stressed the importance of 'excellent' governance as fundamental to economic growth – regional economic integration and tax revenue growth. Regional integration in sub-Saharan Africa (SSA) is crucial for increasing trade within Africa, building more competitive African economies, and creating larger markets for goods and services produced in the region. Yet there are many paths towards greater integration, some of which are easier than others. In addition, integration need not follow a linear path or occur mainly through formal inter-governmental economic coordination. In order to gain insights into how regional integration is occurring in SSA, determine impediments to it, and develop recommendations for how the World Bank and other development agencies can help further facilitate it, the World Bank commissioned a set of political economy of regional integration studies covering sector analyses of agriculture, financial services, professional services, trade facilitation, and transport (Brenton and Hoffmann, 2016).

Tax revenue is of vital importance for the sustainability of both developed and developing countries. Firstly, taxation is the main source of central government revenue, since tax collection is mandatory and regular, which can guarantee the stability of income. Secondly, taxation aims to meet the social and public needs by providing public goods and services. Thirdly, government need tax revenue to establish armed forces and judicial systems to ensure the secure and justice of the society. In many poor developing countries, a low tax-revenue/GDP ratio prevents these nations from undertaking ambitious expenditure programs. Thus a rapid increase in domestic revenue and a corresponding increase in public services is a policy priority. However, one needs to be cautious about increased public spending and increased taxation, as distortionary taxes begin to reduce growth when pushed beyond certain levels: tax bases are not simply 'given' to governments: they can be grown or destroyed (Bird, 2008).

Early studies have established the positive impacts of governance on human and economic development (Gerring *et al*., 2005, Persson and Tabellini 2006; Han *et al*., 2014). Although, the concept of good governance has been subjected to a lot of academic scrutiny, so are regional economic integration and tax revenue growth (particularly in other regions), literatures that link governance quality and regional economic integration to tax revenue are relatively scarce in Sub-Saharan Africa. Thus, this study intends to bring these three major concepts together as it affects the present and future of economic development of SSA. In addition, this study will provide informative insight into cases, not previously tested through the given analytical framework - thus contributing with new research and inform about research gaps.

The proposed study is of relevance, as it will contribute on a theoretical, empirical and philosophical level. It will assist in the understanding of how good governance impacts on economic development through the lens of regional economic integration and tax revenue in SSA. Finally, this study can serve as a basis for the formulation of efficient policies that will enhance good governance and regional economic integration and tax revenue in Sub-Saharan Africa. Therefore, to emphasize the implications of quality governance on regional economic integration and tax revenue growth, this study investigates the theories underpinning the linkages and pathways to regional economic development and attempt so detect where potential insufficiencies exist.

3. Understanding the Linkages

The importance of governance as highlighted by the African Economic Research Consortium (AERC, 1998), puts governance at the core of the growth record of SSA and concludes that poor governance leads to growth inhibiting 'policy syndromes' while improved governance resulted in greater prevalence of growth-enhancing 'syndrome-free' regimes (Ndulu *et al*., 2008). Supporting this is the finding of Tyler and Gopal (2010), who opined that without stable governance, it is hard to maintain any significant regional economic integration or tax revenue growth. This is particularly noticeable in the history of SSA.

The benefits attributed to regional integration for developing countries have been extensively studied (Mugerwa *et al*, 2014; Ayuk and Kaboré, 2013; Vázquez Vicente, 2012; UNU-CRIS, 2008; UNCTAD, 2005, 2006, 2009; Sanahuja, 2007). In the case of SSA, regional integration has been considered since the colonial era, one of the most promising options in terms of growth and development (Mutharika, 1987). After World War II, regional integration in SSA was supported by bodies such as the United Nations (UN, 1968) or the Organisation of African Unity (OAU, 1963). It was considered a viable alternative for socioeconomic transformation of the region and a suitable instrument to fight poverty and contribute to development, peace, security and stability (UNDP, 2011; UNCTAD, 2009; Kabunda, 2002; Asante, 1997). Regional integration initiatives have been proposed by SSA leaders since the 1950s and 1960s (Bidaurratzaga, 1998), although the approach has undergone changes from a theoretical point of view. The initial pan-Africanist positions (Nkrumah, 2010; Bujra, 2004) – based on endogenous development – have thus given way to theoretical approaches that aim to include SSA in the world economy, in line with the neoliberal globalisation approach of liberalisation and openness, known as open-regionalism.

The observation that revenue performance in some developing countries is poor naturally seems to imply that the revenue effort should be increased, but how far and how fast the revenue-to-GDP ratio can be raised is sometimes unclear. The idea of a potential source of tax revenue has influenced the philosophy of taxable capacity or tax effort. A crude means of assessing taxable capacity is to relate tax revenue to GDP across countries, by using a regression model with explanatory variables that represent different elements of taxable capacity. A tax effort larger than

one implies that the country utilizes its tax base well. However, a country with low tax effort (below one) is likely to have the potential to raise substantial additional revenue.

From a policy perspective there is an important distinction between countries with a substantial share of resource-related tax revenues and those without. Resource revenue provides an opportunity for reducing distortionary taxation that may have a negative impact on economic activity, but it also provides the opportunity for maintaining highly inefficient subsidy programme (Collier, *et. al* (2009). Bornhorst *et. al* (2009) found that countries that receive large revenues from the exploitation of natural resource endowments are likely to reduce their domestic tax effort considerably. This is not necessarily worrying as reduced domestic tax burden could foster private sector activities consistent with an improvement in development prospects. Accelerated development is in itself an important determinant of tax revenue. Structural factors exert the strongest influence on the tax revenue/GDP in low-income countries. Growing levels of per capita income, a shift from agricultural to industrial production, a change in consumer demand from basic necessities to manufactured goods and services, falling age-dependency ratios, and increasing urbanization all lead to rising shares of tax revenue in national income. This implies that policies which emphasize structural changes will aid countries in the development process.

More recent studies have found that not only do supply factors matter but that demand factors such as institutional quality has a significant impact in determination of tax effort (Bird *et al.* 2008). As they conclude, a legitimate and responsive state one that secures the rule of law and keeps corruption under control appears to be an essential pre-condition for a more adequate tax collection effort. Chand and Moene (1997) argue that fiscal corruption is a key factor behind the poor revenue performance in a number of developing countries. There is also strong evidence to suggest that measures taken to reduce corruption could be expected to enhance tax revenue significantly (Gupta, 2007). As suggested by Bird *et al.* (2008) improving institutions such as enhancing voice or accountability and reducing corruption may not take longer nor be necessarily more difficult than changing supply-side factors.

How to manage tax revenue effectively, and in particular in countries with weak institutions, is an active area of research itself and deserves more attention. Earlier literature reviewed tax revenue performance in SSA and found that tax revenue performance varies across SSA countries and revenue trends are not uniform; some countries have enjoyed sustained increase in tax revenue shares while others have seen tax revenue shares weaken (Stotsky *et al.,* 1997). Agbeyegbe *et al.* (2006) showed that import duties are still a significant source of revenues in SSA countries, though trade liberalization in the region has led to a reduced reliance on these taxes. And taxes on goods and services are a growing share of revenues, especially with the introduction of VAT in many of the countries in the past few decades, and a reform of excise taxes in many countries as well. Moreover, in countries with relatively well-functioning tax-systems income tax revenues constitute a significant share of revenues. Moreover, Keen *et al.* (2009) have showed the development in tax revenues of 40 SSA countries during the period from 1980 to 2005. They have found that there had clearly been an increase in the average tax shares in GDP since the late 1990s,

but this was very largely due to a marked increase in revenue from natural resources. For non-resource related tax revenues, in contrast, there has been almost no change over the sample period. Finally, with regard to tax structures, Keen *et al.* (2009) showed that there has been a downward trend in trade taxes and an upward trend in indirect taxes while income taxes almost remained constant.

4.0 Theoretical Framework and Econometric Model Specification

The theoretical structure and strategy for modeling drivers of tax revenue at macroeconomics level has consistently rooted on the hypothesis that variation in drivers of revenue *Uf* arising from tax revenue as a percentage of GDP can be explained by variables representing macro-economic factors defined by m_i following the work Nnyanzi et al, (2016), Gastaldi *et al.* (2013), Hansson and Olofsdotter (2004), Given the objective of the present study, we hypothesized that global tax revenue generation function *Uf* (.) can be defined as:

$$Uf \ = \ uf \ (Ln\_tax_{rev} m: GI, \ln\_trade, X) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (1)$$

where, ln_tax_{rev} represents tax revenue measured tax revenue as the percentage of GDP ; m_1 is a vector of determinants of tax revenue in SSA, which we hypothesized to include governance index, (GI), regional economic integration (captured as trade liberalization ln_trade , interaction of regional communities in SSA such as SADC, COMESA, ECOWAS) and a number of macro-economic variables represented by X in the study. Theoretically speaking, the empirical specification of the equation 1 has always been based on the reduced form described as:

$$Ln\_tax\_rev \ = \ f \ (GI, \ln\_trade, X \ ; \varepsilon) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (2)$$

where, ln_tax_rev, GI, TR and X are as defined earlier; *f* represents functional form and ε refers to the error term.

To determine the responsiveness of regional economic integration and quality of governance with the other traditional the sources of tax revenue, we first specified a simple double log-linear Cobb-Douglass production function as:

$$\ln(Y_{it}) = \ \beta_o \ + \ \beta_1 ln\_pop\_growth_{it} \ + \ \beta_2 \ln\_trade_{it} \ + \ \beta_3 ln\_infl\_cpi\_p_{it} \ + \ \beta_4 ln\_enroll_{it} \ + \ \beta_5 ln\_gov\_ind_{it} \ + \ log_{ag_{gdp}} \ + \ \mu_{it} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (3)$$

Where, Subscripts *i* denotes developing countries in sample and subscript *t* denotes times. The dependent variables $(\ln\_trade)it$ represent the tax revenue as percentage of GDP country *i* in year t. $ln\_gov\_ind_{it}$ represents composite of Governance indicator. In disaggregation of the governance indicators, ln_cc natural logarithm of control of corruption, ln_ge natural logarithm of government effectiveness, ln_pv natural logarithm of political stability ln_rl, natural logarithm of rule of law ln_va natural logarithm of voice and accountability ln_rq natural logarithm of regulatory quality. ln_trade_{it} represents the economic integration. Human capital is represented by ln_enroll_{it}. Secondary school enrollment ratio is used as a proxy for human capital. Based on

the standard growth literatures, other control variables included in this study are- inflation, proxy as the consumer price index. $ln\_pop\_growth_{it}$ represents the natural logarithm of population growth. μ_{it} is the disturbance term. Initially, it is important to mention that macro-econometric modeling is an endeavor to explain the empirical behavior of an actual economic system. The above model can be simplified as follows –

4.1 Static Model
The specification of growth equation is based on the static framework of economic growth model. The general form of the regression equation is given below-

$$Y_{it} = \eta_i + \delta_t + \beta(X_{it}) + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Y_{it}=Dependent Variables
η_i= Country specific, time invariant effect
δ_t=Time specific, country invariant effect
X_{it}=The vector of the explanatory variables
Subscript (i) = countries (i=1, 2, ….N)
  (t) =time (t=1, 2, …T)
β = Scalar vector of coefficients of β_1,β_2 …..β_n
ε_{it} =Error term with **E** (ε_{it}) = **0** and **var** (ε_{it}) = $.\sigma_\varepsilon^2$

Assumptions for Static Model:
Generally, we can estimate an equation in three different methods, such as- Pooled Ordinary Least Square (OLS), Fixed Effects (FE) Model and Random Effects (RE) model.
Pooled Ordinary Least Square (OLS):
If country specific effects φ_i are constant over time and there is no time specific effect δ_t then we can apply Pooled Ordinary least squares (OLS) method. There may be omitted variable bias when working with Pooled Ordinary least squares (OLS) estimators. Omitted variables may be due to data limitation or ignorance. In a panel data model, the omitted variable bias resulting from the unobserved variable in the error term that is possibly correlated with one or more of the explanatory variables is also referred to as "unobserved heterogeneity". This unobserved heterogeneity can be handled with three possible ways: first is to disregard the problem and get biased and inconsistent estimators; second approach is to try to find a proxy variable for the unobserved variable but they are likely to be measured with errors; and the third, we could assume that the omitted variable is constant over time and use certain statistical methods to control for the unobserved heterogeneity.
Fixed Effects Model:
The unobserved heterogeneity of the developing countries may lead to country-specific unobserved characteristics be correlated with the explanatory variables in the model. One of the possible options for handling the unobserved heterogeneity is to use Fixed Effects (FE) to control for the unobserved effects. So, the second method of the regression equation assumes constant but

not homogenous country specific effects, which leads to Fixed Effects (FE) model. "Fixed Effects (FE) model is the best fit if we assume that the unobserved heterogeneity among the countries only results in parametric shifts of the regression function and that it is correlated with one or more of the explanatory variables (Wooldridge, 2002)".

Random Effects (RE) Model:

Random Effects (RE) model is the third method of the regression analysis. In case of Random Effect model, we assume non-constant country specific effects and the time effects are absent. In case of Random Effects model we can control for the unobservable heterogeneity through a general least-square estimation (GLS) process if it is assumed that the error terms of each individual country are randomly distributed across countries and hence the unobserved effects are uncorrelated with any explanatory variables.

In this study, we used data from 15 sub Saharan Africa countries over a 1996-2015 period. Fixed effects (FE) model seems always a more reliable choice than random effects model to control for the unobserved heterogeneity when aggregate data is used. A formal statistical test can guide the choice between fixed effects (FE) model and random effects (RE) model. Hausman (1984) proposed a specification test; "Under the null hypothesis of no misspecification, there exists a consistent, asymptotically normal and asymptotically efficient estimator. Under the alternative hypothesis of misspecification, however, this estimator will be biased and inconsistent." In other words, if there is no misspecification, the individual effects are uncorrelated with one or more of the explanatory variables. Therefore, both the fixed effects (FE) and random effects (RE) estimators are consistent and it does not matter which one is used, or the sampling variation in the fixed effects (FE) is too large to conclude whether the difference is statistically significant. Hence, the likelihood of making mistake is minimized by using random effects (RE) estimator. However, if the individual effects are correlated with one or more of the explanatory variables (misspecification), the assumption of the random effects (RE) estimators is false and fixed effects (FE) estimators should be used. Therefore, a rejection of the null hypothesis of Hausman (1978) specification test implies that the individual effects are correlated with the explanatory variables and Fixed Effects (FE) estimates should be used.

4.2 Dynamic Model

In this study, one of the potential problems concerned with estimation of the impact of quality of governance and regional economic integration on tax revenue is endogeneity. It is common in the tax revenue regression that some of the explanatory variables are endogenous. Endogeneity may bias estimates of how the independent variables in equation affect the dependent variable in model. There are two major sources of endogeneity such as- 'Unobservable heterogeneity' and 'Simultaneity'. To eliminate the unobservable heterogeneity, conventionally Fixed Effects estimations are used. However, this estimation is consistent only when we assume that country characteristics or structures are strictly exogenous. That is, they are purely random observations through time and are unrelated to the country's history. But this assumption is unlikely to be valid in reality. So, while OLS estimation may be biased due to the fact that it ignores unobservable heterogeneity, fixed-effects estimation may be biased since it neglects endogeneity.

The problem of endogeneity can be resolved by choosing GMM estimator to estimate the impacts of governance and trade on tax revenue in dynamic panel data model framework. Arellano and Bond (1991) GMM estimator is usually called standard first-differenced GMM estimator. Also, the augmented version of GMM is proposed by Arellano and Bover (1995) and Blundell and Bond (1998), which is known as system GMM estimator.

To specify the dynamic GMM model, equation (1) can be rewritten as follows-

$$Y_{it} = \rho Y_{it-1} + \beta X_{it} + n_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots. (5)$$

Where,

Y_{it} =Log of percentage of tax revenue
$Y_{it} - Y_{it-1}$= Log of percentage of tax revenue lagged one year
η_i Unobserved country-specific effects
δ_t=Time specific, country invariant effect
X_{it}=The vector of the explanatory variables
ρ, β = Coefficients of parameters to be estimated
ε_{it} = The time-varying error term
Subscript (i) = countries (i=1, 2, …. N)
(t) =time (t=1, 2, …T)
To eliminate unobserved heterogeneity Arellano and Bond, (1991) suggest first-differencing Equation (5). By first differencing equation (5) can be written as -

$$\left(Y_{it} - Y_{i,t-1}\right) = \rho\left(Y_{i,t-1} - Y_{i,t-2}\right) + \beta\left(X_{it} - X_{i,t-1}\right) + \Delta\varepsilon_{it}\ldots\ldots\ldots..(16)$$

The equation can be rewritten as following-

$$\Delta Y_{it} = \rho \Delta Y_{it-1} + \beta \Delta X_{it} + \Delta\varepsilon_{it}\ldots\ldots\ldots\ldots\ldots\ldots.(7)$$

The equation (5) is known as difference GMM. By differencing the equation, difference GMM eliminates the unobserved country-specific effect since the disturbance η_i does not vary with time. Thus eliminating omitted variable bias. Moreover, difference GMM helps overcome endogeneity by using lagged-values of the explanatory variables as instruments. However, first-differencing generates a new statistical issue that the constructed differenced error term ($\Delta\varepsilon^{it}$) is now correlated with the differenced lagged variable. As a solution, Arellano and Bover (1995) and Blundell and Bond (1998) propose system GMM. The Arellano-Bover (1995) and Blundell-Bond (1998) estimator augments Arellano-Bond (1991). It builds a system of two equations: one is the original equation in levels and the other is the transformed one in differences. This is known as system GMM. This allows the introduction of more instruments and can improve efficiency. Instruments for the differenced equation are obtained from the lagged levels of the explanatory variables, while instruments for the level equation are the lagged differences of explanatory variables. The

consistency of the GMM estimator depends on the validity of the moment conditions, which can be tested using two specifications tests.

- The first test is the Arellano-Bond test for autocorrelation which tests if there is no second order correlation in disturbances.
- The second test, namely the Hansen (1982) J-test of over-identifying restrictions, tests the validity of the instruments. The 'joint null hypothesis' of the Hansen test is that the instruments are exogenous, i.e. they are not correlated with the error term, and the excluded instruments are correctly excluded from the estimated equation (Roodman, 2009).

We constructed the composite governance index ($ln\_gov\_ind_{it}$) using the Principal Component Analysis (PCA) method.

5.0 Data Source and Description

Data for fifteen selected Sub-Saharan African[1] countries is analyzed in this study. The data is taken from different sources. Data on agricultural per capita GDP, population growth, trade liberalization (as a proxy for economic integration), inflation (Consumer price Index), enrollment in secondary schools (as a proxy for human capital formation), agricultural growth are retrieved from the World Bank's 2016 World Development Indicators. Data on indicators of governance, such as rule of law, control of corruption, voice and accountability, political stability, government effectiveness, and regulator quality are taken from World Bank governance data. The meaning of these indictors is discussed in Table 1 below.

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[1] "Angola" "Gabon" "Mauritius" "Equatorail-Guniea" "Bostwana" "Central Africa Republic" "Ethiopia" "Uganda" "Niger" "Togo" "Cape-verde" "Cote' d voire" "Nigeria" "Swaziland" "Sudan"

Variable	Description	Source
log_ag_gdp	Log of agricultural GDP as proxy of agricultural growth	World Development Indicators(WDI)
ln_per_rem_usd	Log personal Remittances received	WDI
ln_pop_growth	Log of percentage of population growth	WDI
log_infl_cpi_p	Log of consumer price index as proxy for inflation. Annual Inflation, a proxy variable for the macroeconomic policy environment; measured by the consumer price index.	WDI
ln_enroll	Log of Secondary school enrollment (percentage of gross) is used as a proxy for human capital.	WDI
ln_gov_ind	Log of composite value of governance indicators	
rem_gov	Log of interaction between composite of governance indicator and remittances	World Governance Indicators(WGI) WDI
ln_cc	Log of Control of corruption score. Corruption index measures the extent to which public power is exercised for private gains.	WGI
ln_ge	Log of Government Effectiveness score. Government Effectiveness index measures the quality of public and civil services and the ability to formulate and implement good policies.	WGI
ln_pv	Log of Political Stability score. Political stability and absence index measures the likelihood that the government will be destabilized either through domestic violence or overthrown by unconstitutionally means.	WGI
ln_rl	Log of Rule of law score. Rule of law index captures not only the quality of contract enforcement but also the likelihood of crime and violence.	WGI
ln_va	Log of Voice and Accountability score. 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.	WGI
ln_rq	Log of Regulatory quality score. Regulatory quality index captures the ability of the government to formulate and implement sound policies aimed at promoting the private sector.	WGI
Ln_trade	Trade (% of GDP) – in logs; it is a proxy for trade liberalization	WDI
Ln_tax_rev	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.	
L.ln_tax_rev	It is a tax revenue as a percentage of GDP	
SADC_gov	Log of interaction economic integration in the South Africa Development Communities (SADC) and governance index	

ECOWAS_gov	Log of interaction economic integration in the Economic Community of West African States (ECOWAS) and governance index	
COMESA_gov	Log of interaction economic integration in the Common Market for Eastern and Southern Africa (COMESA) and governance index	
SADC_trade	Log of interaction economic integration in the South Africa Development Communities (SADC) and trade liberalization	
COMESA_trade	Log of interaction economic integration in the Common Market for Eastern and Southern Africa (COMESA) and trade liberalization	
ECOWAS_trade	Log of interaction economic integration in the Economic Community of West African States (ECOWAS) and trade liberalization	
trade_gov	Log of interaction between trade liberation and governance.	

6.0 Results and discussions

Following analysis of our models represented in table 2 & 3, we find that the coefficient for regional integration in the static models revealed that regional integration had a significant positive growth effect on tax revenue in SSA. Similarly, the coefficients in the difference and systemic GMM also revealed regional trade promoted growth in the tax revenue of countries in SSA. The coefficients in the dynamic models were however higher compared to those in static models which indicate that regional trade had higher effects on the amount of tax revenue generated when the endogeneity in the model is controlled for and when the variations in the level of trade are considered across countries in the region. This is contrary to the findings of Agbeyegbe *et al.* (2006) which covered the period 1980 – 1996 and found that tax revenue was not strongly related to tax revenue. The results of this study confirm that over the years' regional integration has become more increasingly relevant in the growth of the tax revenue of countries in the SSA.

Turning to population growth as one of the control variables included in the models, we find that population growth had a positive and significant effect on tax revenue in the OLS models and some of the random effect model. The coefficients were however negative and insignificant in the fixed effect models and the dynamic models. Though insignificant in most of the models, the results reveal that countries with high population densities are less likely to experience growth in their tax revenue. The coefficient of the level of inflation had a negative growth effect on the tax revenue in the static models. Contrarily, the coefficients had a positive effect in the dynamic GMM models. When the variation in the level of inflation across countries is considered in the systemic GMM, the coefficients were negative and significant in the models where institutions and regional trade were controlled for. The results from the study of Mahdavi (2008) which revealed that countries experiencing growth in the relative share of the old – age population, population density,

rate of monetization and inflation were likely have lower tax revenue, provide a support for our findings.

The impact of educational enrollment was positive in all the models and only significant in the OLS models. This shows that high student enrollment has the potentials to increase the tax revenue of countries in SSA. Education provides insight for need not to avoid tax. Agricultural growth had a negative growth impact on tax revenue in the static models. In the dynamic models the coefficients were positive and insignificant. Addison and Levin (2012) explained that growth in the agricultural sector which mostly made up of small scale farmers and limited number of tax payers is more likely to have negative growth effects on the tax revenue of countries in SSA.

The control of corruption index had a significant positive growth effect on tax revenue in SSA in all the models. The coefficient was statistically significant in the system GMM model which indicates that when the differences in the corruption control score of countries in the region was considered the extent to which corruption was controlled significantly translated to more revenue. This implies that countries with higher index values which indicate less corruption are more likely to have more tax revenue. Regional trade also had a positive and significant growth effect on Tax revenue in the governance model which indicates that the contribution of regional trade to growth tax revenue could be highly related to extent to which corruption is controlled across countries in SSA. Baum *et al.* (2017) explained that corruption influences tax and all its components and it reduces tax revenue mostly through poor tax compliance. Corruption adversely affects international trade and reduces government revenue as traders' experience delays at the borders and pay bribes before they can clear their goods.

Contrary to expectation, the government effectiveness score was positive and insignificant only in the fixed effect model. The political stability score was also only positive in the OLS and random effect models while rule of law increased tax revenue only in the fixed effect model. The regulatory quality score had a positive growth effect on tax revenue in all the static models but was negative in the dynamic models. The results reveal that apart from corruption, other indicators of government quality do not influence the tax revenue in most countries in SSA. Bird and Martinez-Vazquez (2008) explained that developing countries probably do not tax themselves as it may not be in the interest of those who dominate political institutions.

The coefficient of interaction economic integration in the South Africa Development Communities (SADC) and governance index had negative growth effects on tax revenue in SSA in both the static and dynamic models. The coefficients were significant in the OLS, fixed effect and the systemic GMM models. The results indicate that tax revenue reduced as trade increased between countries in SSA with high quality of governance indicators and South Africa Development Communities.

Table 2: Static Model Estimation for Tax Revenue: OLS, Random Effect and Fixed Effect

VARIABLES	OLS				Random Effect				Fixed Effect			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
ln_trade	0.196***		0.168**	0.134*	0.444***		0.168	0.328	0.471***		0.427***	0.313
	(0.0679)		(0.0671)	(0.0739)	(0.0874)		(0.155)	(0.226)	(0.0849)		(0.111)	(0.234)
ln_pop_growth	0.904***	0.775***	1.118***	0.670***	0.0591	-0.0386	1.118*	0.00770	-0.174	-0.226	-0.138	-0.0556
	(0.205)	(0.199)	(0.232)	(0.220)	(0.555)	(0.593)	(0.575)	(0.550)	(0.688)	(0.690)	(0.537)	(0.667)
log_infl_cpi_p	-0.145**	-0.105	-0.0508	-0.225***	-0.0929*	-0.0915	-0.0508	-0.0638	-0.0908	-0.0977	-0.0814	-0.0582
	(0.0729)	(0.0731)	(0.0707)	(0.0786)	(0.0537)	(0.0584)	(0.138)	(0.0614)	(0.0622)	(0.0745)	(0.0657)	(0.0677)
ln_enroll	0.154***	0.203***	0.148***	0.255***	0.0186	0.0508	0.148	0.0232	0.0194	0.0563	0.0442	0.00916
	(0.0571)	(0.0576)	(0.0560)	(0.0605)	(0.0672)	(0.0662)	(0.0968)	(0.0653)	(0.0595)	(0.0585)	(0.0545)	(0.0654)
ln_agric_growt	-0.0965	-0.249***	-0.147*	-0.0519	-0.0345	-0.0399	-0.147	-0.0365	-0.0179	-0.0108	-0.00643	-0.0341
	(0.0850)	(0.0921)	(0.0786)	(0.0890)	(0.0769)	(0.0876)	(0.128)	(0.0776)	(0.0853)	(0.0954)	(0.0792)	(0.0792)
ln_cc			0.376				0.376				0.292	
			(0.388)				(0.578)				(0.330)	
ln_ge			-0.437**				-0.437				0.396	
			(0.206)				(0.400)				(0.235)	
ln_pv			0.119				0.119				-0.0463	
			(0.0939)				(0.126)				(0.0472)	
ln_rl			-1.406***				-1.406***				0.520	
			(0.419)				(0.432)				(0.320)	
ln_va			-3.760***				-3.760***				-1.946**	
			(1.185)				(0.841)				(0.812)	
ln_rq			0.0157				0.0157				0.0304	
			(0.131)				(0.183)				(0.0778)	
SADC_gov	-0.734*	0.148	-2.094***		-0.0643	0.170	-2.094***		-11.51***	-10.37***	-9.443***	
	(0.391)	(0.331)	(0.426)		(0.232)	(0.272)	(0.350)		(1.732)	(1.855)	(1.606)	
ECOWAS_gov	-1.159***	-0.354	-0.503*		0.369	0.313	-0.503		0.544*	0.372	0.378	
	(0.385)	(0.256)	(0.259)		(0.272)	(0.276)	(0.339)		(0.259)	(0.277)	(0.274)	
COMESA_gov	-0.525*	0.276**	0.192		0.113	0.0330	0.192		0.189	-0.000362	0.000702	
	(0.294)	(0.119)	(0.127)		(0.140)	(0.0949)	(0.310)		(0.115)	(0.0816)	(0.0573)	
SADC_trade				0.208**				0.138				0.122
				(0.0978)				(0.246)				(0.241)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
COMESA_trade				-0.114*				-0.0614				-0.0259
				(0.0653)				(0.239)				(0.274)
ECOWAS_trade				0.0478				0.227				0.305
				(0.0693)				(0.257)				(0.246)
ln_gov_ind	0.786***				-0.0827				-0.175**			
	(0.278)				(0.0609)				(0.0667)			
trade_gov		0.0541***				0.116***				0.124***		
		(0.0170)				(0.0381)				(0.0351)		
Constant	-0.0598	0.285	-0.350	0.250	-0.250	0.434	-0.350		0.910	1.490*	0.777	
	(0.347)	(0.245)	(0.394)	(0.298)	(0.480)	(0.582)	(0.836)		(0.802)	(0.798)	(0.713)	
Observations	255	255	255		255	255	255		255	255	255	
R-squared	0.224	0.161	0.307						0.269	0.198	0.301	
Number of pid					15	15	15		15	15	15	

The impact of the interaction effect between economic integration in the Economic Community of West African States (ECOWAS) and governance index was negative and significant on the tax revenue in the OLS model while in most of random, fixed effect models the coefficient was positive and insignificant. In the dynamic models, the coefficients were positive and significant which implies that after the control of endogeneity, tax revenue increases with the promotion of economic integration across the ECOWAS countries combined with improvements in the quality of governance across the states. The results imply that tax revenue in SSA can be increased through economic integration between member states of the ECOWAS if each country also improves their governance indicators such as the reduction of corruption as shown above.

The coefficient of interaction effect between economic integration in the Common Market for Eastern and Southern Africa (COMESA) and trade liberalization was had a negative growth effect on tax revenue in the static models. Though insignificant the interaction variable had a positive relationship with tax revenue in the dynamic models. This implies that when endogeneity is accounted for the tax revenue would probably increase as economic integration and trade liberalization increased between countries in SSA the COMESA

For the interaction between economic integration in the South Africa Development Communities (SADC) and quality of governance, the coefficient was positive in most of static models and all the dynamic models. Though not significant, this positive nature of the coefficient indicates that tax revenue is likely to increase when there is economic integration in SADC and the quality of governance in SSA improves.

The coefficient of interaction between economic integration in the Common Market for Eastern and Southern Africa (COMESA) and trade liberalization had a negative growth effect on tax revenue in the static models. The variable remained negative in the dynamic models and was significant in the systemic GMM. This implies that when endogeneity is accounted for the tax revenue would probably reduce with trade liberalization and economic integration of SSA countries into the COMESA.

The impact of the interaction variable between economic integration in the Economic Community of West African States (ECOWAS) and trade liberalization was positive in both the static and dynamic models. The coefficient was only significant in the difference GMM model. The result reveal that tax revenue increased as economic integration and trade liberalization increased among ECOWAS countries in SSA. The coefficient of the interaction between trade liberation and governance also had a positive and significant growth effect on tax revenue in the OLS model while it was negative and significant in the fixed effect model. In the dynamic models the coefficient was significant and positive which reveal that growth in both trade liberalization and governance quality across countries in SSA increases tax revenue in the region.

Table 3 : Dynamic Model Estimation for Tax Revenue: Difference GMM and System GM

VARIABLES	Difference-GMM				System-GMM			
	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20
L.ln_tax_rev	0.420***	0.443***	0.399***	0.484***	0.508***	0.542***	0.456***	0.562***
	(0.0806)	(0.0806)	(0.0833)	(0.0770)	(0.0688)	(0.0694)	(0.0722)	(0.0673)
ln_trade	0.405***		0.400***	0.337***	0.324***		0.329***	0.358***
	(0.0614)		(0.0631)	(0.105)	(0.0568)		(0.0581)	(0.0905)
ln_pop_growth	-0.280	-0.153	-0.321	-0.205	-0.0404	-0.0514	-0.00766	-0.150
	(0.427)	(0.428)	(0.441)	(0.394)	(0.280)	(0.285)	(0.296)	(0.260)
log_infl_cpi_p	0.110	0.138*	0.110	0.106	0.119	-0.167**	0.119	-0.125*
	(0.0721)	(0.0708)	(0.0736)	(0.0688)	(0.0738)	(0.0728)	(0.0747)	(0.0723)
ln_enroll	0.0421	0.0614	0.0494	0.0329	0.0542	0.0721	0.0605	0.0525
	(0.0450)	(0.0448)	(0.0464)	(0.0433)	(0.0450)	(0.0456)	(0.0462)	(0.0441)
ln_agric_growth	0.00533	0.0177	0.00937	0.00658	0.0193	-0.0111	0.0235	0.00926
	(0.0638)	(0.0638)	(0.0668)	(0.0613)	(0.0637)	(0.0642)	(0.0675)	(0.0628)
ln_cc			1.193				1.654**	
			(0.777)				(0.729)	
ln_ge			-0.0602				-0.112	
			(0.271)				(0.213)	
ln_pv			-0.0961				-0.0579	
			(0.0958)				(0.0944)	
ln_rl			-1.036				-1.310	
			(0.962)				(0.838)	
ln_va			-1.831				-2.136*	
			(1.266)				(1.187)	
ln_rq			-0.0192				-0.0235	
			(0.120)				(0.121)	
SADC_gov	-5.902	-5.428	-7.812		-0.0797	0.278	-1.536**	
	(7.602)	(7.633)	(8.081)		(0.517)	(0.510)	(0.773)	
ECOWAS_gov	0.394*	0.228	0.238		0.393*	0.273	0.294*	
	(0.221)	(0.169)	(0.172)		(0.225)	(0.174)	(0.175)	
COMESA_gov	0.229	0.0943	0.0927		0.0543	0.0709	0.0323	
	(0.267)	(0.222)	(0.220)		(0.264)	(0.224)	(0.220)	
ln_gov_ind	-0.153			0.0150	-0.0858			0.0284
	(0.149)			(0.0983)	(0.152)			(0.103)
trade_gov		0.125***				0.0826***		
		(0.0212)				(0.0177)		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SADC_trade				0.0771				-0.0349
				(0.150)				(0.120)
COMESA_trade				-0.242				-0.248**
				(0.149)				(0.117)
ECOWAS_trade				0.352**				0.0379
				(0.138)				(0.0946)
Constant	-0.285	-0.0725	-0.215	-0.966***	-0.876***	-0.488*	-0.886***	-0.769***
	(0.839)	(0.840)	(0.901)	(0.346)	(0.306)	(0.288)	(0.330)	(0.296)
Observations	180	180	180	180	195	195	195	195
Number of pid	15	15	15	15	15	15	15	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusion and policy options

The importance of tax revenue to the overall sustainability of the Sub-Saharan African countries is vital as the main source of central government revenue, since tax collection is mandatory and regular, which can guarantee the stability of income. In the same vein, taxation aims to meet the social and public needs by providing public goods and services. Government needs tax revenue to establish armed forces and judicial systems to ensure the secure and justice of the society. In many poor developing countries, a low tax-revenue/GDP ratio prevents these nations from undertaking ambitious expenditure programs. Thus a rapid increase in domestic revenue and a corresponding increase in public services is a policy priority. However, one needs to be cautious about increased public spending and increased taxation, as distortionary taxes begin to reduce growth when pushed beyond certain levels: tax bases are not simply 'given' to governments: they can be grown or destroyed (Bird, 2008).

In this study, we examine the relationship between the regional economic integration, governance quality and tax revenue in Sub-Saharan African Countries using the generalized method of moments technique. We find that that the contribution of regional integration to tax revenues in the SSA is conditional on institutional quality is critical for designing policies to promote tax revenues. In view of our findings, we advocate for 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 highly inflated 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 Sub-Saharan Africa. We also advocate for the complementary nature of policies. For example, as governments embrace policies that encourage economic integration and good governance. 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 which is embedded in cohesive economic integration.

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ANNEXES: Graphical representation of some of the variables used.

"Governance-remittances interaction"

"Perecentage of Agriculture contribution to GDP"