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Remittances and Tax Revenue in SSA Countries: A Panel ARDL Approach

Vusal Ahmadov*, Gabriel Temesgen Woldu**

Abstract: This study evaluates the impacts of remittances on tax revenue in Sub-Saharan African countries. The Kao Cointegration test assesses the presence of long-term relationship between remittances and tax revenues, and Panel ARDL model estimates the impact of remittances on tax revenues. The results of tests show that remittances have a positive impact on both direct and indirect tax revenues. Remittances could be a source of financial resources for entrepreneurs, and facilitate the employment of idle production capacities, leading to an increase in economic activity and employment. Consequently, they could increase direct taxes via income taxes on increased economic activities and employment. In addition, remittances are primarily used for maintaining and improving welfare of family at home, leading to an increase in consumer spending. Consequently, a rise in consumption could increase indirect tax revenues. The study highlights the pivotal role of remittances increasing the tax revenue in Sub-Saharan African countries, underlining the necessity for policymakers to consider remittances in their fiscal planning.

Keywords: remittances; tax revenue; Sub-Saharan Africa.

JEL classification: F24; H2; O55.

* Department of International Economics and Business, Azerbaijan State University of Economics, Azerbaijan; e-mail: *vusal_ahmadov@unec.edu.az* (corresponding author).
** Department of Microeconomics and Public Economics, School of Business and Economics, Maastricht University, Netherlands; e-mail: *gabriel.temesgen@gmail.com*.

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1. INTRODUCTION

International labor migration is becoming a global trend, with the flow of migrants moving predominantly from developing countries to developed countries and emerging economies. The number of migrant workers surged from 20 million in 1970 to 200 million in 2022 (International Organization for Migration, 2022). Inflow of remittances to migrant sending countries accompanied the international labor migration. Remittances increased from 2 billion (current USD) in 1975 to 766 billion in 2022 (Mansoor and Quillin, 2006). The remittances constitute the second largest source of capital inflows into developing countries following Foreign Direct Investment (FDI). Sub-Saharan Africa has experienced a high level of labor migration with remittances play a crucial role in supporting household income and macroeconomic stability (Gonzalez-Garcia *et al.*, 2016; Makina and Mudungwe, 2023). In countries like Coba Verde, The Gambia, and Comoros, remittances account for over 20 percent of GDP underlining their crucial economic importance.

The impact of remittances on the receiving economy, particularly in terms of poverty reduction, education, economic growth, macroeconomic stability has been richly investigated (Acosta *et al.*, 2009a; Fayissa and Nsiah, 2010; Ncube and Brixiova, 2013). However, relatively underexplored dimension is the effect of remittances on government revenue which is crucial for providing public goods and financing development objectives, especially, in the context of Sub-Saharan Africa (Asatryan *et al.*, 2017). By investigating the impact of remittances on tax revenue in Sub-Saharan Africa, this study contributes to the literature on remittances and public finance.

Sub-Saharan African governments struggle with low tax collection rates, which constrain their ability to fund essential public services and development programs (Keen, 2012). Given that understanding the fiscal implications of remittances has important policy relevance. By focusing on this underexplored but important issue, this study contributes novel insights to the literature on remittances and public finance.

The main objective of this study is assessing the impact of remittances on indirect and direct tax revenues. The result of the study shows that remittances are mainly spent on consumption of receiving family members thereby increasing the basis of indirect taxes via stimulation consumption. It therefore could have a positive impact on indirect taxes in the region. Additionally, remittances could spur economic activity by both increasing domestic demand and providing finance for businesses. As a consequence, it could increase the direct tax revenue.

The paper is organized in the following ways. Section 2 introduces the theoretical background of study. Section 3 details the data and empirical methodology. Results and findings are discussed in the Section 4. Section 5 outlines the policy implications of the study and concludes.

2. LITERATURE REVIEW

This section first provides an overview of the differences in public finance and taxation between developed and developing economies. A review of the literature on remittance and taxation is then presented.

2.1 Taxation in developing countries

There are contrasting differences both in level of tax revenue and its structure between developing and developed countries. Developing countries can typically tax 15-20 percent of

GDP, in stark contrast to 40 percent in developed countries. Additionally, the indirect taxes comprise a big share of tax revenues in contrast to richer countries where direct taxes dominate the total tax revenue. The structure of economy, lack of administrative capacity and prevailing political system can mainly explain the lower level of tax revenue and small share of direct tax revenue in developing countries (Abd Hakim *et al.*, 2022). The low value-added sectors are dominant in the economies of developing countries while the higher value-added sectors are small or nearly non-existent. Economic subjects in low value-added activities often earn barely above the subsistence level. Additionally, informality is prevailing in economies of developing countries making it challenging to tax a considerable part of national income. Therefore, overall tax level is low and share of direct taxes is smaller in developing countries. The capacity of tax administration is also considerably lower in developing countries. The staffs are often underpaid, and under-skilled while modern collection procedures, recordkeeping and assessment are absent. Consequently, these factors impede the tax collection, particularly of the technically more complex direct taxes (Avi-Yonah and Margailoth, 2007; Bahl and Bird, 2008). The wealthy elite controls the political arena in most developing countries and political competition is constrained by this elite. In this regard, policies tend to favor those with above-median incomes there is no pressure on political elite to conduct progressive redistributive tax policies. Consequently, the economy is undertaxed.

2.2 Remittances and tax revenue

A huge body of literature exists that analyzes both microeconomic and macroeconomic effects of remittances in the context of developing countries. Regarding microeconomic effects, Khan *et al.* (2022) evaluate the effects of remittances on poverty, Azizi (2018) examines their role in human capital accumulation and Aggarwal *et al.* (2011) explore their influence on financial development. Research on macroeconomic effects analyzes the impact of remittances on various aspects including economic growth and balance of payments (Lartey, 2019) export competitiveness (Ahmadov, 2022) and on quality of institutions (Alamdar *et al.*, 2022).

Remittances flowing into developing countries can exert different effects on direct and indirect taxes in developing countries. This subsection details the conceptual framework to guide the understanding of the causal effect of remittance on direct and indirect taxes.

Direct tax revenue. In practice, it is hard to tax remittances directly. However, the impact of remittances on direct tax revenues can occur in indirect ways. 1) One of the main barriers to the actualization of economic potential in developing countries is the capital deficiency (Beck and Demirguc-Kunt, 2006). Hereof, remittances can facilitate the access to finance and promote the utilization of idle production factors and consequently result in increase in economic activity (Woodruf and Zenteno, 2001). Consequently, this increase in economic activity could lead to higher direct tax revenues. Nonetheless, remittances might also have a negative effect on direct tax revenues via "Dutch Disease" effect. As a foreign capital, remittances could lead to a decline in export competitiveness of economy by causing domestic currency to appreciate (Acosta *et al.*, 2009b). This could consequently lead to the contraction or demise of some production sectors. Remittances could have a negative effect on employment by increasing the receivers` reservation wage (Mansoor and Quillin, 2006). In consequence, weaking of production sectors and decline in employment would result in

contraction of direct tax revenues. In the light of both possible channels of positive and negative effects of remittances on direct tax revenues, the net effect is inconclusive.

Indirect tax revenue: The primary motive of senders is to support consumption of their families back home (Abdih *et al.*, 2012). Therefore, main part of remittances is channeled to consumption, and it could have a positive contribution to indirect tax revenues.

The potential effect of remittances on tax revenues is large in developing countries. Accordingly, they can tailor their policy responses by adjusting the rate of direct and indirect taxes. Given that remittances are mainly destined for consumption, government might target indirect taxes to take a share from remittances. In this context, the rate of indirect taxes could be increased, and their base could be broadened. Secondly, the "Dutch Disease" and employment-reducing effects of remittances can shape the tax policy in receiving countries. To mitigate the decline in competitiveness of domestic economy and promote employment, governments in remittance-receiving countries may reduce direct taxes. Against the backdrop of decline in direct tax rates, these governments could increase the rate of indirect taxes for compensating the loss of tax revenue from stemming direct taxes.

Lastly, the prevailing informal economy offers another perspective to understand the effect of remittances on tax policy in developing countries (Schneider and Enste, 2013). Remittances can increase the potential revenue from indirect taxes. To capitalize on this potential, governments may reduce the indirect tax rates for motivating economic actors make a shift towards formal activity. On the other hand, remittances can have a positive contribution to the receiving countries` financial system (Aggarwal *et al.*, 2011). Development in the financial system allows to reduce the shadow economy, thereby facilitating better enforcement of income taxes. As a result, it would enable to increase direct tax revenues and have a more balanced composition of direct and indirect taxes.

The impact of remittances on the economies of receiving countries from various perspectives is thoroughly studied. However, there are only a few numbers of studies analyzing the impact of remittances on the tax revenues in developing countries. Abdih *et al.* (2012) assess the contribution of remittances to tax revenues in Middle East, North Africa, Central Asia and Caucasia. Their conclusion is that remittances have a positive effect on indirect tax revenues via increased imports and consumptions. Singer (2012) evaluates the effect of remittances on government revenues and concludes that they have a positive effect on tax revenues derived from consumption. Ebeke (2014) evaluates the effect of remittances on level and stability of government revenues in receiving countries, finding that remittance has a positive effect on both level and stability of government revenue primarily through indirect taxes. Asatryan *et al.* (2017) states that the effect of remittances on revenues from direct tax is negligible but it is positive on revenues from indirect tax.

Based on the theoretical explanation of the impact of remittances on direct and indirect taxes, this study tests the following hypothesis.

H1*: Remittances have a positive impact on total tax revenue in Sub-Saharan African countries.*

H2*: Remittances have a positive impact on direct tax revenue in Sub-Saharan African countries.*

H3*: Remittances have a positive impact on indirect tax revenue in Sub-Saharan African countries.*

Derived from the hypotheses of the study, the following research question is raised: What is the impact of remittances on total, direct and indirect tax revenues? To answer the research question, Panel ARDL regression model is conducted.

3. EMPIRICAL STRATEGY

3.1 Data

This study collects annual data from 2000 to 2021 from Cabo Verde, Comoros, The Gambia, Guinea-Bissau, Mali, Senegal, and Togo. The dataset employed in this study is sourced World Development indicator, World Governance indicator and Government Revenue Dataset, UNU-WIDER. In this study, we use 5 percent and above personal remittances received (% of GDP) as a criterion to select the SSA countries. The tax to GDP, direct tax to GDP, and indirect tax to GDP ratios are dependent variables. The existing literature suggests a set of variables that can be determining factors for tax revenues in developing countries (Gupta, 2007; Mahdavi, 2008). These are GDP per capita, exchange rate, net foreign aid and resource rent as a percentage of GDP, trade openness, urban population growth, government effectiveness, vulnerable employment to total employment (an approximate indicator of informal employment) and inflation. The higher GDP per capita means a larger share of the population are earning quite above the subsistence level of income, therefore, it is possible to tax proportionally higher share of national income. Depreciation increases the volume of excise tax and VAT from imports in terms of domestic currency. Citizens always have a resistance to increase in taxes, and it is politically unpopular. Incoming foreign aid creates additional revenue for government makes enable not to conduct unwelcoming policy of increasing taxes. Therefore, foreign aid has a negative impact on the level of taxation. The same logic is applicable in the case of resource rent. The higher level of resource rents frees governments from conducting unpopular taxation policies; therefore, it has a negative effect on the level of taxation. Opening foreign trade results in a decline in tariffs and other revenues. To compensate for this decline, the domestic taxation could be increased. Therefore, trade openness has a positive effect on the level of taxation. The higher share of urban population means a bigger part of population over subsistence income, consequently, it is easier to levy tax. Therefore, it has a positive impact on taxation level. Government effectiveness means that governments are capable of taxing the economy. Consequently, it has a positive effect. Higher level of vulnerable employment indicates the presence of higher share of subsistence level of income which is hard to tax. Therefore, it has a negative association with taxation level. Persisting inflation may confine consumption and consequently reduce the base of indirect taxes. *The main explanatory variable is the remittance to GDP ratio*. The data are transformed into natural logarithmic form except government effectiveness, inflation and urban share of total population.

Table no. 1 – Description of variables

Variable	Data source
Tax-GDP ratio	UNU-WIDER (2023)
Direct tax-GDP ratio	UNU-WIDER (2023)
Indirect tax-GDP ratio	UNU-WIDER (2023)
Remittance-GDP ratio	World Bank (2023)
REER	Darvas (2021)
Real GDP per capita	World Bank (2023)
Aid-GNP ratio	World Bank (2023)
Natural resource rent -GDP ratio	World Bank (2023)
Trade openness	World Bank (2023)

Variable	Data source
Government effectiveness	World Bank (2024)
Urban population growth	World Bank (2023)
Inflation	World Bank (2023)
Vulnerable employment	World Bank (2023)

Source: authors' construction

3.2 Methodology

3.2.1 Panel ARDL

We employ the Panel Autoregressive, Distributed Lag (ARDL) model that was developed by Pesaran *et al.* (1999). This model presents advantages over conventional estimating models. a) Both short and long-run dynamics can be estimated simultaneously (Shin *et al.*, 2014), b) it can be used in both small and large sample size data (Rafindadi and Yosuf, 2013), c) its estimates are more consistent and robust (Gocer and Ongan, 2020), d) it can accommodate variables with different orders of integration (Katircioglu, 2009).

The following equation describes the model:

$$T_{i,t} = \sum_{j=1}^{p} \beta_{i.t} T_{i,t-j} + \sum_{j=1}^{q} \delta_{i,t} X_{i,t-j} + \mu_i + \varepsilon_{i,t} \quad (1)$$

X is the vector of explanatory variables. We reparametrize the model into the following form:

$$\Delta T_{i,t} = \varphi(T_{i,t-1} - \beta_i X_{i,t}) + \sum_{j=1}^{p-1} \alpha^*_{i,j} \Delta T_{i,t-j} + \sum_{j=0}^{q-1} \delta^*_{i.j} X_{i,t-j} + \mu_i + \varepsilon_{i,t} \quad (2)$$

β_i is the coefficient of the long-run effects of the independent variables on tax revenues. φ_i indicates the error correcting term, reflecting the speed at which tax revenues adjust to their long-term equilibrium following a change in the independent variables. α and δ are the short-term coefficients. $\varepsilon_{i,t}$ are the disturbances with zero mean and constant variance and independently distributed across time and units.

The Pooled Mean Group (PMG) allows the heterogeneity in short-term coefficients across units but imposes the homogeneity of long-term coefficients. Therefore, accuracy of short-term coefficients cannot be guaranteed. It cannot provide accurate estimates for short-term coefficients. Therefore, we only present the discussion of long-term coefficients. It is necessary to exist cointegration among variables for the model to be considered an error correcting mechanism. In this respect, the stationarity of data is tested, then cointegration test is conducted. Lastly, discussion of panel estimates is presented.

Table no. 2 – Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax	154	11.51	4.286	3.66	21.17
direct tax	154	3.27	1.489	.67	6.91
indirect tax	154	8.162	2.969	2.80	14.84
Remittance	154	8.44	4.421	.37	26.83
Percapita	154	1146.54	791.926	536.56	3690.66
govt effectiveness	154	-.86	.559	-1.81	.34
aid gni	154	9.02	4.502	1.75	31.16
Trade	154	58.71	17.751	31.89	117.81
rent gdp	154	8.95	8.035	1.23	49.20
Inflation	154	-.096	13.754	-89.17	17.03
Reer	154	98.71	9.719	71.89	167.77
urbanpopulationgro~h	154	3.57	1.061	1.57	5.70

Table no. 2 describes the variables used in the analysis. The average total tax, direct tax and indirect tax as a percentage of the GDP are 11.51%, 3.27% and 8.16%, respectively. On average, the remittance inflows as a percentage of the GDP for SSA countries over the period 2000- 2021 is 8.44%.

Table no. 3 – Pairwise Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) lntax	1.00										
(2) lntrade	0.75***	1.00									
(3) lnrent	0.30***	0.67***	1.00								
(4) lnaid	-0.06	0.14*	0.37***	1.00							
(5) lnvulnerable	-0.45***	-0.50***	-0.20**	-0.12	1.00						
(6) govt_effective	0.66***	0.62***	0.20**	0.17**	-0.55***	1.00					
(7) inflation	0.09	0.22***	0.25***	0.01	0.13*	0.31***	1.00				
(8) lnpercapita	0.55***	0.49***	0.08	-0.01	-0.93***	0.56***	-0.17**	1.00			
(9) lnremittance	0.21***	0.16**	-0.06	0.03	-0.42***	0.11	-0.29***	0.37**	1.00		
(10) lnreer	-0.01	0.10	0.08	0.02	-0.09	-0.09	0.23***	0.10	0.31**	1.0	
(11) urbanpopl	0.04	0.01	0.07	0.08	0.67***	-0.09	0.20**	0.68**	0.29**	0.8	1.0

Table no. 3 shows that tax rate is positively correlated with trade openness, natural resource rent, remittance, GDP per capita, government effectiveness, inflation and urban population growth while it is negatively correlated with aid, vulnerable employment and exchange rate.

3.3 Panel Unit Root Test

3.3.1 Cross sectional dependence

Table no. 4 presents the results of cross-sectional dependence tests. The CD-test reveals that the presence of cross-sectional dependence at a 1% level for all the variables except for trade openness. Hence, in this study, Pesaran (2007) unit root tests were implemented to allow for cross-sectional dependence.

Table no. 4 – Cross-sectional dependence test

Variable	CD-test	p-value	corr	abs (corr)
lntax	11.490	0.000	0.534	0.534
lndirect	8.570	0.000	0.399	0.552
lnindirect	6.350	0.000	0.296	0.383
lnvulnerab~t	18.480	0.000	0.860	0.860
lnpercapita	9.910	0.000	0.461	0.650
lntrade	1.200	0.232	0.056	0.198
lnrent	6.870	0.000	0.319	0.466
lnaid	-0.530	0.599	-0.024	0.385
lnremittance	5.660	0.000	0.263	0.567
urbanpopul~h	0.620	0.535	0.029	0.611
inflation	4.900	0.000	0.228	0.418
govt_effec~s	0.170	0.863	0.008	0.402
lnreer	7.090	0.000	0.330	0.635

Notes: Under the null hypothesis of cross-section independence CD ~ N(0,1)
Source: authors' computations

This study performs Fisher type Choi (2001); Levin *et al.* (2002); Im *et al.* (2003); Pesaran (2007) unit roots tests. The Fisher test assumes the data are generated by an AR(1) process while the LLC test assumes the persistence parameters are uniform across cross-sections. Conversely, the Im–Pesaran–Shin test is based on the cross-sectional independence assumption. Lastly, Pesaran (2007) unit root test is based on the cross-sectionally augmented IPS (CIPS) test.

As shown in Table no. 5 total tax, direct tax and indirect tax variables strongly reject the null hypothesis at level for all the unit root tests. Similarly, remittance inflows reject the null hypothesis at 1 percent for all tests at level. We find that, aid to GNP reject the null hypothesis at level. Vulnerable employment, GDP per capita, trade openness, natural resource rent, government effectiveness, real exchange rate, and urban population growth rate series indicate the presence of unit root at level but stationary at first difference.

Table no. 5 – Panel unit root tests

Variables	Fisher type [Philips–Perron] (Inverse normal Z)	LLC (t*-stat)	IPS (w-stat)	Pesaran (2007) (z-stat)* Critical Value at 1%, 5%, and 10%
Level				
Log (Total Tax-GDP ratio)	-2.52***	-2.70**	-1.97**	-3.35***
	(0.0057)	(0.0034)	(0.0243)	
Log (Direct Tax/GDP)	-2.00**	-5.32***	-2.24**	-3.78***
	(0.0226)	(0.0000)	(0.0124)	
Log (Indirect Tax/GDP)	-2.10**	-3.39***	-2.90***	-3.78***
	(0.0175)	(0.0003)	(0.0018)	
Log (Remittance/GDP)	-4.38***	-3.22***	-1.93**	-3.47***
	(0.0000)	(0.0006)	(0.0265)	
Log (VulneraEmpl/GD)	0.42	-0.90	1.34	-2.29
	(0.6636)	(0.1820)	(0.9100)	
Log (GDP Per Capita)	0.37	-0.24	1.48	-2.08
	(0.6474)	(0.4030)	(0.9318)	
Log(TradeOpenness/GDP)	-1.78**	-1.18	-0.81	-2.56
	(0.0373)	(0.1182)	(0.2079)	

Variables	Fisher type [Philips–Perron] (Inverse normal Z)	LLC (t*-stat)	IPS (w-stat)	Pesaran (2007) (z-stat)* Critical Value at 1%, 5%, and 10%
Log (Natural/Resource/GDP)	0.16	-1.45*	-1.00	-2.18
	(0.5641)	(0.0723)	(0.1584)	
Log (Aid/GNP)	-3.89***	-3.03***	-0.20	-3.19**
	(0.0000)	(0.0012)	(0.4175)	
Government Effectiveness	-0.01	-0.09	0.47	-2.92*
	(0.4921)	(0.4614)	(0.6837)	
Log (REER)	-1.56*	-5.10***	-4.12***	-3.28**
	(0.0585)	(0.0000)	(0.0000)	
Urban population growth	1.39	-1.34*	0.81	-2.01
	(0.9179)	(0.0897)	(0.7918)	
Inflation	-5.70***	-0.56	-3.92***	-3.79***
	(0.0000)	(0.2875)	(0.0000)	
First difference				
Δ Log (Total Tax/GDP)				
Δ Lg (Direct TaX/GDP)				
ΔLog(IndirectTax/GDP)				
ΔLog(Remittance/GDP)				
ΔLog(Vulnerable Empl)	-6.01***	-7.88***	-3.48***	-3.50***
	(0.0000)	(0.0000)	(0.0002)	
Δ Log (GDP Per Capita)	-7.88***	-9.37***	-2.98***	-4.09***
	(0.0000)	(0.0000)	(0.0014)	
Δ Log (Trade Openness/GDP)		-9.17***	-5.58***	-4.72***
		(0.0000)	(0.0000)	
ΔLog(NaturalResource/GDP)	-7.42***		-5.78***	-4.56***
	(0.0000)		(0.0000)	
Δ Log (Aid GNP ratio)			-6.69***	
			(0.0000)	
Δ Government Effectiveness	-9.40***	-8.82***	-5.18***	
	(0.0000)	(0.0000)	(0.0000)	
Δ Log (REER)				
Δ Urban population growth	-4.29***		-3.89***	-3.20**
	(0.0000)		(0.0000)	
Δ Inflation		-8.34***		
		(0.0000)		

Note: values in parenthesis denote p-value.

Source: authors' computations

3.4 Cointegration Test

In this paper, Kao's cointegration test is used to test the hypothesis of cointegration among the variables. as depicted in Table no. 6, the result of Kao's cointegration test rejects the null hypothesis of no cointegration. This is true for the five tests statistics reported in the table and provides strong evidence that all panels in the data are cointegrated.

Table no. 6 – Kao cointegration test

Kao test for cointegration	Statistic	p-value
Modified Dickey Fuller t	-2.0588	0.0198
Dickey Fuller t	-1.7149	0.0432
Augmented Dickey Fuller t	-1.5596	0.0594
Unadjusted modified Dickey Fuller t	-2.3542	0.0093
Unadjusted Dickey Fuller t	-1.8384	0.0330

Source: authors' computations

4. RESULTS AND DISCUSSION

The remittance inflow is found to be positive and statistically significant on the total tax and tax structures such as direct tax and indirect taxes (Table no. 7). This finding supports the view that remittances inflow spurs total tax collection in SSA countries, and the finding is in line with the a priori expectations of Ebeke (2014); Asatryan *et al.* (2017). Furthermore, our result corroborates the findings of Yang (2008); Abdih *et al.* (2012) confirming the effect of remittance inflow is larger on indirect taxes than on direct taxes (Table no. 7). The remittances are mainly spent on consumption of receiving family members. They played a positive role in reducing the poverty and smoothing consumption in Sub-Saharan Africa (Akobeng, 2016). By spurring household consumption, remittances may result in an increase in bases of indirect taxes. The following potential channels can explain the positive effect of remittances on rise in direct taxes: Remittances stimulates the household consumption and consequently increase the domestic demand. Additionally, they can provide financial resources for small business. As a result, remittances-driven rise in economic activity could promote employing the idle production factors (Durand *et al.*, 1996; Woodruf and Zenteno, 2001). It would result in rise in employment, entrepreneurship activity and income of workers and firms which in turn translates into expansion of bases for income taxes.

Table no. 7 – PANEL ARDL results

VARIABLES	(1) total	(2) total	(3) direct	(4) direct	(5) indirect	(6) indirect
ECT	-0.808***		-0.609***		-0.745***	
	(0.140)		(0.201)		(0.221)	
Lntrade	0.1419**		-0.275**		0.0849*	
	(0.0761)		(0.126)		(0.0506)	
Lnrent	0.0718***		0.0579*		0.00658	
	(0.0177)		(0.0327)		(0.0204)	
Lnaid	-0.0215		-0.119**		0.00963	
	(0.0327)		(0.0481)		(0.0135)	
lnvulnerable_empt	0.146		0.601***		0.0272	
	(0.0989)		(0.151)		(0.0587)	
govt_effectiveness	0.110**		0.211***		-0.0694***	
	(0.0520)		(0.0688)		(0.0207)	
Inflation	-0.000992		-0.000681		-0.00179***	
	(0.000988)		(0.00113)		(0.000253)	
Lnpercapita	0.650***		0.646***		0.863***	
	(0.110)		(0.193)		(0.0719)	
Lnremittance	0.110***		0.149***		0.286***	
	(0.0324)		(0.0508)		(0.0125)	
Lnreer	-0.999***		-1.493***		-0.00197	
	(0.190)		(0.316)		(0.0831)	
urbanpopulationgrowth	0.154***		0.110**		0.233***	
	(0.0282)		(0.0483)		(0.0235)	
Constant	0.667***		1.586***		-5.067***	
	(0.106)		(0.488)		(1.551)	
Observations	147	147	147	147	147	147

The Sub-Saharan countries investigated in this study are low and lower middle-income economies. At this stage of economic development, the saving rate is typically low which translates to the scarcity of capital - one of the main obstacles to economic growth. Remittances could alleviate the capital scarcity problem thereby promoting the expansion of economic activities and employment. As a result, it could have a solid potential to increase the direct taxes in these countries. However, weakness of administrative capacity to enforce effective tax collection could result in missing of benefit from this opportunity.

An increase in natural resource rent raises total tax rate and direct tax in SSA countries while it is statistically insignificant for indirect tax (Table no. 7). Typically, governments monopolize resource revenue in the developing countries. They may leverage this revenue to create formal employment within the public sector. Consequently, rise in formal employment could expand bases for direct taxes.

Trade openness has a negative effect on direct tax but positive and significant on the indirect tax (Table no. 7). Tariffs and taxes on foreign trade have long been a key pillar of the fiscal revenue in developing countries. Notwithstanding, trade liberalization enforced a reduction in tariffs and tax revenues from foreign trade. Thereupon, increase in indirect taxes was introduced to compensate the loss from tariff and trade taxes in developing countries (Arezki *et al.*, 2021). This tendency could explain the positive association between trade openness and indirect tax revenue.

In addition, an improvement in GDP per capita boosts tax collection in all the specifications in the long run (Table no. 7). In line with Wagner`s law, rise in national income creates a demand for larger public sector that may necessitates more tax revenues. At the same time, increase in national income enables taxation of more of national income. Improvement in economic status raises the income over the subsistence level and reduce the resistance to the taxation.

Government effectiveness has a positive effect on tax collection in all specifications (Table no. 7). Tax collection requires the effective government apparatus and improvement in government effectiveness has a positive contribution to tax collection.

The real effective exchange rate exhibits a negative and significant effect in all specifications (Table no. 7). An increase in the REER would result in a decline in profit of firms in tradable sector and even considerable shrinkage of this sector if the appreciation of domestic currency persists over a long time. In this regard, it could result in decline in tax revenue, especially direct tax revenue via the contraction of employment and business in tradable sector (Niftiyev, 2021).

There is a positive and significant relationship between urban population growth and tax collection in all specifications (Table no. 7). Urbanization spurs the transition from informal to formal economy which makes a rise in tax collection (Chilima, 2005).

Foreign aid has a negative effect on the direct tax collection (Table no. 7). Presence of aid could allow the government to maintain tax collection lower due to political unpopularity of taxing.

Inflation is found to be negative and statistically significant for the indirect tax collection (Table no. 7). Persisting inflation may confine consumption and consequently reduce the base of indirect taxes.

Contrary to theoretical expectation, vulnerable employment has a positive effect on the direct tax revenue (Table no. 7).

5. CONCLUSION AND POLICY RECOMMENDATION

In this study, we evaluated the impact of remittances on the tax revenues in Sub-Saharan countries by employing the Panel ARDL model. Our findings reveal that remittances have a positive effect both on tax revenue and its structures- direct and indirect tax revenue. Given ongoing decline in foreign aid to the developing countries, remittance-driven tax revenue presents a worthwhile alternative source of revenue for governments.

Remittances both play a role in provision of finance for entrepreneurship and increasing demand for goods and services via increased consumption. This in turn could result in an increase in business activity and employment serving as an additional source of income tax revenue. In this consideration, active involvement of governments is required in realizing the potentials of remittances on economic activity. It would support economic and employment growth and increase tax revenue. Accompanying, it is necessary to implement the following measures. 1) Financial system should be restructured to channel remittance-capital towards productive activities. This can be achieved by designing the deposit policies that attracts the remittance into financial system making these funds available for business loans. Simultaneously, the lending practices should prioritize support for productive sectors.

Remittances mainly fuels the consumption, making it easier taxing them by indirect taxes. Consequently, via consumption channel, remittances increase the indirect tax revenue in Sub-Saharan countries. Given their technical easiness, it would result in exploitation of indirect taxes. In this regard, the design of tax structure should take balance between direct and indirect taxes into consideration. Additionally, tax policy should account for progressivity of indirect taxes. The taxes on necessities should be set minimal to ensure affordability for economically vulnerable segment of society.

Previous studies mainly highlight the positive effect of remittance on public finance via indirect taxes. Asatryan *et al.* (2017) is the only study to consider the effect of remittances on direct taxes and they conclude that such effect is not visible. This study demonstrates that remittances have a positive effect on tax revenue including *direct* and indirect taxes.

Remittances enable receivers to have individual solutions for overcoming poverty investment in health and education and other social risks. However, the effect of remittances on social institutions to overcome mentioned social challenges remains unquestioned. Future studies should analyze the interaction between remittances and social institutions in Sub-Saharan countries. Additionally, remittance-driven rise in tax revenue could create a rent-seeking incentives through public spending. Investigation of effect of remittance on rent-seeking behavior in Sub-Saharan Africa worths to focus on.

A considerable share of remittances is sent via informal channels in Sub-Saharan Africa, consequently unreported. The official statistics do not entail remittances that are sent via informal channels. Secondly, remittances can provide opportunities for governments to increase their tax revenues. However, a capable fiscal apparatus is necessary to benefit from this opportunity. The efficiency of tax administration is not considered in assessing the impact of remittances on tax revenues. These mentioned issues are the main limitations of this study.

ORCID

Gabriel Temesgen Woldu https://orcid.org/0000-0003-4092-4286

References

Abd Hakim, T., Karia, A., David, J., Ginsad, R., Lokman, N., & Zolkafli, S. (2022). Impact of direct and indirect taxes on economic development: A comparison between developed and developing countries. *Cogent Economics & Finance, 10*(1), 214-223. http://dx.doi.org/10.1080/23322039.2022.2141423

Abdih, Y., Chami, R., Ebeke, C. H., & Barajas, A. (2012). Remittances Channel and Fiscal Impact in the Middle East, North Africa, and Central Asia. *IMF Working Papers, 2012*(40). http://dx.doi.org/10.2139/ssrn.2135983

Acosta, P., Calderón, C., Fajnzlber, P., & López, H. (2009a). *The impact of remittances on poverty and human capital: Evidence from Latin American household surveys*.

Acosta, P., Lartey, E., & Mandelman, F. (2009b). Remittances and the Dutch disease. *Journal of International Economics, 79*(1), 102-116 http://dx.doi.org/10.1016/j.jinteco.2009.06.007

Aggarwal, R., Demirgüç-Kunt, A., & Peria, M. (2011). Do remittances promote financial development? *Journal of Development Economics, 96*(2), 255-264. http://dx.doi.org/10.1016/j.jdeveco.2010.10.005

Ahmadov, V. (2022). Remittances and competitiveness: a case study on Armenia and Georgia. *Hungarian Statistical Review, 5*(1), 94-108 http://dx.doi.org/10.35618/hsr2022.01.en094

Akobeng, E. (2016). Out of inequality and poverty: Evidence for the effectiveness of remittances in Sub-Saharan Africa. *The Quarterly Review of Economics and Finance, 60*, 207-223 http://dx.doi.org/10.1016/j.qref.2015.10.008

Alamdar, A., Ahmed, M., & Jadoon, A. K. (2022). Do migrant remittances promote corruption in Pakistan? iRASD. *IRASD Journal of Economics, 4*(1), 88–97. http://dx.doi.org/10.52131/joe.2022.0401.0063

Arezki, R., Dama, A. A., & Rota-Graziosi, G. (2021). Revisiting the Relationship between Trade Liberalization and Taxation. *CESIFO Working Paper, 9244*. http://dx.doi.org/10.2139/ssrn.3907727

Asatryan, Z., Bittschi, B., & Doerrenberg, P. (2017). Remittances and public finances: Evidence from oil-price shocks. *Journal of Public Economics, 155*, 122–137. http://dx.doi.org/10.1016/j.jpubeco.2017.09.009

Avi-Yonah, R. S., & Margailoth, Y. (2007). Taxation in Developing Countries: Some Recent Support and Challenges to the Conventional View. *Virginia Tax Review, 27*(1), 1-21.

Azizi, S. S. (2018). The impacts of workers' remittances on human capital and labor supply in developing countries. *Economic Modelling, 75*, 377–396. http://dx.doi.org/10.1016/j.econmod.2018.07.011

Bahl, R. W., & Bird, R. (2008). Tax Policy in Developing Countries: Looking Back—and Forward. *National Tax Journal, 61*(2), 279-301 http://dx.doi.org/10.17310/ntj.2008.2.06

Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance, 30*(11), 2931-2943. http://dx.doi.org/10.1016/j.jbankfin.2006.05.009

Chilima, A. (2005). Determinants of Tax Revenue Performance in Malawi: Evidence of Direction and Dynamic Inference by ARDL Modelling. *Yokohama International Social Sciences Research, 24*(3), 53-75.

Choi, I. (2001). Unit root tests for panel data. *Journal of international money and Finance, 20*(2), 249-272 http://dx.doi.org/10.1016/S0261-5606(00)00048-6

Darvas, Z. (2021). Timely measurement of real effective exchange rates. *Bruegel working paper, 15*.

Durand, J., Kandel, W., Parrado, E. A., & Massey, D. S. (1996). International migration and development in Mexican communities. *Demography, 33*, 249–264. http://dx.doi.org/10.2307/2061875

Ebeke, C. H. (2014). Do international remittances affect the level and the volatility of government tax revenues? . *Journal of International Development, 26*(7), 1039–1053. http://dx.doi.org/10.1002/jid.2979

Fayissa, B., & Nsiah, C. (2010). The impact of remittances on economic growth and development in Africa. *The American Economist, 55*(2), 92–103. http://dx.doi.org/10.1177/056943451005500210

Gocer, I., & Ongan, S. (2020). The Relationship between Inflation and Interest Rates in the UK: The Nonlinear ARDL Approach. *Journal of Central Banking Theory and Practice, 9*(3), 77-86 http://dx.doi.org/10.2478/jcbtp-2020-0037

Gonzalez-Garcia, M., Hitaj, M., Mlachila, M., Viseth, A., & Yenice, M. (2016). Sub-Saharan African migration: patterns and spillovers. *IMF, 2016*(009). http://dx.doi.org/10.5089/9781475546668.062

Gupta, A. S. (2007). Determinants of Tax Revenue Efforts in Developing Countries. *IMF Working Papers, 2007*(184). http://dx.doi.org/0.5089/9781451867480.001

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics, 115*(1), 53-74. http://dx.doi.org/0.1016/S0304-4076(03)00092-7

International Organization for Migration. (2022). World Migration Report 2022. Retrieved from https://worldmigrationreport.iom.int/wmr-2022-interactive/

Katircioglu, S. T. (2009). Revisiting the tourism-led-growth hypothesis for Turkey using the bounds test and Johansen approach for cointegration. *Tourism management, 30*(1), 17-20. http://dx.doi.org/10.1016/j.tourman.2008.04.004

Keen, M. (2012). Taxation and Development: Again. *IMF*.

Khan, R., Zeeshan Haque, M. I., Gupta, N., Tausif, M. R., & Kaushik, I. (2022). How foreign aid and remittances affect poverty in MENA countries? *Plos one, 17*(1). http://dx.doi.org/10.1371/journal.pone.0261510

Lartey, E. K. K. (2019). The effect of remittances on the current account in developing and emerging economies. Economic Notes, Review of Banking. *Economic Notes, Review of Banking. Economic Notes, 48*(3). http://dx.doi.org/10.1111/ecno.12149

Levin, A., Lin, C., & Chu, J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of econometrics, 108*(1), 1-24. http://dx.doi.org/10.1016/S0304-4076(01)00098-7

Mahdavi, S. (2008). The level and composition of tax revenue in developing countries: Evidence from unbalanced panel data. *International Review of Economics & Finance, 17*(4), 607-617 http://dx.doi.org/10.1016/j.iref.2008.01.001

Makina, D., & Mudungwe, P. (2023). *Patterns and Trends of International Migration within and Out of Africa*: In Routledge Handbook of Contemporary African Migration http://dx.doi.org/10.4324/9781003005551-7

Mansoor, A., & Quillin, B. (2006). Migration and Remittances, Eastern Europe and the Former Soviet Union. *World Bank*.

Ncube, M., & Brixiova, Z. (2013). Remittances and their macroeconomic impact: Evidence from Africa. *World Economy, 14*(4), 1–20.

Niftiyev, I. (2021). Dutch Disease Effects in the Azerbaijan Economy: Results of Multivariate Linear Ordinary Least Squares (OLS) Estimations. *HSE Economic Journal, 25*(2), 309-346 http://dx.doi.org/10.17323/1813-8691-2021-25-2-309-346

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of applied econometrics, 22*(2), 265-312.

Pesaran, M. H., Shin, Y., & Smith, R. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of American Statistical Association, 94*(446), 621-634 http://dx.doi.org/10.1080/01621459.1999.10474156

Rafindadi, A. A., & Yosuf, Z. (2013). An Application of panel ARDL in analysing the dynamics of financial development and economic growth in 38 Sub-Saharan African continents in Kuala. *In Proceeding-Kuala Lumpur International Business, Economics and Law Conference, 2*, 2-3.

Schneider, F., & Enste, D. (2013). *The Shadow Economy: An International Survey*: Cambridge University Press. http://dx.doi.org/10.1017/cbo9781139542289

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). *Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework in Festschrift in Honor of Peter Schmidt Econometric Methods and Applications* (Vol. Econometric methods and applications). New York. http://dx.doi.org/10.2139/ssrn.1807745

Singer, D. A. (2012). The Family Channel: Migrant Remittances and Government Finance. *MIT Political Science Department Research, 2012*(23). http://dx.doi.org/10.2139/ssrn.2125200

UNU-WIDER. (2023). UNU-WIDER Government Revenue Dataset. *United Nations University World Institute for Development Economics Research*. Retrieved from http://dx.doi.org/10.35188/UNU-WIDER/GRD-2023

Woodruf, C., & Zenteno, R. (2001). Remittances and Microenterprises in Mexico. *Graduate School of International Relations and Pacific Studies Working Paper*. http://dx.doi.org/10.2139/ssrn.282019

World Bank. (2023). World Development Indicators (WDI). *World Bank Group*. Retrieved from https://databank.worldbank.org/source/world-development-indicators

World Bank. (2024). Worldwide Governance Indicators (WGI). *World Bank Group*. Retrieved from https://www.worldbank.org/en/publication/worldwide-governance-indicators

Yang, D. (2008). International migration, remittances and household investment: Evidence from Philippine migrants' exchange rate shocks. *The Economic Journal, 118*(528), 591-630.