Informality, Governance Institutions and Tax Revenue Performance in Africa

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Abstract

Most countries in Africa are faced with the challenges of low tax revenue, weak governance institutions and large sizes of informal economy. The characteristics of economic activities in the informal sector and prevalence of weak governance institutions pose serious challenges for government authorities in mobilising tax revenue. This study looks at how informality affects tax revenue performance in African nations and how it interacts with governance systems. The extent of informality is measured by multiple indicators multiple causes model-based (MIMIC) estimates of informal output as percentage of official gross domestic product (GDP) and self-employment as a percentage of total employment, and tax performance is expressed as percentage share of tax revenue in the GDP. A dynamic panel data model was specified and estimated using the Least Squares Dummy Variable Corrected (LSDVC) method, and data from 20 African countries for the period of 1996 to 2022. The findings suggest that informality has a negative impact on tax revenue performance. However, improvement in governance institutions could moderate the negative effects of informality on tax revenue. Therefore, African countries need to improve and strengthen governance institutions to dampen the negative effect of informal economic activities on their tax revenue mobilisation efforts.

***K*eywords:** Africa, Informality, Informal economy, Governance Institutions, Tax Revenue

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1. Introduction

Taxes are compulsory transfers of financial resources from the people and firms (private sector) to the government for public purposes (IMF, 2021). Taxes are supposed to serve as primary source of government revenue (Ofoegbu & Akwu, 2016), but most African countries depend largely, on other (secondary) sources such as proceeds from mineral exports. Tax revenue mobilisation remains low in many African countries, while a large segment of the economic activities take place in the informal sectors, largely hidden from the authorities. Revenue gaps and mounting public debts are evident in many of these countries. Thus, increasing tax revenue mobilisation through reforms has become a sustainable medium through which they could meet their growing financial responsibilities including debt obligations. Unfortunately, the huge size of informal sector in African economies has been a big hurdle to taxation on the continent. The International Labor Organization (ILO) 2 billion people, or more than 60% of the adult labour force worldwide, are thought to be employed, at least part-time, in the unorganized sector. Although the official and informal sectors of the economy coexist in all economies, their relative proportion varies both within and between nations and continents. The informal sector typically accounts for 35 percent of GDP in low- and middle-income nations, while advanced economies only account for 15 percent. Latin America and sub-Saharan Africa have the highest levels of informality, while Europe and East Asia are the regions with the lowest (IMF, 2021).

The huge size of informal sector in the African economic landscape presents both challenges and huge opportunities for taxation. The large size of informal economy in Africa suggests that there exist huge untapped opportunities that could be exploited by governments in the region to grow their tax revenues, if bidding constraints to tax collection in the sector are addressed. Harnessing the opportunities for expansion of the tax net from the informal sector could help complement traditional revenue sources in the formal sector and improve fiscal sustainability (Nwaka, 2005). Hence, there is the need for in-depth understanding of the empirical relationship between informality and tax revenue performance in Africa. Although, there is a substantial volume of literature on the impact of informality on tax revenue in various regions and countries (Kodila-Tedika & Mutascu, 2013; Awasthi & Engelschalk, 2018; Muchiri, 2014; Tataryanto, 2014; Boitano, & Abanto, 2019; Gwaindepi, 2022; Ishak, & Farzanegan, 2020; Mazhar & Meon, 2017; Vlachaki, 2015; Omodero, 2020; Bentum-Ennin & Adu, 2024), However, there seems to be a void when looking at research that focuses specifically on Africa. Only a small number of studies have explicitly focused on African nations; the majority have examined the connection between informality and tax revenue in a global or multi-country setting. (Kodila-Tedika, & Mutascu, 2013; Gwaindepi, 2022; Ishak, & Farzanegan, 2020; Muchiri, 2014, and

Omodero, 2020). Among the above studies, only one had a specific focus on Africa as a whole (Kodila-Tedika, & Mutascu, 2013), while others covered a sub-region of Africa or specific country. More so, African countries are known for weak governance institutions, but most of the previous studies did not consider the moderating roles of governance institutions in the relationship between informality and tax revenue. Thus, given the challenges with economic, social, and political institutions in African countries, studies to fill the research gap(s) in the informality-tax revenue nexus taking due cognisance of institutions with focus on the continent are desirable. This study aims to cover this gap by examining the impact of size of informal economic activities on tax revenue performance. The findings of the study would enhance better understanding of the effects of informality on tax revenue within context of weak governance institutions and provide useful insights to many governments across Africa contending with rising costs of governance and sluggish revenue performance in the face of huge informal sector.

This paper's remaining content is divided into four sections. The literature is reviewed in section two, and the approach is presented in section three. The findings and discussion are shown in Section 4. The conclusion and suggestions are presented in Section 5.

2. Literature Review

This section presents the conceptual and empirical review of literature. The conceptual review is restricted to concept of informal sector which is referred to as “informality” in this study. The other concepts which are “institutions” and “tax revenue” are not surrounded by controversies as it is with “informality”. The concept of institutions, though vague as informality, has been well explained in the literature. And there are well known indexes for measuring various types of institutions and tax revenue.

The concept of informality is diverse. Bovi and Dell’Anno (2010) acknowledges that there is no universally accepted definition or term for informality or the shadow economy. The reason for this is that a single, arbitrary definition can miss a lot of crucial aspects of informality and fail to capture the phenomenology of today. An exact definition could result in a measurement system that is insufficient or erroneous. The characteristics of the informal sectors in many nations vary, which makes it more difficult to define informality. (Eilat & Zinnes, 2000). Informal economy is sometimes also referred to as black, hidden, parallel, second or underground economy (Elgin, & Schneider, 2016It consists of employees and companies that are not state-registered and may not adhere to legal requirements. Workers in informal enterprises are usually underpaid, and government tax authorities sometimes cannot see them. The bulk of people in most developing nations are employed in the unorganized sector and perform various menial tasksIn addition to being informal merchants, many

smallholder farmers who earn little more than subsistence also sell their excess produce. Small companies like minibuses, hair salons, and market stalls are operated by other unorganized laborers. Informal sector workers often include menial waged laborers like construction workers and housekeepers. (ActionAid, 2018).

Awa (2022) argued that the concept of informal economy was originally introduced by the International Labour Organization, and is described as “a way of doing things” consisting of seven factors: family ownership, ease of entrance, dependence on local resources, small-scale operations, labor-intensive and adaptable technologies, and deregulated and competitive marketplaces. Thus, the entirety of economic activity that takes place outside of governmental supervision and is not subject to taxes or included in a nation's GDP is referred to as the informal economy. (Enahoro & Olabisi, 2014). Informality is also defined as economic activity that does not adhere to conventional accounting procedures, is characterized by high rates of underreporting or non-reporting, and is commonly left out of social assessment instruments such as the Gross Domestic Product. (Oduwole & Sanni, 2014). Similarly, Webb, Bruton, Tihanyi and Ireland, (2013) defined the term "informal economy" refers to economic activity that takes place outside of official institutional boundaries but stays inside them for a significant portion of the population. Activities in the informal sector are theoretically prohibited by this definition, although they do not have an antisocial purpose. Other important terms that have been used to characterize informality include illegality, tax evasion, and employees' lack of social security coverage. (Gerxhani, 2004; Routh, 2011). Based on the above conceptual literature reviewed, it is obvious that there is no single generally accepted definition of informality.

The absence of consensus on definition of what constitutes the informal economy has made it difficult to measure it size in the overall economy. Furthermore, most people involved in the informal economy do not wish to be tracked down, and actions within it cannot be directly seen. (IMF, 2021), also compounded the problem. are thought to be employed, at least part-time, in the unorganized sector. The direct approach measures the number of informal workers and businesses directly via surveys, voluntary responses, and other compliance techniques. Indicators like self-employment (as a percentage of total employment), informal employment (as a percentage of total employment), and work outside the formal sector as a proportion of total employment make up the direct measure (Elgin, Kose, Ohnsorge & Yu, 2021). Indirect methods on the other hand, focus on certain characteristics, or proxies, that can be observed and are closely related to informal economic activities. Proxies in this approach include the currency-demand approach, electricity-demand approach, dynamic general equilibrium model-based (DGE) estimates of informal output (% of official GDP) and the Multiple indicators multiple causes model-based (MIMIC) estimates of informal output as percentage of official GDP

(Elgin, Kose, Ohnsorge, & Yu, 2021). The MIMIC approach of measuring informality takes into account various observable indicators that are related to informal economic activities such as tax evasion rates, underground employment figures, or unreported business transactions, and attempts to uncover the factors driving the discrepancy between observed economic indicators and official economic data (Alderslade, Talmadge, & Freeman, 2006). As in the case for this study, the study adopts both the direct and indirect approach of measuring informality. The self-employment rate and the MIMIC are used as indicators of informality for this study. Major justification for using the MIMIC over self-employment rate is that it utilises multiple data sources to capture many components of informal economic activities. Another reason is that it has a long time series and broad country coverage.

2.1 Review of Empirical Literature

Multiple studies have been undertaken on the relationships between informality and tax revenue, while others consider the impacts of institutional variables of governance and corruption on tax revenue performance. Many of these studies have found a negative relationship between informality and tax revenue. For instance, Gwaindepi (2022) and Bentum-Ennin and Adu (2024) discovered that in Sub-Saharan Africa, lower levels of domestic revenue mobilization (DRM) are linked to higher levels of informality. In the same way, Kodila-Tedika & Mutascu (2013) revealed significant negative impacts of the shadow economy on tax revenues in Africa.

These findings were corroborated by country and city specific studies such as Muchiri (2014) which reported a significant negative relationship between informality growth and tax revenue collection in Kenya; Awwad and Al-Kababji (2023) observed detrimental effects of the shadow economy on tax revenues in Palestine; and Lukito and Adi (2023) in Mojokerto city. Although the detrimental effects of informality on tax revenue are noticeable in all locations, there are differences in the magnitude or degree of these effects. Boitano & Abanto (2019) highlighted regional disparities in informality levels across Peru, Latin America, and OCDE countries, and therefore suggesting diverse implications for tax revenues. Similarly, Nchor (2020) found substantial negative, but varying impacts of the shadow economy on tax revenues in the Czech Republic, Hungary, and Poland, underscoring regional differences in tax revenue losses. Thus, suggesting the roles of differences in institutions across countries and regions.

Despite the overall consensus on the negative impact of informality on tax revenue, some studies have reported divergent findings. Omodero (2020) found that while corruption significantly

reduces tax revenue collection in Nigeria, the informal economy has no significant impact and Ishak & Farzanegan (2020) also observed no significant improvement in tax revenues following declines in oil rents in countries with sizable shadow economies. Some studies that have acknowledged the direct negative impact of the underground economy on tax revenue, also noted possibility of indirect positive effects through GDP growth. An example of such studies is Orsi and Seip (2023) which delved into the intricate relationship between the underground economy and tax revenue in Italy. This complexity was further highlighted by Tatariyanto (2014) in Indonesia, where the underground economy was found to have substantially reduced tax revenue collection. On the other hand, many empirical studies argue that corruption and weak governance institutions have negative effect on tax revenue (Ghura, 1998; Gupta, 2007; Ajaz & Ahmad, 2010; Aghion, Akcigit, Cage & Willliam, 2016; Drif & Rawat, 2018; Jahnke & Weisser, 2019; Abebe & Fikre, 2020; Yaru & Ajibola, 2022).

The reviewed literature provides valuable insights into the impact of informality on tax revenue on one hand and that of institutions on the other, but there are notable gap(s) on how informality and institutions could interact to influence tax revenue mobilisation in Africa. Few studies have explored potential roles of governance institutions in moderating the negative impact of informality on tax revenue collection. This research fills these gaps by examining the impact of informality and institutions combined on tax revenue performance in Africa.

3. Methodology

3.1 Model Specification

Equation (1) which serves as the study's generic model contains vectors of informal economy and control variables (basically tax base and indicators of governance institutions) which are assumed to have some influence on tax revenue performance. Equation (2) represents panel data form of the model with specific variable representing tax base (i.e., GDP and population density (POD)), and informality (i.e., Multiple Indicators Multiple causes (MIMIC) Self-employment as a percentage of total employment (SSMP) and the informal estimate of informal output as a percentage of official GDP are defined. Equations (1) and (2) provide the empirical framework for the models, which is primarily based on the empirical tax model put out by Kodila-Tedika, & Mutascu (2013). The model shows that informality can influence tax revenue performance negatively (Kodila-Tedika, & Mutascu, 2013 & Awasthi, & Engelschalk, 2018), while control variables such as the population density and GDP per capita are expected to have positive effect on tax revenue (Muzdalifah & Qibthiyyah, 2023; Raof, 2022).

However, institutional variables are also included as control variables and are expected to have a positive effect on tax revenue as well as moderate the negative effect of informality on tax revenue.

$$Tax\ Revenue\ = \beta_0\ + \boldsymbol{\beta} Informal\ economy + \boldsymbol{\delta Z} + \mu \ldots\ldots\ldots\ldots (1)$$

where Z = (Z_1,… Z_k) is the vector of control variables, while μi represents the error term. β_0 is the intercept, $\beta 1$ captures the effect of informality and δ = (δ_1, δ_2.....δ_k) is the parameter vector for the control variables.

More specifically, the baseline model is given as:

$$TR_{it}\ = \beta_0\ +\ \delta_1 GDP_{it}\ + \delta_2 POD_{it}\ + \beta_j INFECONOMY_{jit} + \delta_{k+2} GOVINST_{kit} +$$
$$\varphi_1\ (INFECONOMY_{jit} * GOVINST_{kit}) + \mu_{it}\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (2)$$

$i =, 1,2\ 3, \ldots\ldots N.\ t = 1,2,3, \ldots, T;\ j = 1, 2;\ k = 1,2,3\ldots..6$

where $N =$ Total Number of Countries; $T =$ Number of Years; $k =$ types of governance institutions);

The interpretation and measurement of the variables are presented in Table 1. An important concern related to equation (2) arises from the endogeneity issue stemming from the characteristics of the error term. Therefore, the error term can be articulated as follows:

$$\mu_{it}\ = \rho_i\ + \varepsilon_{it}\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (3)$$

If equation (3) is valid, then the utilization of the ordinary least squares (OLS) estimator to estimate equation (2) will result in biased and unreliable estimates (Baltagi, 2005). Thus, equation (2) can be restated as follows, under the assumption that the country-specific effect remains constant:

$$TR_{it}\ = \beta_0\ +\ \delta_1 GDP_{it}\ + \delta_2 POD_{it}\ + \beta_j INFECONOMY_{jit} + \delta_{k+2} GOVINST_{kit} +$$
$$\varphi_1\ (INFECONOMY_{jit} * GOVINST_{kit}) + \rho_i\ + \varepsilon_{it}\ \ldots\ldots\ldots\ldots\ldots\ldots\ (4)$$

It is possible that a given year's tax revenue could be affected by the value of the year before. As a result, adding a dynamic component to the model becomes essential. Consequently, the static model we previously stated in equation 4 undergoes a transition into a dynamic one as in equation 5.

$$TR_{it}\ = \beta_0\ + \alpha TR_{it-1}\ +\ \delta_1 GDP_{it}\ + \delta_2 POD_{it}\ + \beta_j INFECONOMY_{jit} + \delta_{k+2} GOVINST_{kit} +$$
$$\varphi_1\ (INFECONOMY_{jit} * GOVINST_{kit}) + \rho_i\ + \varepsilon_{it}\ \ldots\ldots\ldots (5)$$

3.2 Model Estimation

The Least Squares Dummy Variable Corrected (LSDVC) method is used for estimation of the various variants of the specified model (equation 5). This method is a bias-corrected estimator for dynamic panel data models with fixed effects and particularly suitable when the time dimension (T) is small relative to the cross-sectional units (N) and suitable for unbalanced panel data. Dynamic panel models often suffer from the Nickell bias due to the correlation between the lagged dependent variable and the

unobserved fixed effects (Nickell, 1981). The LSDVC method is conceptually related to the panel GMM framework (Arellano and Bond, 1991; Blundell and Bond, 1998) widely used for dynamic panel models. Both methods aim to address endogeneity issues arising from the inclusion of lagged dependent variables. However, they differ in key aspects, which makes the LSDVC method preferable. First, panel GMM methods rely on internal instruments (e.g., lagged levels or differences of variables) to eliminate endogeneity, whereas LSDVC corrects the bias without explicitly constructing instruments. Panel GMM is efficient in large panels, but prone to weak instruments in small T, while LSDVC provides a robust alternative for smaller panels. LSDVC is computationally simpler and avoids issues like instrument proliferation, which can arise in GMM methods. It is designed for panels with small T, where traditional methods such as the Generalized Method of Moments (GMM) may suffer from weak instrument problems (Bruno, 2005a, 2005b). It accounts for unobserved heterogeneity across cross-sectional units by incorporating fixed effects, making it robust to omitted variable bias. For all the reasons above, the LSDVC method is used for the estimations of the dynamic models for this study.

3.3 Variables, Measurement and Data

Unbalanced panel data is used for the study. The data covered 20 African countries (Angola, Botswana, Burkina Faso, Congo Republic, Cote d'Ivoire, Equatorial Guinea, Eswatini, Ethiopia, Ghana, Lesotho, Madagascar, Malawi, Mali, Mauritius, Morocco, Namibia, South Africa, Tanzania Togo and Zambia) for 1996-2022 periods; (Togo – 2004-2022, Botswana and Equatorial Guinea – 2006-2022, and Malawi and Tanzania – 2009-2022). Based on the data that was available, the nations and research period were selected. The data on the variables are sourced primarily from the World Bank database. Table 1 presents more details on description of each of the variables, measurement and source(s) of data.

Table 1. Description of variables, measurements and sources of data

Definition of Variables	***Variable Notation in the Model***	***Measurement***		***Source(s) of data***
Tax Revenue Performance	*TR*	Tax Revenue as (% of GDP)	measured as percentage share of tax revenue in the country 's gross domestic product, i.e., (Tax revenue as % of GDP)	World Bank (2024)
Size of Informal Economy	$INFECONOMY_1$*(MIMIC)*	Multiple Indicators Multiple Causes	measured as estimates of informal output (% of official GDP)	(Elgin, Kose, Ohnsorge, & Yu, 2021) & World Bank (2024)
	$INFECONOMY_2$*(SSEMP)*	Self-employment	Total Number of Self-employed as % of total employment) (modelled ILO estimate)	World Bank (2024)
Tax Base	*LNGDPPCLC*	Gross Domestic Product (*GDP*) per capita	Natural Log of Annual GDP based on constant local currency divided by mid-Year population	World Bank (2024)
	POD	Population density	measured as the midyear population divided by the land area in square kilometres	World Bank (2024)
Governance Institutions	$GOVINST_k$	Political Stability and Absence of Violence (*PSAV*)	Figures represent the country's score on each of the aggregate indicator, in units of a standard normal distribution ranging from approximately -2.5 (worst performance) to 2.5 (best performance).	World Bank (2024)
		Control of Corruption(*CCOR*)		
		Government Effectiveness (GE)		
		Regulatory Quality (*RQ*)		
		Rule of Law (*RL*)		
		Voice and Accountability (*VA)*		

Source: Authors, 2024

3. Results and Discussion

This section presents and discusses the results obtained from the preliminary data analysis, and estimated models. It comprises three subsections which include summary of descriptive statistics, correlation results, and the results of estimated dynamic panel data models based LSDVC method. The LSDVC method is conceptually related to the panel GMM framework (Arellano and Bond, 1991; Blundell and Bond, 1998), and particularly appropriate when the panels involve short period of time like the one used for this study.

3.1 Summary of Descriptive Statistics

The descriptive statistics shows the results of the preliminary investigations into the characteristics of the data on the variables considered in the regression model. These statistics include the mean, standard deviation, minimum and maximum values of each variable. Table 2 reports these statistics. From Table 2, the average share of tax revenue in the GDP (*TR*) for the 20 African countries during the period covered was 16.18 percent with a maximum value of 39.99 percent and minimum of 4.51 percent, and standard deviation of 7.43. Self-employment as percentage of total employment (*SSEMP*) has a mean value of 63.83 percent with a maximum rate of 95.45 percent, minimum value of 17.81 percent and standard deviation of 24.61, while *MIMIC* which is measured as informal sector output as percentage of official GDP, has a mean value of 37.76 percent with a maximum rate of 55.39 percent, minimum value of 20.84 percent and standard deviation of 7.51. The mean value of SSEMP suggests that on the average about 64 percent of the population are engaged in the informal sector, while the MIMIC suggests that the sector account for about 38 percent of the GDP in African countries.

Population Density *(POD)* measured as number of people per square kilometre has a mean of 84.64 people per square kilometre with maximum, minimum and standard deviation values of 634.12, 2 and 134.18 people per square kilometre respectively. The mean values of the institutional variables ranged between -0.53 and -0.26, absolute values ranged between -2.50 and 1.20.

Table 2: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
TR	16.18	7.43	4.51	39.99
MIMIC	37.76	7.51	20.84	55.39
SSEMP	63.83	24.61	17.81	95.45
LNGDPPCLC	11.33	2.40	4.06	16.07

POD	84.64	134.18	2.00	634.12
PSAV	-0.26	0.75	-2.50	1.20
CCOR	-0.40	0.57	-1.65	1.02
GE	-0.53	0.60	-1.52	1.15
RQ	-0.43	0.60	-1.73	1.20
RL	-0.42	0.59	-1.63	1.02
VA	-0.38	0.74	-2.00	1.01

Source: Authors' Computation, 2024.

The summary of descriptive statistics reveals several significant insights into the economic, fiscal and institutional challenges in African countries. These include low share of tax revenue to GDP, huge size of informal sector, low population density, and weak governance institutions. The statistics also portrayed wide disparities among countries on the continent with respect to these challenges. Notwithstanding the disparities, the substantial existence of informal economic activities within the region, low population density and very weak governance institution certainly have some implications for tax collection and economic policies.

3.2 Correlation Results

The results of pair-wise correlation are presented in Table 3. The correlation analysis was conducted to examine the degree of linear relationships among the variables considered in the empirical models. The value in each cell in the table represents the correlation coefficient which quantifies the extent of association between the two corresponding variables. The diagonal values being 1.0 indicate correlation between the same variables. The values of correlation coefficients show statistically significant negative correlations between the percentage share of tax in the GDP (*TR*) and the two measures of informality (MIMIC and SSEMP), while positive correlation exist between the share of tax in GDP (*TR*) and the governance institutional variables (*PSAP, CCOR, GE, RQ, RL and VA)* with the coefficients ranging between 0.36 and 0.60. However, correlations between the tax base variables and *TR* were found to be very weak.

Meanwhile, strong positive correlations are found among the governance institutional variables. The correlation coefficients ranged between 0.56 and 0.89. While this finding indicates strong interrelationship and interconnections between the governance institutional variables, it raises concern about the multicollinearity issues that would come with the inclusion of all the six variables in a regression model at once. Multicollinearity can rarely be avoided in empirical modelling, but becomes a concern if the correlation coefficient is above 0.70 (Anderson, Sweeney, & Williams,

1990; Batalgi, 2008). Because of this, when estimating the regression models, We considered how informality and one of the institutional factors at a time interacted. (see Table 5).

The correlation results in Table 3 provide some important insights. For instance, the strong negative relationship between indicators of governance institutions and measures of informal sector activities in Africa suggest that the prevalence of informal economic activities could be blamed on weak institutions. Thus, suggesting that improving governance institutions such as control of corruption, government effectiveness, regulatory quality and rule of law could reduce the size of the informal sectors. This implies that the impact of informal sectors activities on tax revenue could be influenced by the governance institutions. Moreso, improvement in governance institutions would increase tax revenue indirectly by reducing the size of the informal sector of the economy.

Table 3: Correlation matrix

	TRV	*MIMIC*	*SSEMP*	*LNGDPPCL*	*POD*	*PSAV*	*CCOR*	*GE*	*RQ*	*RL*	*VA*
TR	1.0										
MIMIC	-0.210	1.0									
	(0.000)										
SSEMP	-0.258	0.701	1.0								
	(0.000)	(0.000)									
LNGDPPCLC	-0.018	0.076	0.204	1.0							
	(0.700)	(0.094)	(0.000)								
POD	-0.063	-0.516	-0.380	0.068	1.0						
	(0.165)	(0.000)	(0.000)	(0.135)							
PSAV	-0.052	-0.423	-0.519	-0.063	0.307	1.0					
	(0.251)	(0.000)	(0.000)	(0.164)	(0.000)						
CCOR	0.174	-0.596	-0.684	-0.357	0.260	0.555	1.0				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
GE	0.366	-0.688	-0.747	-0.301	0.472	0.574	0.853	1.0			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
RQ	0.323	-0.585	-0.685	-0.217	0.408	0.579	0.874	0.892	1.0		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
RL	0.188	-0.676	-0.664	-0.288	0.519	0.701	0.842	0.890	0.862	1.0	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
VA	0.257	-0.498	-0.479	-0.192	0.368	0.576	0.735	0.757	0.802	0.839	1.0
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Source: Authors' Computations, 2024

3.3 Results of Estimated Models

The model specified as equation (5) was estimated in seventeen different structural forms. The results are reported in Tables 4 and 5. Table 4 reports the results of Models 1-5, while Table 5 contains the results of Model 6-17. Column 1 in Table 4 reports the result of the baseline model (Model 1) which examines only the impacts of tax base variables (TR_{t-1}, *LNGDPC and POD*) on tax revenue. Model 2 and 3 reported in column 2 and 3 are extensions of model 1 including *MIMIC* and *SSEMP* respectively to examine the impact of informality on tax revenue, while Models 4 and 5 include six governance institutional variables (*CCOR, GE, RQ, RL* and *VA*). Models 6 -17 examine the interactive effects of the institutional variables and informality (measured by MIMIC and SSEMP respectively). The use of the two measures of informal sector size is for robustness check and each of the two measures are interacted with each of the six indicators of governance institutions. This was to examine how each of the governance institutions could moderate the effects of informality in the economy on tax revenue mobilisation by the government.

The results of the model estimations presented in Table 4 and 5 show that population density (POD) and lag of tax revenue which are measures of tax base have favourable and statistically significant effects on each model's tax revenue performance. And this conforms with the A-priori expectation. The results of model 1 for instance, suggest that an increase in the number of people per square kilometre by one person would increase tax revenue by 0.0202 percent point. Population density statistic indicates level of economic development. Very high population density could suggest greater urbanisation, industrialization as well as formalisation in the economy, all of which may increase tax revenue generation by the governments. But contrarily to A-priori the impact of GDP measured as log of GDP per capita appears negative on the tax revenue as share of GDP across all the models. For instance, in Model 1, an increase in GDP per capita by one percent would reduce tax revenue by 0.345 percent point. But when we consider the absolute value tax revenue as the dependent variable, the impact is positive (see Appendix I & II for the results).

Table 4: Results of Panel Regressions Models on the Impact of Tax base, Informality and Governance Institutions on Tax Performance

Dependent Variable: Share of tax Revenue in GDP	(1)	(2)	(3)	(4)	(5)
Variables	Model 1	Model 2	Model 3	Model 4	Model 5
TR_{T-1}	0.717***	0.694***	0.713***	0.635***	0.670***
	(0.0249)	(0.0283)	(0.0340)	(0.0267)	(0.0271)
LNGDPPCLC	-0.345***	-0.534***	-0.346***	-0.658***	-0.363***
	(0.0796)	(0.121)	(0.0524)	(0.154)	(0.0764)
POD	0.0202***	0.0142***	0.0212**	0.0201***	0.0251**
	(0.00486)	(0.00337)	(0.00988)	(0.00663)	(0.0110)
MIMIC		-0.224***		-0.327***	

		(0.0550)		(0.0321)	
SSEMP			0.00844		0.00991
			(0.0549)		(0.0790)
PSAV				-0.0573***	-0.222*
				(0.00373)	(0.121)
CCOR				-0.0579	0.0807
				(0.717)	(0.905)
GE				-0.229	0.0766
				(0.686)	(0.629)
RQ				-1.201***	-1.208***
				(0.0139)	(0.0678)
RL				-1.177***	-0.729**
				(0.219)	(0.342)
VA				0.751*	0.968
				(0.425)	(0.754)
Observations	466	466	466	466	466
Number of countries	20	20	20	20	20

Source: Authors' Computations, 2024. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

With regard to the effects of informality, the results of all the estimated models shows coefficients of informality as measured by MIMIC to be negative and statistically significant at 1 percent significance level. Thus, suggesting that an increase in size of informality as measured by MIMIC would result to decline in tax revenue. In Model 2 for instance, the result shows that an increase in the size of informal sector by 1 percent point reduces share of tax revenue in GDP by 0.224 percent point. This negative impact conforms to the A-priori expectation and that aligns with earlier research as well. (such as Boitano & Abanto, 2019; Tatariyanto, 2014; and Bentum-Ennin & Adu, 2024). However, the coefficients of self-employment (*SSEMP*), a direct measure of informality was not statistically significant in all of the models. But its interactive effects of informality (based on the two alternative measures) and all of the government institutions were statistically significant except voice and accountability (*VA*).

Table 5: Results of Panel Models on the Interactive Effects of Informality and Governance Institutions on Tax Performance
Dependent Variable = Tax revenue share of GDP

Explanatory Variables	(1) Model 6	(2) Model 7	(3) Model 8	(4) Model 9	(5) Model 10	(6) Model 11	(7) Model 12	(8) Model 13	(9) Model 14	(10) Model 15	(11) Model 16	(12) Model 17
L.TR	0.679***	0.704***	0.679***	0.711***	0.671***	0.709***	0.635***	0.685***	0.667***	0.704***	0.690***	0.712***
	(0.0151)	(0.0230)	(0.0321)	(0.0319)	(0.0324)	(0.0339)	(0.0110)	(0.0184)	(0.0256)	(0.0270)	(0.0216)	(0.0272)
LNGDPPCLC	-0.495***	-0.312***	-0.587***	-0.340***	-0.660***	-0.357***	-0.588***	-0.311***	-0.564***	-0.339***	-0.531***	-0.341***
	(0.134)	(0.0624)	(0.109)	(0.0637)	(0.132)	(0.0517)	(0.101)	(0.0584)	(0.120)	(0.0655)	(0.122)	(0.0638)
POD	0.00958*	0.0181	0.0128***	0.0205*	0.0159***	0.0217**	0.0164***	0.0213**	0.0123***	0.0219**	0.0138***	0.0214**
	(0.00537)	(0.0114)	(0.00456)	(0.0112)	(0.00374)	(0.00982)	(0.00251)	(0.00945)	(0.00420)	(0.00989)	(0.00394)	(0.00921)
MIMIC	-0.240***		-0.300***		-0.350***		-0.340***		-0.335***		-0.248***	
	(0.0474)		(0.0217)		(0.0594)		(0.0399)		(0.0325)		(0.0167)	
*MIMIC*PSAV*	-0.00808**											
	(0.00387)											
SSEMP		0.00930		0.000942		-0.00320		-0.00852		-0.00479		0.00331
		(0.0559)		(0.0728)		(0.0596)		(0.0634)		(0.0679)		(0.0731)
*SSEMP*PSAV*		-0.00324*										
		(0.00190)										
*MIMIC*CCOR*			-0.0241*									
			(0.0132)									
*SSEMP*CCOR*				-0.00497								
				(0.0121)								
*MIMIC*GE*					-0.0328***							
					(0.00122)							
*SSEMP*GE*						-0.00499**						
						(0.00226)						
*MIMIC*RQ*							-0.0523***					
							(0.00559)					
*SSEMP*RQ*								-0.0199**				
								(0.00840)				
*MIMIC*RL*									-0.0309***			
									(0.00575)			
*SSEMP*RL*										-0.00699		
										(0.00691)		
*MIMIC*VA*											-0.00848	
											(0.0137)	
*SSEMP*VA*												-0.00290
												(0.00959)
Obs	466	466	466	466	466	466	466	466	466	466	466	466
Number of Countries	20	20	20	20	20	20	20	20	20	20	20	20

Source: Authors' Computations; Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

3.4 Discussion of Results

This sub section presents a discussion of the findings from the results of the estimated models in Table 4 and 5. The models primarily investigate the effect of informality as well as the interactive effects of informality and governance institutions on tax revenue performance in Africa. The results from across the models affirms a negative impact of informality on tax revenue matching the initial assumptions and findings from other studies such as Kodila-Tedika and Mutascu (2013), Tatariyanto (2014), Boitano and Abanto (2019) and Bentum-Ennin & Adu, (2024). In the informal economy, most transactions and earnings are unreported. As such, a higher prevalence of informality can lead to reduced tax revenue due to underreporting and tax evasion. Additionally, high levels of informality are associated with challenges in enforcing tax compliance and non-adherence to tax regulations compared to formal enterprises. For these reasons, an increase in informal economy increases challenges of tax enforcement and opportunities for tax evasion thereby reducing tax revenue. On the other hand, population density (POD) emerges as a statistically significant variable, exhibiting positive impact on tax revenue. As the number of people per square kilometre increases, tax revenue is expected to increase by at least 0.00958 percent point. This result may be linked to the positive relationship between high population density, urbanisation, industrialisation and formal economy. Regions with high population density might have a higher proportion of formal economic activities, making it easy for authorities to track and tax earnings effectively.

Moreover, the stark disparity between the rich and the poor may be the cause of the statistically significant inverse relationship between GDP per capita and tax revenue share. The majority of African nations' economic expansion does not result in a decrease in poverty. More so, high-income earning individuals try to pay less taxes relative to their incomes. Their wealth and influence provide them with opportunities to engage in tax evasion or avoidance activities, such as using offshore tax shelters or exploiting legal tax loopholes. Additionally, countries with higher GDP per capita may choose to implement tax policies that prioritise economic growth and investment, which may involve lower tax rates on certain income sources or as incentives for businesses. While these policies may stimulate economic activity, they can lead to reduced tax revenue as a percentage of GDP. Population density appears to have a positive impact on tax revenue implying relatively urbanised or industrialised countries have greater tax GDP-ratio.

4. Conclusion and Recommendations

The study addresses a research gap concerning informality, governance institutions and tax revenue within the context of African countries. Specifically, the study examined the effect of informality on tax revenue in African countries, as well as whether or not governance institutions could moderate such effect. Based on the findings from the empirical analysis, it could be concluded that informality, as measured by the MIMIC indicator, negatively impacts on tax revenue in Africa. And the negative effects of informality on tax revenue could be moderated by improvement in governance institutions. Ultimately, this study reiterated the importance of reforms for addressing informality and improving governance institutions to enhance tax revenue performance in Africa and other regions with a high prevalence of informal economic activities. Also, policymakers in Africa should carefully consider tailoring tax policies to suit the economic realities of informal sector in the economies. In particular, policies that can promote tax compliance and maximize revenue collection in the informal sectors to enable tax authorities harness tax revenue from the hidden incomes generated through informal economic activities.

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Appendix I

Results of Panel Regressions Models on the Impact of Tax base, Informality and Governance Institutions on Tax Performance

Dependent Variable: Log of Tax Revenue

Variables	(1) Model 1a	(2) Model 2a	(3) Model 3a	(4) Model 4a	(5) Model 5a
TRV_{t-1}	0.910***	0.869***	0.913***	0.840***	0.898***
	(0.0181)	(0.0214)	(0.0181)	(0.0104)	(0.00301)
LNGDPPCLC	0.0399***	0.0339***	0.0401***	0.0407***	0.0474***
	(0.000935)	(0.00287)	(0.00164)	(0.00788)	(0.00610)
POD	0.000890	0.000797	0.00101	0.00198***	0.00184***
	(0.000687)	(0.000598)	(0.000980)	(0.000612)	(0.000586)
MIMIC		-0.0271***		-0.0364***	
		(0.00579)		(0.00292)	
SSEMP			0.00217		0.00174
			(0.00373)		(0.00645)
PSAV				0.0323***	0.0228***
				(0.00240)	(0.00390)
CCOR				0.0516	0.0761
				(0.0544)	(0.0696)
GE				0.0449	0.0575
				(0.0548)	(0.0520)
RQ				-0.159***	-0.139***
				(0.00105)	(0.0205)
RL				-0.0945***	-0.0643***
				(0.0194)	(0.0232)
VA				-0.0541	-0.0119
				(0.0368)	(0.0625)
Observations	466	466	466	466	466
Number of unitid	20	20	20	20	20

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Source: Authors' Computation, 2024

Appendix II

Results of Panel Models on the Interactive Effects of Informality and Governance Institutions on Tax Performance

DV = log of Tax revenue

Variables	(1) Model 6a	(2) Model 7a	(3) Model 8a	(4) Model 9a	(5) Model 10a	(6) Model 11a	(7) Model 12a	(8) Model 13a	(9) Model 14a	(10) Model 15a	(11) Model 16a	(12) Model 17a
TRV_{t-1}	0.866***	0.911***	0.864***	0.916***	0.866***	0.911***	0.840***	0.903***	0.859***	0.912***	0.859***	0.912***
	(0.0140)	(0.00876)	(0.0187)	(0.00843)	(0.0242)	(0.0175)	(0.0125)	(0.00472)	(0.0207)	(0.0132)	(0.0146)	(0.0109)
LNGDPPCLC	0.0369***	0.0411***	0.0344***	0.0384***	0.0306***	0.0408***	0.0433***	0.0465***	0.0373***	0.0404***	0.0375***	0.0403***
	(0.00697)	(0.00256)	(0.00191)	(0.00156)	(0.00260)	(0.00188)	(0.00485)	(0.00381)	(0.00311)	(0.00120)	(0.00498)	(0.00175)
POD	0.000657	0.000997	0.000837	0.00102	0.000877	0.000996	0.00119***	0.00111	0.000725	0.00103	0.000865	0.00103
	(0.000633)	(0.000956)	(0.000618)	(0.000858)	(0.000661)	(0.000940)	(0.000429)	(0.000745)	(0.000656)	(0.000895)	(0.000546)	(0.000797)
MIMIC	-0.027***		-0.029***		-0.0322***		-0.0369***		-0.0350***		-0.031***	
	(0.00506)		(0.00262)		(0.00590)		(0.00442)		(0.00373)		(0.00194)	
*MIMIC*PSAV*	-0.000291											
	(0.000331)											
SSEMP		0.00200		0.00302		0.00272		0.00111		0.00209		0.00217
		(0.00435)		(0.00548)		(0.00428)		(0.00501)		(0.00504)		(0.00566)
*SSEMP*PSAV*		-4.89e-05										
		(0.000195)										
*MIMIC*CCOR*			-0.000628									
			(0.00115)									
*SSEMP*CCOR*				0.000534								
				(0.00104)								
*MIMIC*GE*					-0.0014***							
					(4.12e-06)							
*SSEMP*GE*						0.000338						
						(0.000259)						
*MIMIC*RQ*							-0.0036***					
							(0.000461)					
*SSEMP*RQ*								-0.000992				
								(0.000897)				
*MIMIC*RL*									-0.0022***			
									(0.000586)			
*SSEMP*RL*										-5.32e-05		
										(0.000614)		
*MIMIC*VA*											-0.00135	
											(0.00124)	
*SSEMP*VA*												2.06e-05
												(0.000876)
Obs	466	466	466	466	466	466	466	466	466	466	466	466
Countries	20	20	20	20	20	20	20	20	20	20	20	20

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Source: Authors' computation, 2024.