

# Does Financial Inclusion Impact Tax Revenue in Sub-Saharan African Countries? A Panel Data Analysis

## Olumuyiwa Ganiyu Yinusa

Department of Banking and Finance  
Olabisi Onabanjo University,  
Ago Iwoye

## Jimoh Sina Ogede

Department of Economics  
Olabisi Onabanjo University,  
Ago Iwoye

## Hammed Tiamiyu

Department of Economics  
Olabisi Onabanjo University,  
Ago Iwoye

## Lukman Raimi

Department of Business Administration  
(Entrepreneurship)  
Universiti Brunei  
Darussalam, Brunei.

### Correspondence:

sinaogede@oouagoiwoye.edu.ng

### Abstract:

The issue of increasing domestic revenue mobilization remains problematic for many governments, especially in low-income countries. Leveraging systems theory and collaborative intervention theory of financial inclusion, this study examines how financial inclusion impacts tax revenues in selected sub-Saharan African countries (SSA) from 2011-2017 using data collected from sub-Saharan Africa. Based on the dynamic panel estimation results of the system GLS and random effect estimations, mobile money account, as well as financial inclusion, play a significant impact the tax revenue drive of SSA countries. The study concludes that financial inclusion contributes significantly to tax revenue in SSA counties. It is offered that the monetary authorities should drive towards enhancing the financial institutions to accommodate more inclusive services and as well put up strict adherence to the requirements and documentation in order to reduce perpetration of fraud and maintain sustainable tax revenue.

Key words: Tax Revenue, Financial Inclusion, SSA, Random-Effect

### Introduction

The problem of low tax revenue and the institutional challenges are well known among many developing countries, particularly the sub-Saharan Africa countries (Bertinelli & Bourgain, 2016). In recent years, the poorer countries as well as the international financial institutions supporting their economies have become preoccupied with tax systems. In addition to relieving them of the need to bail out cash-strapped governments, expanding government revenue also benefits international financial institutions. The prospect of expanded revenue offers these countries

<https://dx.doi.org/10.4314/ajmr.v29i1.6>

greater autonomy in the future and the possibility of breaking conditions. These countries are showing symptoms of undue reliance on oil earnings due to the lack of tax revenue components in their revenue profiles. Tax revenue in Burkina Faso as a percentage of GDP was 15.50 percent as of 2019, 12.03 percent in Cote d'Ivoire, 12.4% in Ghana, 9.46 percent in Guinea Bissau, 14.50 percent in Mali, 6.0% in Nigeria, 16.38 percent in Senegal, and 13.16 percent in Togo. Further, the study shows that most resource-rich countries on the Sub-Saharan Africa's had tax-to-GDP ratios less than 15% in 2019 versus most non-resource-rich countries (OECD, 2021).

In a number of prior studies, different factors have been considered in determining tax revenue (Ajide & Bankefa, 2017; Bertinelli & Bourgain, 2016; Bird, Martinez-Vazquez, & Torgler, 2014; Castro & Camarillo, 2014; Chaudhry & Munir, 2010; Clist & Morrissey, 2011; Maherali, 2017; Mahdavi, 2008; Park & Mercado, 2015). Institutional quality and structural variables, as well as macroeconomic factors such as quality of government, government effectiveness, inflation, and population density, are all considered. However, studies like Schumpeter (1911) have demonstrated the importance of financial development in facilitating and enhancing the economic growth. Similarly, Schumpeter and Opie (1934) have suggested that a functioning financial system contribute to economic growth because financial institutions help fund productive investments and facilitate innovation, which are both conducive to economic growth. These viewpoints have led to recent studies exploring the nexus between financial development and tax revenue (see Ahamed, 2016; Capasso & Jappelli, 2013; Ilievski, 2015; Maherali,

away from restrictive aid and loan

2017; Petrescu, 2013; Taha, Colombage, Maslyuk, et al., 2013; Oz-Yalaman, 2019). These studies argued that financial system impacts tax revenues positively. Despite this, the connection between financial development and tax revenue has received little research attention.

Unlike previous research on the subject, the current paper explores whether changes in tax revenue sources are linked to changes in financial inclusion for selected sub-Saharan Africa nations. The few studies focused largely on developed countries and financial development as determinant of tax revenue, thereby overlooking the role of financial inclusion in the tax revenue generation process of SSA countries. We demonstrate that access to financial services does not imply utilization of the services. Access to financial infrastructure often not signify growth in the economy. Rather, it entails a state in which a growing proportion of a country's excluded populations can access and use formal financial services. Financial inclusion is a critical component of social inclusion, particularly in terms of making economic services available to everybody by having a functional financial system. Financial inclusion is predicted as a crucial tool of achieving multidimensional macroeconomic stability and sustainable development goals (Omar, & Inaba, 2020). This study attempts to examine the extent at which SSA countries could grow their tax revenues as well as economic growth? Or whether the success of financial inclusion through mobile money, will serve as a direct source of taxation revenue, which has potentially been ignored by the stakeholders to date. In view of the foregoing, this present paper is a novel attempt to assess how financial inclusion

has driven tax revenue particularly in an economic grouping like sub-Saharan Africa countries. The study considers it crucial to examine how policy makers and government can achieve more financial inclusion to enhance their tax revenue. It is expected that when people are more financially included in the financial system, they may have more financial access that can empower them to pay more taxes. We extend the frontier knowledge with insightful contributions in three ways. First, most theoretical and empirical works in SSA focused the impact of financial inclusion on the distribution of income, poverty, entrepreneurship and social mobility, the current study analyses the impact of financial inclusion on tax revenue, focusing on the selected 15 developing countries in SSA. Second, our theoretical framework is a built on a marriage systems theory of and collaborative intervention theory of financial inclusion to provide logical explanations for how financial inclusion impacts tax revenue within the financial systems of developing countries. Third, it investigates the conditional relationships between financial inclusion and other macroeconomic indicators in the selected SSA economies, as well as the impact of financial inclusion on tax revenue. To the best of our knowledge, no empirical research on the indirect effects of financial inclusion on tax revenue in Africa has been undertaken. Furthermore, most previous empirical studies are longitudinal single-country studies on financial inclusion with data collected from financial regulators, but the current study analyses every key nexus between variables using a panel data, fixed effect, and random effect models to properly handle endogeneity related to financial inclusion.

This study shows that there is a remarkably

direct relationship between financial inclusion and tax revenue when utilizing a mobile money account and withdrawing money from an ATM at various times. The relationship is particularly significant in random-effect models. The remainder of the paper is laid out as follows: Section 2 examines related literature. The third section describes the dataset and explains the methodology. The fourth section explains the parameter estimates, and the final section concludes.

## Review of Related Literature

### *Theoretical framework*

Mainstream economic theory identifies the demerits of financial exclusion and the merits of financial inclusion (Malik, Maheshwari, & Singh, 2019; Kling, et al., 2022). Most recent studies affirm that financial exclusion perpetuates income inequality and hinders social mobility in developing counties with imperfect financial systems, but financial inclusion reduces income inequality and improves social mobility through investments in education and entrepreneurship (Ozili, 2020; Kling, et al., 2022). From the extant literature, a number of theories explicate financial inclusion and its impact on poverty and inequality (Oz-Yalaman, 2019; Al-Own & Bani-Khalid, 2021). In the current study, two theories provide logical explanations for the plausibility of financial inclusion impacting tax revenue, namely, systems theory of financial inclusion and collaborative intervention theory of financial inclusion.

The systems theory of financial inclusion simply explicates that financial inclusion outcomes and benefits are more effectively and efficiently actualised when policymakers and stakeholders leverage existing socio-economic and political sub-systems on which financial inclusion is built

(Ozili, 2020). The economic and financial systems of any country may include monetary authorities, banks and payment industry players, households, companies and others in the payment landscape (Srouji, 2020). When applied to the current study, the theory posits that tax revenue improvement can be more effectively and efficiently actualised when policymakers and stakeholders leverage existing socio-economic and political sub-systems on which financial inclusion is built because the tax system (tax authority) and financial system (banks as suppliers of financial services) are both sub-systems within the national economy. To improve tax revenue, therefore, policymakers must leverage the financial inclusion mechanisms of banks, such as ATM and bank account access.

The collaborative intervention theory of financial inclusion, on the other hand, states that financial inclusion outcomes and benefits are more effectively and efficiently actualised through collaborative intervention from multiple stakeholders (Veillard et al., 2017; Ozili, 2020). The emphasis here is the joint action of multiple stakeholders, such as tax authorities, banks, firms, households and others, within the tax system value chain. When applied to tax revenue improvement, the theory explains that financial inclusion can effectively increase tax revenue when there exist collaborative joint efforts among the multiple stakeholders within the tax system and financial system. This thought is consistent with previous thoughts. Tan & Pan (2003) have long established that tax arrears can be reduced and new tax revenue can be better augmented through collaborative communication with stakeholders. In raising tax revenue for improving the conservation of tropical forests in the Pacific, Keppel et al. (2012) noted that the revenue capacity of

government was enhanced through improved collaboration between the various stakeholders. From the stakeholder collaboration perspective, the collaborative intervention theory of financial inclusion presupposes that joint efforts among the multiple stakeholders within the tax value chain improve tax revenue, ease collection and bring the excluded population into the formal financial services of banks (Ozili, 2018; Ozili, 2020). In Argentina, the government augments overall tax revenue through collaborative financial inclusion that integrates middle-class Argentines into the formal banking system. Consequently, tax payers use less cash and switch to credit and debit cards that are easily taxed in the formal market (Mitchell & Scott, 2019). Similarly, the governments of United Arab Emirates and Gulf Cooperation Council (GCC) countries leveraged collaborative intervention from multiple stakeholders (monetary authorities, banks and payment industry players) to promote cashless payments by encouraging digital payments by citizens purposely to improve tax revenue collection and ensure greater transparency and security in the payment landscape (Srouji, 2020). Collaborative efforts among stakeholders in Europe's financial systems have also shown that improved financial inclusion leads to higher tax revenue. Particularly, well-coordinated and implemented financial inclusion through access to bank accounts and credit card ownership have increased tax revenues (Al-Own & Bani-Khalid, 2021).

From foregoing, the plausibility of financial inclusion impacting the tax revenue of a country is largely shaped by two imperatives, namely, national systems interconnectedness and the extent of collaborative intervention among multiple stakeholders within the tax system and financial system.

### ***Theoretical framework***

Empirical research on financial development and economic growth and/or development has emerged, with a focus on access issues, specifically the presence of banking branches. These empirical investigations on the subject appear to have focused largely on developed countries and financial development as determinant of tax revenue, thereby overlooking the role of financial inclusion in the tax revenue generation process. The review of literature demonstrates that access to financial services does not imply utilization of the services. Access to financial infrastructure often does not signify growth in the economy. Rather, it entails a state in which a growing proportion of a country's excluded populations can access and use formal financial services. Likewise, literature has emerged on the impact of financial inclusion, growth, and poverty reduction. These studies proved that financial inclusion either increases or decreases poverty or economic growth.

Park and Mercado (2015), for instance, explored the factors that determine financial inclusion, as well as the significance of financial inclusion in lessening poverty and income inequality in a number of developing Asian countries. An increase in per capita income and institutions will improve financial inclusion, but a larger age-dependency ratio dramatically reduces it. Oboh, Chinonyelum, and Edeme (2018) applied the Seemingly Unrelated Regression (SUR) technique to five ECOWAS countries from 2000 to 2015. According to the findings, total tax income has a positive and significant impact on economic growth. Sethi and Sethi (2019) examined the impact of financial services on India's economic growth from both the supply and demand

sides. According to the data, there is a positive correlation between financial inclusion and economic growth.

Similarly, Onakoya, Afintinni, and Ogundajo (2017) investigated the impact of tax revenue on African economic growth from 2004 to 2013. In addition to the Hausman tests, the authors used fixed and random effect tests. According to the study, tax income is positively associated with GDP and promotes African economic growth. Some other body of empirical research examined the impact of government fiscal policies such as taxation on financial performance and the inclusion of business operators (see Ojeka, 2011; Ahikawodzi & Adade, 2012; Eniola & Entebang, 2016; and Riwayati, Salim, Maskie & Indrawati, 2020). For example, Ojeka (2011) asserted that SMEs' perceptions of government tax policies that benefit small businesses, such as increased access to taxes and simplified tax procedures, had a significant positive impact on SME performance. Ahiawodzi and Adade (2012) also looked at the impact of tax rates and banking policies on the success of small and medium-sized businesses (SMEs). The findings revealed that tax rates and banking regulations affecting loan rates have a beneficial impact on SME success. Eniola and Entebang (2016) investigated the effect of SMEs' performance on SMEs' actors' financial inclusion. SMEs can improve their financial understanding by improving their performance, and as a result, SMEs will be more competitive in the economy.

Riwayati, Salim, Maskie, and Indrawati (2020) investigated the role of taxation in mediating the impact of financial performance and business actor inclusion on the success of 76 batik business actors in Indonesia. The findings revealed that enacting tax regulations for small and

medium-sized business actors has a number of positive effects on the success of the companies involved. The authors argued that tax regulation, as determined by the tax rate, ease of tax access, and simplification of tax procedures, all of which are aided by financial inclusion, is a determining factor in expanding capital, business scale, profit, and management. Dieter and Anna (2020) employ the national income dynamics data to assess the impact of financial inclusion on wealth disparity in South Africa. The findings confirmed the existence of a negative cross-country linkage between financial inclusion and income inequality. Likewise, Omar and Inaba (2020) also carry out an investigation on the impact of financial inclusion in lowering poverty and income inequality in developing countries. The authors employ a panel data analysis of 116 selected developing countries for the period spanning over 2004 to 2016. Similarly, in developing nations, a robust gauge of financial inclusion index was created using a varied set of financial sectors spread data. According to the findings, financial inclusion significantly reduces poverty and income inequality in the selected developing countries. Furthermore, it believes that improving access to formal financial services for socially excluded groups will demand an increase in overall societal welfare. Rekha, Rajamani, and Resmi (2021) conducted a study in 22 emerging economies to examine the relationship between digital financial inclusion, economic freedom, financial development, and economic growth. The authors concluded from panel data analysis that digital financial inclusion is a growing phenomenon that has increased the accessibility and availability of formal financial services. The study's findings also suggested that the nexus of ICT diffusion–

economic freedom–financial development has a long-term direct impact on financial inclusion, emphasizing the importance of fostering an economic climate that encourages long-term growth. Despite the fact that the majority of existing research shows a link between financial inclusion, economic growth, and income inequality, research on financial inclusion and tax revenue is scarce. Previous studies lack a systematic insight due to a lack of a dynamic panel investigation and a narrow set of inputs for attempting to build a financial inclusion index, and possibly an impact analysis of financial inclusion on tax revenue with a broad range of parameters for financial inclusion measure and a panel data set composed of a large number of developing countries in Africa.

### *Model specification and Data description*

Following the empirical work of Ajide and Bankefa (2017), Zhang and Posso (2019), and Bassam and Tareq (2021), the baseline model is structured to test whether the changes in tax revenue is associated with the changes in financial inclusion for various SSA countries.

$$\begin{aligned} Rev_{i,t} = & \beta_0 + \beta_1 mma_{i,t} + \\ & \beta_2 fia_{i,t} + \beta_3 dco_{i,t} + \beta_4 wipy_{i,t} + \\ & \beta_5 wwa_{i,t} + e_{i,t} \end{aligned} \quad (1)$$

where total tax revenue (rev) represents the dependent variable following extant studies (see Oz-Yalaman, 2019). Re-presenting the notations of equation (1) in a log-linear format as equation (2);

$$\begin{aligned} \ln Rev_{i,t} = & \beta_0 + \beta_1 \ln mma_{i,t} + \\ & \beta_2 \ln fia_{i,t} + \beta_3 \ln dco_{i,t} + \end{aligned}$$

$$\beta_4 \ln wipy_{i,t} + \beta_5 \ln wwa_{i,t} + e_{i,t} \quad (2)$$

The Generalized Least Squares (GLS) method, on the other hand, is employed to test our study hypothesis. The nature and kind of variable in the study account for the rationale for using panel data. The study's specific goal is to evaluate if variations in tax income are connected with variations in financial inclusion in SSA countries by incorporating all available data for estimation and inference. As a result, in the presence of autocorrelation and heteroskedasticity, least squares, nonlinear least squares, and instrumental variables are still unbiased, consistent, and asymptotically normal, but they are no longer efficient estimators, rendering traditional inference approaches inapplicable (Ogede, 2014). To keep the least squares efficiency property in panel data, the model must be changed. The generalised least squares method (GLS) in its converted form provides a mechanism of ensuring that autocorrelation and heteroskedasticity are taken into consideration and that the appropriate methodology is used. Consequently, the empirical model is estimated using fixed effects that account for cross-section seemingly unrelated regression (SUR) weights, as well as random effects from the Swamy and Arora estimators, after the GLS transformation. The Hausman test is used to assess which strategy is more accurate between fixed effects and random effects estimation. The a priori expectations for the parameters' estimates as specified in the baseline regression model equation (2):  $\beta_1, \beta_2, \beta_3$  and  $\beta_4 > 0$ . This demonstrates that an increase in mobile money account, financial institution account, debit card ownership, and withdrawal with ATM is expected to

induce a linear impact in tax revenue. Furthermore, the study employed time series dataset of 15 sub-Saharan Africa countries over the years between 2011 and 2017 owing to the data availability. These countries include Benin, Burkina Faso, Cabo Verde, Cote d'voire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Table 1 has a complete overview of the variables and their sources. However, the choices of variables employed to gauge financial inclusion are consistent with previous empirical literature (Ahamed & Mallick, 2019; Park & Mercado, 2021; Sarma & Pais, 2011; Zachosova et al., 2018; Ozili, 2020). In this study, financial inclusion is gauged with mobile money account (MMA), financial institution account (FIA), withdrawal in the past year (WIPY), and withdrawal with ATM (WWA). These variables were sourced from Global finindex database, World development indicators (WDI) as well as Central Bank of Nigeria (CBN). Financial institution account (% of age +15) is employed as a percentage of respondents who report having an account at a bank or another type of financial institution or report personally using a mobile money service (Sarma & Pais, 2011; Shankar, 2013; and Ozili, 2020). Another financial inclusion index explored is debit card ownership (DCO), (% age 15+), which is defined as the percentage of respondents who report having a credit card (Zhang & Posso, 2019).

## Results and discussion

This section presents and discuss the findings on the impact of financial inclusion on tax revenue in the selected SSA countries. It focusses on the summary statistics, correlation analysis and the panel regression result for the period examined.

Table 2 indicates the summary statistics for the variable of interest for the dataset of Table 1: Description of Data

Variables	Definition	Studies with similar definition	Source (s)
REV	Tax revenue (LCU)	Oz-Yalaman (2019)	CBN, WDI
MMA	Mobile money account (% age 15+)	Sarma & Pais, 2011	Global Findex, WDI
DCP	Debit card ownership (% age 15+)	Zhang & Posso, 2019	Global Findex, WDI
FIA	Financial institution account (% age 15+)	Shankar, 2013; Ozili, 2020	Global Findex, WDI
WIPY	Withdrawal (Past years;% age 15+)	Ahamed & Mallick, 2019	Global Findex, WDI
WWA	Withdrawal with ATM	Ahamed & Mallick, 2019	Global Findex, WDI

(REV), mobile money account (MMA), financial institution account (FIA), debit card ownership, withdrawal in the past year (WIPY), and withdrawal with ATM (WWA) are 3.6400, 0.0910, 0.1743, 0.0749, 0.3704, and 0.0937 respectively, from the sample of SSA. The lowest value of tax revenue is 0.00 while the maximum value is 3.58 for the period examined. Mobile money account has the mean value of 0.0910 with standard deviation of 0.1152. The lowest value of mobile money account is 0.00 while the maximum value is 0.3894 for the period examined. The descriptive statistics reveal that financial institution account has the mean value of 0.1743 with standard deviation of 0.1144. The lowest value of financial institution account is 0.00 while the maximum value is 0.4417 for the period examined. Debit card ownership has the mean value of 0.0749 with a standard

sub-Saharan Africa (SSA) countries from 2011 to 2017. The average of tax revenue

deviation of 0.0785. The lowest value of debit card ownership is 0.00 while the maximum value is 0.356 for the period examined. Withdrawal in the past years has the mean value of 0.3704 with standard deviation of 0.3344. The lowest value of withdrawal in the past years is 0.00 while the maximum value is 0.8798 for the period examined. Withdrawal with Automated Teller Machine has the mean value of 0.0937 with standard deviation of 0.1552. The lowest value of withdrawal with automated teller machine is 0.00 while the maximum value is 0.7054 for the period examined. However, the significant variation between all lowest and maximum values indicates that the series has fluctuated over time. At the same time, the standard deviation figure provides information on the series' modest level of variance.

Table 2: Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
REV	3.6400	0.0000	3.5800	0.0000	7.6800
MMA	0.0910	0.0393	0.3894	0.0000	0.1152
FIA	0.1743	0.152350	0.4417	0.0000	0.1144
DCO	0.0749	0.051075	0.3560	0.0000	0.0785
WIPY	0.3704	0.4887	0.8798	0.0000	0.3344
WWA	0.0937	0.000000	0.7054	0.0000	0.1552



Author's compilation, 2021

Table 3 contains the correlation matrix's results, illustrating the relationship between the regressors and the outcome variables. Our findings indicate a positive correlation between tax revenue and both mobile money account and withdrawal in the past years. In contrast, findings show a negative correlation between tax revenue and financial institution account, debit card ownership and withdrawal with automated teller machine. Mobile money account is

positively correlated with financial institution account, debit card ownership and withdrawal in the past years but negatively correlated with withdrawal with automated teller machine. Financial institution account is positively correlated with debit card ownership, withdrawal in the past years and withdrawal with automated teller machine. Debit card ownership is positively related withdrawal in the past years and withdrawal with automated teller machine.

Table 3: Correlation Matrix

Variable	REV	MMA	FIA	DCO	WIPY	WWA
REV	1					
MMA	0.476	1				
FIA	-0.116	0.394	1			
DCO	-0.085	0.236	0.858	1		
WIPY	0.226	0.473	0.487	0.444	1	
WWA	-0.159	-0.282	0.407	0.490	0.283	1

Author's compilation, 2021.

The results of the estimated panel regression model that capture the impact of financial inclusion on tax revenue in Sub-Saharan Africa (SSA) using the fixed and random effects estimation techniques are presented in table 4 and the interpretation in respect to estimation methods and diagnostic test follows subsequently. Table 4 displays that all proxies of financial inclusion exert a positive significant impact on tax revenue (REV) except the coefficient of financial institution account (FIA) that exert a negative significant impact on tax revenue (REV). The findings show that a percentage increase in FIA will lead to 4.76 decrease in tax revenue in SSA countries. The coefficient of mobile money account (MMA) has a positive significant impact on tax revenue (REV), implying that a percentage increase in MMA will lead to

4.85 increase in tax revenue (REV). Besides, the coefficient of debit card ownership (DCO), withdrawal in the past years (WIPY) and withdrawal with ATM (WWA) exert a positive insignificant effect on tax revenue. For the findings of coefficient of debit card ownership (DCO) and tax revenue, a unit increase in debit card ownership, one of the proxy of financial inclusion will lead to 2.14 increase in tax revenue (REV). While a percentage increase in WIPY will lead to a 1.64 increase in tax revenue in SSA. The weighted diagnostic tests results reveal that the adjusted R-squared is 29.88% and this indicates that 29.88 of the total variation in SSA tax revenue is accounted for by financial inclusion between 2011 and 2017. The F-statistic explains the simultaneous significance of all considered factors and

the result reveals that financial inclusion has simultaneous significant effects on tax revenue growth level in SSA between 2011

and 2017 at 5% critical level.

Table 4: Pooled Regression. Dependent Variable: Tax Revenue

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.350	2.111	2.05526	0.048
MMA	4.851	1.341	3.61061	0.001
FIA	-4.761	1.981	-2.40685	0.022
DCO	2.141	2.761	0.77610	0.443
WIPY	1.641	4.161	0.39476	0.696
WWA	1.031	9.591	1.07193	0.292
R-squared	0.394			
Adjusted R-squared	0.299			
F-statistic (Prob.)	4.154 (0.005)			

Author's compilation, 2021.

The findings show that the Hausman chi-square 7.88 at 5% is insignificant, implying that there is no correlation between the error term and one or more independent

variable. Hence, in view of the findings, the study considered the random effect model to be capable of generating more consistent estimate as against fixed effect model.

Table 5: Hausman Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.858541	5	0.1642

Author's compilation, 2021.

The findings show that the Hausman chi-square 7.88 at 5% is insignificant, implying that there is no correlation between the error term and one or more independent variable. Hence, in view of the findings, the study considered the random effect model to be capable of generating more consistent estimate as against fixed effect model.

(REV), suggesting that a percentage increase in MMA will lead to 2.75 increase in REV. The result shows that mobile money account has a positive significant impact on tax revenue which is in line with the study of (Oz-Yalaman, 2020) but contrary with the work of (Maherali, 2017). More so, the result is also in line the theoretical postulation and a priori expectation of positive impact. The findings differ when withdrawal with ATM is explored to gauge inclusive financial access. The coefficient of financial

Table 6 displays the findings of the random effect model. The findings show that mobile money account (MMA) has a positive significant impact on tax revenue

Table 6: Random Effect Model Dependent Variable: Tax Revenue

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.1411	2.1611	1.918748	0.0440
MMA	2.7512	8.6611	3.174674	0.0033
FIA	-2.1612	1.6512	-1.303663	0.2016
DCO	2.1611	2.3712	0.091305	0.9278
WIPY	6.6410	2.3211	0.286671	0.7762
WWA	4.8111	5.0111	0.960908	0.3438
<b>Effects Specification</b>				
			S.D.	Rho
Cross-section random			5.2611	0.7286
Idiosyncratic random			3.2111	0.2714
<b>Weighted Statistics</b>				
R-squared	0.2878	Mean dependent var	1.2511	
Adjusted R-squared	0.1765	S.D. dependent var	3.7011	
S.E. of regression	3.3511	Sum squared resid	3.5824	
F-statistic (Prob.)	2.5866 (0.045)	Durbin-Watson stat	1.0168	
<b>Unweighted Statistics</b>				
R-squared	0.3150	Mean dependent var	3.6411	
Sum squared resid	1.5025	Durbin-Watson stat	0.2437	

Author's compilation, 2021.

inclusion proxy with withdrawal with ATM (WWA) exerts a positive insignificant effect on tax revenue in SSA, implying that a unit increase in WWA will lead to 4.811 increase in tax revenue. However, the finding is consistent with the study of Oz-Yalaman (2020) but contrary with the work of (Maherali, 2017). More so, the result is also in line with the theoretical postulation and a priori expectation of positive impact. Also, financial institution account (FIA) has a negative insignificant impact on REV, demonstrating that a unit increase in FIA will lead to 2.16 per cent decrease in tax revenue (REV). The findings are consistent with Oz-Yalaman (2020) but contrary with the work of (Maherali, 2017). More so, the result is also in line with the theoretical postulation and a priori expectation of positive impact. Furthermore, Table 6

displays that debit card ownership (DCO) has a positive insignificant effect on REV suggesting that a unit increase in debit card ownership will lead to 2.16 increase in tax revenue in SSA. Similarly, the coefficient of withdrawal in the past years (WIPY) has a positive insignificant impact on tax revenue in SSA over the period of review. This finding suggests that a percentage increase in withdrawal in the past years (WIPY) will translate to 6.64 increase in tax revenue in SSA. The weighted diagnostic tests results reveal that the adjusted R-squared is 17.65% and this indicates that 17.65% of the total variation in SSA tax revenue is accounted for by financial inclusion between 2011 and 2017. The F-statistic 2.5866 (0.045) explains the simultaneous significance of all considered factors and the result reveals that financial inclusion has

simultaneous significant effects on tax revenue growth level in SSA between 2011 and 2017 at 5% critical level.

## **Conclusion and policy implications**

The issue of increasing domestic revenue mobilization remains problematic for many governments, especially in low-income countries. Leveraging systems theory and collaborative intervention theory of financial inclusion, this study examines how financial inclusion impacts tax revenues in selected sub-Saharan African countries (SSA) from 2011-2017 using data collected from sub-Saharan Africa. Based on the dynamic panel estimation results of the system GLS and random effect estimations, the mobile money account has a positive significant impact on tax revenue which means increase in the number of mobile money account users leads to an increase in the tax generated by the government which will be beneficial to the economy. Likewise, withdrawal with ATM has a positive insignificant effect on tax revenue suggesting that higher withdrawals made through the ATM, the higher the revenue generated by the government. Financial institution account has a negative insignificant impact on tax revenue which means the higher account opening carried out by banks, the lower the tax generated by the government. The study argues that the insignificance of the coefficient of withdrawal with ATM could be due to the skeletal function of the most ATM which reduces the number of transactions carried out via the ATM machine. More so, the negative impact of financial institution account could be due to the fraud perpetrated by account holder e.g., having multiples of account for perpetration of fraud. Most of these fraudulent transactions executed evade tax. The study

concludes that mobile money account is the major variable contributing significantly to tax revenue in SSA counties, and there is significant relationship between financial inclusion and tax revenue in SSA.

Our empirical studies validate the two theories of financial inclusion, namely, systems theory of financial inclusion and collaborative intervention theory of financial inclusion. The first theory confirms that tax revenue improvement as one of the financial inclusion outcomes can be more effectively and efficiently actualised when policymakers and stakeholders leverage existing socioeconomic and political subsystems on which financial inclusion is built because the tax system (tax authority) and financial system (banks as suppliers of financial services) are both subsystems within the national economy. To improve tax revenue, therefore, policymakers must leverage the financial inclusion mechanisms of banks, such as ATM and bank account access. The second theory affirms that financial inclusion can effectively increase tax revenue when collaborative joint efforts exist among the multiple stakeholders within the tax system and financial system. Three policy implications have clearly emerged. The first policy implication is that the monetary authorities of selected SSA countries should ensure that the pace of attaining the targeted level of financial inclusion is maintained to increase tax revenues in these countries because the higher the level of income of citizens, the higher the financial services they would require as customers, and consequently and the more tax to be generated by the governments. This is consistent with the recent findings in Argentina, UAE, and the GCC. Second, it is imperative for SSA countries to encourage bank customers to increase the usage of the mobile money

account due ease of collection of tax revenue. Three, revenue-generating drive of the tax authorities of SSA countries should be strengthening through strong collaborative efforts with financial institutions so that more bank accounts would be opened by the excluded people

and businesses, while existing customers should be encouraged to use debit cards, credit cards, and withdrawal through the automated Teller machine, which are effective means of maintaining of tax collection by the government.

## REFERENCES

- Ahamed, M. M. (2016). Does inclusive financial development matter for firms' tax evasion? Evidence from developing countries. *Economics Letters*, 149, 15-19.
- Ahiawodzi, A.K. & Adade, T. C. (2012). Access to Credit and Growth of Small and Medium Scale Enterprises in the Ho Municipality of Ghana. *British Journal of Economics, Finance and Management Sciences*, 6(2), 34-51.
- Ajide, F. M. & Bankefa O. I., (2017). Does financial inclusion influence tax revenue? The case of Nigeria. *African Journal of Economic Review*, 5 (3), 15-33.
- Al-Own, B., & Bani-Khalid, T. (2021). Financial inclusion and tax revenue: evidence from Europe. *International Journal of Financial Research*, 12(2), 27-42.
- Bassam, A. & Tareq, B. (2021). Financial Inclusion and Tax Revenue: Evidence from Europe. *International Journal of Financial Research* Vol. 12 (2).
- Bertinelli, L., & Bourgain, A. (2016). Tax mobilization in Sub-Saharan Africa: The impact of tax and business law reforms. *Economics Bulletin*, 36(3), 1805-1810.
- Bird, R.M., Martinez-Vazquez, J. & Torgler, B. (2014). Societal institutions and tax effort in developing countries. *Ann. Econ. Finance* 15 (1), 185e230.
- Bird, R. M., Martinez-Vazquez, J. and Torgler, B. (2008). Tax Effort in Developing Countries and High-Income Countries: The Impact of Corruption, Voice and Accountability, *Economic Analysis and Policy*, 38(1), 55-71.
- Capasso, S. & Jappelli, T. (2013). Financial development and the underground economy. *Journal of Development Economics*, 101, 167-178.
- Castro, G. Á., & Camarillo, D. B. R. (2014). Determinants of tax revenue in OECD countries over the period 2001-2011.c *Contaduría y Administración*, 59(3), 35-59. [https://doi.org/10.1016/S0186-1042\(14\)71265-3](https://doi.org/10.1016/S0186-1042(14)71265-3)
- Chaudhry, I. S. & Munir, F. (2010). Determinants of low tax revenue in Pakistan. *Pakistan Journal of Social Sciences*, 30(2), 439-452.
- Clist, P. & Morrissey, O. (2011). Aid and tax revenue: signs of a positive effect since the 1980s. *J. Int. Dev.* 23 (2), 165-180.
- Demirgüç-Kunt, A., Klapper, L. & Singer, S. (2017). Financial Inclusion and Inclusive Growth: A Review of Recent Empirical Evidence, 1-25.
- Demirgüç-Kunt A, Klapper, L., Singer

- D, Ansar, S. & Hess, J. (2018). The Global Findex Database 2017: measuring financial inclusion and the FINTECH revolution. World Bank Group, Washington, DC. <http://documents.worldbank.org/curated/en/332881525873182837/pdf/126033-PUB-PUBLIC-pubdate-4-19-2018.pdf>
- Eniola, A.A. & Entebang, H. (2016). Financial literacy and SME firm performance. *International Journal of Research Studies in Management*, 5(1), 31-43.
- Global Findex, 2014. <http://www.worldbank.org/globalfindex>
- Ilievski, B. (2015). Stock markets and tax revenue. *Journal of Applied Finance & Banking*, 5(3), 116.
- IMF (2019). Fiscal Policy and Development: Human, Social, and Physical Investments for the SDGs. Fiscal and Development, IMF Staff Discussion Note, SDN/19/030
- Keppel, G., Morrison, C., Watling, D., Tuiwawa, M. V., & Rounds, I. A. (2012). Conservation in tropical Pacific Island countries: why most current approaches are failing. *Conservation Letters*, 5(4), 256-265.
- Klapper, L., Ansar, S., Hess, J. & Singer, D. (2019). Sub-Saharan Africa series: Mobile money and digital financial inclusion. World Bank.
- Kling, G., Pesque-Cela, V., Tian, L., & Luo, D. (2022). A theory of financial inclusion and income inequality. *The European Journal of Finance*, 28(1), 137-157.
- Le, T.M., Moreno-Dodson, B. & Bayraktar, N. (2012). Tax Capacity and Tax Effort: Extended Cross-Country Analysis from 1994 to 2009. World Bank.
- Mahdavi, S. (2008). The level and composition of tax revenue in developing countries: evidence from unbalanced panel data. *Int. Rev. Econ. Finance*, 17 (4), 607e617.
- Maherali, A. (2017). "Financial inclusion, Digital Payments, and their Impact on Income and Tax Revenue around the World. 1-70.
- Malik, S., Maheshwari, G. C., & Singh, A. (2019). Understanding financial inclusion in India: A theoretical framework building through SAP-LAP and efficient IRP. *Global Journal of Flexible Systems Management*, 20(2), 117-140.
- Mitchell, K., & Scott, R. H. (2019). Public revenue, financial inclusion and value-added tax in Argentina. In *Pesos or plastic?* (pp. 33-58). Palgrave Pivot, Cham.
- Oboh, J.O., Chinonyelum, O.J. & Edeme, R.K. (2018). Tax Revenue and Economic Growth in Selected ECOWAS Countries, Evidence from Sure Model. *International Journal of Academic Research in Accounting, Finance and Management Sciences* 8 (3), 310-324.
- OECD.STAT (2018). Retrieved from <https://stats.OECD.org/Index.aspx?DataSetCode=REIV> on the 21st of August 2021.
- OECD (2021). Revenue Statistics in Africa.
- Ogede, J. S. (2014). Openness and the Economic Performance of Sub-Saharan Africa: Evidence from Time Series and Cross Sectional Analyses. *Ago-Inwoye Journal of Behavioural Sciences*, Vol. 3 (2), 104-124
- Ojeka, S.A. (2011). Tax policy and the growth of SMEs: Implications for the Nigerian economy. *Research Journal*

- of Finance and Accounting, 2(2), 125-135.
- Omar, A. & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. *Journal of Economic Structures*, 9(37). <https://doi.org/10.1186/s40008-020-00214-4>
- Onakoya, A.B., Afintinni, O.I. & Ogundayo, G.O. (2017). Taxation revenue and economic growth in Africa. *Journal of Accounting and Taxation*, 9(2) 11-22.
- Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, 18(4), 329-340.
- Ozili, P. K. (2020). Financial inclusion research around the world: A review. *Working Paper*, presented at the Forum for Social Economics. <https://doi.org/10.1080/07360932.2020.1715238>
- Ozili, P.K. (2020). "Theories of Financial Inclusion", Özen, E. and Grima, S. (Ed.) *Uncertainty and Challenges in Contemporary Economic Behaviour* (Emerald Studies in Finance, Insurance, and Risk Management). Emerald Publishing Limited, Bingley, 89-115. <https://doi.org/10.1108/978-1-80043-095-220201008>
- Oz-Yalaman, G. (2019). Financial inclusion and tax revenue. *Central Bank Review*, 19(3), 107-113. <https://doi.org/10.1016/j.cbrev.2019.08.004>
- Park, C. Y. & Mercado, R. (2015). Financial inclusion, poverty, and income inequality in developing Asia. Asian Development Bank Economics Working Paper Series, 426. Asian Development Bank.
- Petrescu, I. (2013). Financial Sector Quality and Tax Revenue: Panel Evidence. Mimeo, University of Maryland.
- Rekha, G., Rajamani, K. & Resmi, G. (2021). Digital Financial Inclusion, Economic Freedom, Financial Development, and Growth: Implications from a Panel Data Analysis. ADBI Working Paper 1244. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/digital-financial-inclusion-economic-freedom-financial-development-growth>
- Riwayati, H.E., Salim, U., Maskie, G. & Indrawati, N. K. (2020). Financial Inclusion and Performance to Mediate the Effect of Banking and Tax Regulation on the Success of Small and Medium Enterprises in Indonesia. *International Journal of Economics and Business Administration, Volume VIII, 3, 517-533*
- Sarma, M., (2008). Index of financial inclusion. Working paper, no. 215. Indian Council for Research on International Economic Relations (ICRIER), New Delhi.
- Sarma, M. & Pais, J. (2011). Financial inclusion and development. *Journal International Development*, Vol 23(5), 613–628
- Schumpeter, J. A. (1911). *A theory of economic development*. Cambridge, MA: Harvard University Press.
- Sethi, D., and Sethy, S. K. (2019). Financial Inclusion Matters for Economic Growth in India: Some Evidence from Cointegration Analysis. *International Journal of Social Economics* 46 (1), 132–51.

- Shankar, S. (2013). Financial Inclusion in India: Do microfinance institutions address access barriers? *ACRN Journal of Entrepreneurship Perspectives*, 2(1), 60-74. Retrieved from <http://www.acrn.eu/resources/Journals/201302d.pdf>
- Srouji, J. (2020). Digital payments, the cashless economy, and financial inclusion in the United Arab Emirates: Why is everyone still transacting in cash? *Journal of Risk and Financial Management*, 13(11), 260.
- Taha, R., Colombage, S.R.N., Maslyuk, S. & Nanthakumar, L. (2013). Does financial system activity affect tax revenue in Malaysia? Bounds testing and causality approach. *Journal of Asian Economics*, 24, 147-157.
- Tan, C. W., & Pan, S. L. (2003). Managing e-transformation in the public sector: an e-government study of the Inland Revenue Authority of Singapore (IRAS). *European Journal of Information Systems*, 12(4), 269-281.
- Veillard, J., Cowling, K., Bitton, A., Ratcliffe, H., Kimball, M., Barkley, S. & Wang, H. (2017). Better measurement for performance improvement in Low-and Middle-Income countries: the primary health care performance Initiative (PHCPI) experience of conceptual framework development and indicator selection. *The Milbank Quarterly*, 95(4), 836-883.
- World Bank, (2014). Global Financial Development Report. Financial Inclusion. ECOWAS.
- Zachosova, N., Babina, N. & Zanora, V. (2018). Research and methodological framework for managing the economic security of financial intermediaries in Ukraine”, *Banks and Bank systems*, 13(4), 119-130. [https://doi.org/10.21511/bbs.13\(4\).2018.11](https://doi.org/10.21511/bbs.13(4).2018.11)
- Zhang, Q. & Posso, A. (2019). Thinking inside the Box: A Closer Look at Financial Inclusion and Household Income. *The Journal of Development Studies*, 55(7), 1616-1631. <https://doi.org/10.1080/00220388.2017.1380798>