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Impact of Shadow Economy on Tax Revenue in Sub-Saharan Africa

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Abstract
This study tends to focus on how shadow economy and trade openness influence tax revenue in the Sub-Saharan Africa (SSA). The study used four SSA countries to test this relationship from 1991 to 2017. The study employs pool OLS with robust standard error to address the potential threat of heteroscedasticity. The result from this estimation indicate that shadow economy diminished the amount of tax revenue generated by these countries. Thus, the study recommends that appropriate measures should be put in place to curtail the size of the shadow economy because of its detrimental effects on tax revenue.

Keywords: Shadow Economy, Trade Openness, Tax Revenue.

1.0 Introduction

The shadow economy, often referred to as the informal or underground economy, plays a significant role in Sub-Saharan Africa (SSA), contributing to employment and livelihoods for millions of people. However, it also poses substantial challenges to economic development, particularly in the area of tax revenue generation. The informal nature of economic activities within the shadow economy leads to a significant loss of tax revenue, which impairs governments' ability to provide public goods and services. In SSA countries like Ghana, Kenya, Nigeria, and South Africa, the informal sector accounts for a substantial portion of economic activity, with estimates ranging from 26.8% to 56.8% of the total gross domestic product (GDP) (Medina & Schneider, 2018). The shadow economy of Ghana constitutes about 41%, Kenya 31.9%, Nigeria 56.8%, and South Africa 26.8% (Medina & Schneider, 2020).

The shadow economy encompasses a wide array of economic activities that are not regulated or taxed by the government. These activities are not necessarily illegal but are often unreported to avoid taxation or regulation (Schneider, 2014). In SSA, a large portion of economic activity takes place in this informal sector, which includes small-scale traders, farmers, artisans, and service providers who operate outside formal regulatory frameworks (Meagher, 2018). The shadow economy serves as a critical source of income and employment for millions of people, especially in the context of high unemployment and limited formal sector opportunities (Benjamin et al., 2012).

However, the size of the shadow economy presents significant challenges for governments in terms of revenue collection. When economic activities are conducted informally, they escape the tax net, leading to substantial losses in potential tax revenue (Mazhar & Méon, 2017). This revenue shortfall limits governments' ability to invest in critical infrastructure, education, healthcare, and other public services necessary for sustainable development. In Ghana, for example, it is estimated that the informal sector constitutes over 30% of the economy, yet contributes minimally to tax revenue due to the high levels of non-compliance (Ameyaw et al., 2016). Similarly, Nigeria, with one of the largest informal economies in

the region, struggles to mobilize sufficient tax revenue to meet its developmental needs (Ogbuabor & Malaolu, 2019).

The negative impact of the shadow economy on tax revenue is well-documented. As economic activities go unregistered and untaxed, governments lose out on significant revenue streams that could otherwise fund public services and infrastructure (Schneider & Enste, 2000). In SSA, this problem is exacerbated by weak tax administration systems, corruption, and limited capacity to enforce tax laws (Kumar et al., 2021). For example, in Kenya, despite the expansion of the formal economy, tax evasion remains rampant in the informal sector, where most transactions are conducted in cash, making it difficult for tax authorities to monitor and collect taxes Kim, (2022).

In South Africa, the shadow economy is somewhat smaller compared to other SSA countries, yet it still poses significant challenges to the tax system. The South African Revenue Service (SARS) has struggled to capture the economic activities of the informal sector, despite its relatively advanced tax administration (Chauke & Sebola, 2016). The existence of a large informal economy leads to inequities in the tax system, where those in the formal sector bear a disproportionate share of the tax burden, while informal businesses avoid paying taxes (Etim, & Daramola 2020).

The relationship between the shadow economy and tax revenue is not merely one of tax evasion. Informal economic activity also contributes to broader economic distortions, reducing the efficiency of the tax system and creating unfair competition between formal and informal businesses (Hassan & Schneider, 2016). Informal businesses, by evading taxes and regulations, can offer goods and services at lower prices than their formal counterparts, leading to market distortions and disincentives for businesses to operate formally. However, in SSA there are large portion of cash that remains unbanked and excluded from the formal financial system.

Ghana, Kenya, Nigeria, and South Africa present unique opportunities for studying the relationship between the shadow economy, tax revenue, and payment systems. These countries are among the largest and most dynamic economies in SSA, each with varying degrees of informality and different approaches to digital payment systems. Ghana and Kenya have been leaders in mobile money adoption, while Nigeria and South Africa, despite having more advanced financial sectors, still face challenges in expanding the reach of digital payments to the informal sector. By studying these four countries, this paper aims to provide insights into how shadow influences tax revenue.

The remainder of this paper is organized as follows. Section 2 provides a comprehensive literature review on the shadow economy and its impact on tax revenue, with a focus on SSA. Section 3 explores the methodology used in the study. Section 4 presents the result of the study followed by the discussion. Section 5 offers conclusions and policy recommendations.

2.0 Literature Review and Hypotheses Development

This section is dedicated for relevant and related literature on taxation revenue and shadow economy. In the first instance, theoretical literature is reviewed. In the second stage, we provide an empirical review of literature on taxation revenue and shadow economy

Theories on Taxation Revenue

Many scientific controversies and political discussions arise because of different or unsatisfactory definitions of the shadow economy. It is necessary to clarify the term in each context (Schneider & Enste, 2013). "Shadow economy" includes all economic activities not recorded in official statistics and therefore

are not touched by government regulations and tax obligations (Evers & Korff, 2002). Such as 'soft' illicit activities ('moonlighting'), illegal work and social deception, and criminal economic activities (Schneider & Enste, 2013). There are several contrasting explanations for the shadow economy (Marcelliis et al., 2010; Williams, 2014).

i. Modernizations Theory

Modernization theory states that the shadow economy declines with economic development (Williams, 2014). The public believes the declared economy is constantly developing, and the shadow economy is a remnant of the pre-modern era, which is gradually disappearing as the modern economy becomes more and more dominant (Williams & Nadin, 2011). From this lens, the shadow economy is a traditional pre-modern sector representing traditionalism and underdevelopment, whereas the emerging modern economy expresses signals of 'progress,' and 'development' (Williams, 2014).

ii. Tax Evasion Theory

According to the theory of tax evasion, persons and businesses pay taxes by evading a specific portion of their taxes. Paying taxes is a forced behavior for them, because they believe that if they do not pay taxes, they will be punished by the state (Sandmo, 2005; López, 2017; Mannan et al., 2021). The theory of tax evasion indicates that taxpayers evade their income tax for their interest due to egoist behavior. If possible, the taxpayers intend to evade their taxes completely. The reason why they don't do so is that the chance of not being discovered by the authorities is almost zero. Additionally, it was presumptive that the government used the taxes and fines collected from those tax evaders for the purposes having nothing to do with the taxpayers (D'Souza, 2016). Therefore, considering personal interests, when the expected income of tax evasion is greater than its cost, the taxpayers tend to evade their taxes.

The theory of psychological egoism and the theory of tax evasion have similar bases. Both are based on personal interest, affect tax revenue collection performance, and ultimately harm societal development. Almost all researchers agreed that those theories are centered on the egoist behavior of individualism.

This theory suggests that the shadow economy, which encompasses undeclared economic activities, black market transactions, and tax evasion, can have a direct negative impact on tax revenue. As businesses and individuals engage in unreported economic activities, they avoid paying taxes, leading to a reduction in overall tax collections. This theory assumes that individuals and businesses attempt to maximize their economic gains by minimizing their tax liabilities. Given the forgone arguments, it could be deduced that modernization and tax evasion theories are the two theories that explains tax revenue and shadow economy relationship.

Empirical Review of Literature

Extant literature indicates that the size of the shadow economy in the developing world surpasses 40%. Medina and Schneider (2019) asserted that "all economic activities which are hidden from official authorities for monetary, regulatory, and institutional reasons" are included in the shadow or informal sector.

The debate over how the shadow economy affects tax reform is closely related to the scant literature on the association between the shadow economy and tax revenue. Although there are a considerable number of scholars that examine the factors that determine taxes, however, only a handful of studies have explored how the shadow economy affects tax receipts.

Mazhar and Méon (2017) examined the effect of the shadow economy on taxation using a sample of 153 developed and developing countries from 1999–2007. The study revealed that the size of the size of the shadow economy has a strong negative association with tax. Indicating that the greater the shadow economy the less the amount of tax expected to be generated by the government.

Nguyen and Duong (2022) from the BRICS economies, investigated the association between shadow economy and tax revenues from 2001 to 2017. The study employed Bayesian linear regression and found that the size of the shadow economy and the tax revenue of the BRICS economies has a nonlinear association. The study further showed that at a certain point in time, the shadow economy positively affects tax revenue collection. However, when the size of the shadow economy increases to the extent that it exceeded a certain threshold, the relationship decreases the BRICS countries' tax revenue collection. In a similar note, Vlachaki, 2015 uses an unbalanced panel of 125 nations to experimentally study the influence of the shadow economy on indirect tax receipts between 1990 and 2011. The study indicated that the size of the shadow economy has a positive effect on the indirect tax revenues if the informality does not go beyond a cutoff value. However, when the informality value is higher than the cutoff value, the effect of shadow economy on indirect tax becomes negative.

Kodila-Tedika and Mutascu (2014) employed a panel-model approach to examine the association between size of shadow economy and tax revenue in African economies from 1999-2007. The study found that shadow economy has a detrimental effect on tax revenue. More precisely, as the shadow economy expands, the level of tax revenues decreases.

Also, shadow economy and tax evasion in the 28 EU countries was examined from 2003-2014 (Schneider et al., 2015). In the sample countries, the mean value of the shadow size dropped from 22.6% in 2003 to 18.6% in 2014 because of indirect taxes enforcement and the increase in self-employment. More so, Schneider (2005) analysed 110 OECD, developing, and transitional nations. According to the study and among others, tax burden is one of the primary factors influencing the size and expansion of the shadow economy. Torgler and Schneider (2009) examined the connection between the shadow economy, institutional quality, and tax morale. The author showed that tax morale is inversely associated with the shadow economy.

Gnangnon (2023) evaluated the impact of the shadow economy on tax reform in developing countries using narrative approach that allows the author to obtain precise nature as well as exact timing of key tax actions in various forms of tax policy and revenue administration that led to increases in tax revenue. Furthermore, the author decomposes the tax reform into structural tax reform and tax transition reform. The study shown that the shadow economy reduces the likelihood of structural tax reform particularly in low-income countries. While the shadow economy undermines the tax transition reform in countries whose tax revenue structure is strongly dependent on international trade tax revenue. The study also noted that an increase in the size of the shadow economy would likely corrode the tax base and as well reduce tax receipts. This study is consistent with the view that a substantial informal sector reduces the tax base (Esaku, 2021).

In this vein, underground activities are regarded as productive economic activities, but they are consciously concealed from tax authorities, among others, to circumvent the payment of various forms of taxes and social security contributions. This suggests that the growth of the shadow economy would lead to the shrinking the reducing tax revenue (Sena Kimm Gnangnon, 2023).

Using a survey data from the Russian economy from 2007 to 2019, (Fedotov, 2021) indicates that shadow economy and tax burden are correlated negatively. Invariably, evidence have shown that high tax burden serves as an incentive for a larger size of the shadow economy (Buehn & Schneider, 2012; Krivorotov et al., 2019; Sutina et al., 2020; Torgler & Schneider, 2007; Yu. & Fedonina, 2019). In a study conducted by Ishak and Farzanegan (2020) discovered that, in a group of industrialized and emerging nations, the drop in oil rents has a negative impact on tax collection as the shadow economy grows larger, particularly when it accounts for more than 35% of GDP.

Furthermore, Williams and Horodni (2015) explored the nexus between tax morale and the shadow economy in three Baltic states (Latvia, Estonia, and Lithuania). They postulated that a reduction in tax morale raises the probability that people engage in the shadow economy. The study uses logit regression and finds that participating in the shadow economy is greater when the tax morale is lower. Furthermore, the probability of participation greatly depends on gender, employment status and likewise the of living country. This finding is also in line with previous evidence (Alm & Benno, 2006; Richardson, 2006; Torgler & Schneider, 2009) which show that strong correlation exists between tax morale and the shadow economy. Based on the above empirical studies, we proposed that

H1: Shadow economy has a significant effect on tax revenue.

Tax and Trade Openness

Trade openness provide a to enhance tax revenue. Angour and Nmili (2019) stated that foreign trade transactions are regarded as a vital tax base. This is because of the challenging of moving formal economic activity to the unofficial sector and conceal transactions from law enforcement (Medina & Schneider, 2017). This implies that a substantial shadow economy is inversely correlated with trade openness (Torgler & Schneider, 2007). The relationship between tax revenue and trade openness (Sena Kimm Gnangnon, 2019; Loganathan & Ahmad, 2020; Ngouhouo et al., 2021) have been explored in the literature. For example, Loganathan & Ahmad (2020) provided an evidence, that trade openness has no significant causality impact on tax collection in Malaysia. In contrast, Gnangnon (2019) using a data set of 92 developing countries from 1980 to 2014 reveals that tax reform is positively associated with trade openness. The study further indicated that least developed countries (LDCs) benefit a higher effect of tax reform on trade openness compared with non-LDCs. One of the benefits of trade openness is that it introduces indigenous producers to global best practises in terms of expertise, technology, and knowledge (Loganathan & Ahmad, 2020). In an innovative contribution Agbeyegbe et al. (2006) examined a panel of 22 Sub-Saharan Africa economies on the association between tax receipts and trade liberalisation. The study showed that trade liberalisation resulted in a higher income tax revenue among the sampled economies. The study further indicated that the measure of trade liberalisation is found to be sensitive in one the estimated models. In another study, Ngouhouo et al. (2021) provided evidence that tax burden has significant enhancing effects on trade openness among Sub-Saharan Africa.

H2: Trade openness affect tax revenue significantly.

3.0 Methodology

Successively, the model, data, and the method of the estimation are offered below.

Specification of the Model

To investigate the effect of shadow economy and trade openness, we used the below model:

$$TXRV = \alpha 0 + \alpha 1SHEC + \alpha 2TDOP + \alpha 3INFL + \alpha 4INTP + E$$

Where TXRV represents tax revenue which is measured as tax revenue as a percentage of GDP (Mazhar & Méon, 2017), SHEC refer to as shadow economy and is measured is as share of shadow economy to GDP (Medina & Schneider, 2019), TDOP means trade openness and is measured as ratio of imports plus exports to GDP (Ngouhouo et al., 2021), INFL represent inflation and is measured as consumer's price inflation deflated by GDP (Ngouhouo et al., 2021), and INTP refers to internet penetration and measures the number of individuals using the Internet, in percentage of the population (Sèna Kimm Gnangnon, 2022). ε is the model's error term.

Data of the Study

We employed a sample of 4 SSA countries whose data were available from 1991 to 2017. Exclusively, we choose these period and countries based on the data availability and the significant role that these countries have in the SSA. Regarding the estimation method, we use ordinary least square (OLS) regression method with robust standard error.

4.0 Results and Discussion

The result of the study consists of summary statistics, correlation matric variance inflation factor (VIF) and the main regression analysis.

Summary statistics

The summary statistics are presented in Table 1. The mean values of the variables used in the study are: tax revenue (TXRV), 5.630; shadow economy (SHEC), 39.112; trade openness (TDOP), 54.177; inflation (INFL), 15.558; internet penetration (INTP), 8.727.

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
TXRV	108	15.630	4.050	9.402	24.457
SHEC	108	39.112	12.125	21.900	64.000
TDOP	108	54.177	18.368	26.099	116.048
INFL	108	15.558	13.972	0.686	84.683
INTP	108	8.727	12.919	0.000	56.167

Note: Tax revenue (TXRV); shadow economy (SHEC); trade openness (TDOP); inflation (INFL); internet penetration (INTP).

Correlation Matrix

Moreover, Table 2 shows the variables correlation coefficients with their significance. Among the variable the correlation reach -0.542, 0.100, -0.162, and 0.364 respectively. Also, the variable, shadow economy and tax revenue is negative significantly related. Likewise, tax revenue and internet penetration is positive and significant. However, the correlation of the other two variables trade openness and inflation were found positive and negative respectively but not significant. Table 2 more so, lists the variance inflation factor (VIF) results. From this result, the VIF of all the variables under consideration is lower than 10. Consequently, results indicated that multicollinearity is not a problem in the study.

Table 2: Correlation analysis and VIF test

VAR	TXRV	SHEC	TDOP	INFL	INTP	VIF	1/VIF
TXRV	1.000					-	-
SHEC	-0.542***	1.000				1.42	0.703
TDOP	0.100	-0.222*	1.000			1.19	0.842
INFL	-0.162	0.389***	0.217*	1.000		1.38	0.723
INTP	0.364***	-0.354***	0.014	-0.316***	1.000	1.19	0.837

Note: Tax revenue (TXRV); shadow economy (SHEC); trade openness (TDOP); inflation (INFL); internet penetration (INTP). *** p<0.01, ** p<0.05, * p<0.1.

Regression Output

The regression output is presented in Table 3. The result is based on OLS estimation. This is because the Breush and Pagan's LM test was found to favour the OLS estimation. Additionally, Baltagi (2005) argued that using Hausman test to select between fixed or random effects when there is the presence of heteroskedasticity may be inappropriate and hence, lead to bias in the estimation. Furthermore, to correct for potential threat of heteroskedasticity and auto correlation, OLS with robust standard error was used as suggested by Rogers (1993).

From the Table 3, the main variables of interest are two. Shadow economy and trade openness. Based on this result, shadow economy is found to be negative and significantly related to tax revenue with a coefficient of -0.174 and t-value of -5.840. The result agrees with the hypothesis developed in section two. This means that the tax revenue will be reduced because of an increase in the size of shadow economy. Thus corroborates the findings previously documented (Fedotov, 2021; Sena Kimm Gnangnon, 2023).

Table 3: Regression Results

variable	Coef.	Std. Err.	T	P>t
SHEC	-0.174	0.030	-5.840	0.000
TDOP	-0.010	0.021	-0.480	0.635
INFL	0.035	0.027	1.290	0.199
INTP	0.068	0.030	2.270	0.025

Note: tax revenue (TXRV); shadow economy (SHEC); trade openness (TDOP); inflation (INFL); internet penetration (INTP).

The second variable of interest is trade openness. The result shows that the variable has a coefficient of -0.010 and t-value of -0.480 but statistically insignificant. Thus, the result failed to support the hypothesis. Furthermore, the result corroborates the findings of Loganathan & Ahmad (2020) that trade openness has no significant causality impact on tax collection in Malaysia. However, the finding is in contrast with Gnangnon (2019) reveals positive association with tax reform while examining 92 countries.

5.0 Conclusion and Recommendations

Using a data set of four SSA countries from 1991-2017 as the study sample, this research explores the impact of shadow economy and trade openness on tax revenue. The study found that shadow economy has an inverse effect on tax revenue on the sample used. Hence, this finding provides an important implication that the governments of these SSA countries should not relent in their efforts to minimize the

size of the shadow economy. This is because doing this will minimize the size of the shadow economy and enhances tax revenue generation.

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