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A Pooled Mean Group Estimation of Taxation and Economic Growth in Sub-Saharan Africa

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ABSTRACT

The study investigates the impact of taxation on economic growth in Sub-Saharan Africa during the period 2000-2020 making use of annual panel data. The hypotheses were linearly modeled while adopting the pooled mean group estimation. Taxes on goods and services; taxes on income, profits, and capital gains; and taxes on international trade were the independent variables and gross domestic product (a proxy for economic growth) was the dependent variable. Findings reveal that taxes on goods and services have a negative and significant effect while taxes on income, profits, and capital gains; and taxes on international trade have a positive and insignificant effect on the economic growth of Sub-Saharan African countries in the long run. Given the positive but insignificant impact of taxes on income, profits, and capital gains; and taxes on international trade on economic growth, the study thus recommends that governments of Sub-Saharan African countries should reform the tax system and focus on expanding the tax base in order to increase the tax effort as well as improve efforts to eliminate fraud, tax evasion, corruption and improve the mechanisms for the collection of taxes

1. Introduction

Many developing countries confront trouble in generating adequate revenues needed for public purposes. In Sub-Saharan African (SSA) nations, the public budgets that are short of funds and ineffective use of government expenditure have restricted the investments in both human resources and capital infrastructure that is fundamental for attaining economic growth. Taxes constitute an imperative component of government revenue and the tax-to-GDP proportion is a key indicator that shows the capacity of the government to contribute to different development activities (Abomaye-Nimenibo, Michael, & Friday, 2018). In developing nations, taxation is a vital instrument; It makes it possible to fund the provision of public goods such as infrastructure, education, health care, and equity, which are fundamental for growth. Taxation also has a huge effect on savings, education decisions, production activities, job creation, investment, and trade development; as well as the choice of savings instruments and assets by investors (OECD, 2009). Tosun & Abizadeh (2005) outlined five possible mechanisms by which taxes can influence economic growth. First, taxes can hinder the rate of investment through taxes such as company and personal income tax, capital gains taxes. Second, taxes can retard development in labour supply by perverting labour-leisure choice in support of leisure. Third, tax policy can influence efficiency in production through its discouraging impact on research and development expenditures. Fourth, in a Harbinger system, taxes can lead to a flow of assets to other sectors that may have lower efficiency. At last, high taxes on labour supply can mutilate the proficient utilization of human capital. taxation is seen to decelerate economic growth and development In Sub-Saharan African Countries. Taxes policies, frequently, do not take under consideration the frail regulatory capacity available in the countries of Sub-Saharan Africa (Gbato, 2017). Confronted with this circumstance, nations within the region have set out on reforms directed at alleviating the burden of tax structures that obstruct economic growth. These reforms are by and large focused on creating a tax environment that stimulates savings, investment, entrepreneurship, and labour. They are not necessarily directed at bringing down the tax burden but to redefining the tax structure that would minimize the negative effect of taxes on economic growth while conserving fiscal revenues. In practice, these reforms have introduced tariff and tax rate decreases that have not continuously widened the domestic tax base. The degree to which taxation causes economic growth has proceeded to draw in empirical debate especially in developing nations and the basic issue is the tax structure.

2. Review of Related Literature

Empirical Literature

In the empirical literature, various studies have examined the relationship between fiscal policy and growth utilizing different approaches, leading to different results. Studies by Dowrick (1992), Skinner (1988) and Xing (2012) show that taxation negatively affects economic growth.

Dowrick (1992) on examination of the role of fiscal policy on economic growth in Organization for Economic Co-operation and Development (OECD) countries from 1960 to 1985, finds that a strong negative relationship exists between personal income taxation and output growth, but there was no impact of corporate taxes on output growth. Skinner (1988) examined taxation and output growth in Africa using data from 31 different African nations to conclude that personal income and corporate taxation led to significant decrements in output growth than average export and sales taxation. Angepoulos, Economides, and Kammas (2006) applied the panel's method to a sample of 23 OECD countries to study the impact of taxation on economic growth. They found that a negative and significant relationship exists between labor income and output growth, while corporate tax and capital income tax impacts growth positively. Arnold (2008) used the error correction panel technique, on data from 21 OECD countries over the period 1970-2005, to examine the effect of tax structures on economic growth. The study reveals that taxes on wealth positively impacts economic growth; particularly periodic taxes on real estate are the most favorable to growth. It was further revealed that individual income taxes is a significant disadvantage, and corporate tax has the greatest negative impact on GDP per capita. These findings agree with the study by Xing (2012) that revealed that the personal income tax, the corporate income tax, or the consumption taxes are associated with a lower per capita income level in the long term for OECD countries. Xing (2012) argues that to promote growth, evidence indicates that personal income tax is superior to corporate tax, or excise tax is superior to income tax.

Santiago and Yoo (2012) utilized an error correction model using data from 69 high-income, middle-income, and low-income countries from 1970 to 2009 to study the relationship between tax composition and growth. They found that income tax, social security contributions, and personal income tax have a strong negative link to growth. Their result also showed that the property tax has a strong positive relationship with growth. They further revealed that lower-income tax and higher value-added tax are also associated with faster growth. However, they state that their results apply to high- and middle-income countries, but not to low-income countries. Mehrara (2014) studied the effect of fiscal policy on economic growth and inflation using the Panel Vector Autoregression approach on data from 14 developing countries from 1990 to 2011. They found that short-term tax revenue shocks have no impact on long-term economic growth. They also found that indirect taxes are more effective than other types of taxes at the macroeconomic level. Hakim, Karia, and Bujang (2014) used the ArellanoBond GMM estimator to investigate the impact of indirect taxes (VAT) on economic growth in developing and developed countries. The result revealed that there exists a negative correlation between indirect taxes and economic growth in developing countries while a significant positive correlation exists between indirect taxes and economic growth in developed countries. They conclude that the introduction of the current flat-rate value-added tax is not very effective in generating higher incomes and stimulating growth in developing countries. They argue that current value-added tax implementation needs to be modified to generate higher incomes and economic growth without seriously impacting consumption and real per capita income in developing countries.

Arachi, Bucci, and Casarico (2015) also investigated the relationship between growth and tax structure in a sample of 15 Organization for Economic Co-operation and Development countries from 1965 to 2011, using implicit tax rates and tax rates as an indicator. The result revealed that when the hypothesis unobservable heterogeneity between countries is assumed, the association between tax structure and per capita GDP, in the long run, is not strong. These results are confirmed by Baiardi, Profeta, Puglisi, and Scabrosetti (2017). Gbato (2017) performed a regression analysis of the impact of taxation on long-term growth using data samples from 1980 to 2010 in 32 Sub-Saharan African countries. The results showed that taxation has no impact on long-term growth in the region. The results further revealed that a significant negative impact of indirect and direct taxes on individuals in the short run. Gbato (2017) argued that the use of taxation as a means of intervention in the region is inappropriate.

Hypothesis Development
Overall, the empirical literature consists of studies with contradictory results depending on the duration, the characteristics of the countries sampled, and the econometric methodology used. In addition, previous studies focus majorly on OECD countries and the results cannot be generalized to Sub-Saharan Africa. The debate over the relationship between taxation and economic growth remains uncertain and requires further investigation. Thus, we propose to test the following hypothesis:

1. There is no long-run relationship between taxation and economic growth in Sub-Saharan Africa

2. There is no significant relationship between taxation and economic growth in Sub-Saharan Africa

3. Research Methodology and Data Analysis

Data used for this study were sourced from World Bank. this study employs balanced panel data of 16 African countries sourced from the World Bank for the year 2000 to 2020. Data availability constraints strictly guided the choice of countries. The type of data to be used is secondary and includes data on Gross Domestic Product (GDP) as the dependent variable while Taxes on goods and services (TGS); taxes on income, profits, and capital gains (TIPC); and taxes on international trade (TIT) as the independent variables. This study draws majorly from Barro and Salai Martin's (1992) recent endogenous growth theory which can assess the impact of budgetary variables on economic growth. To establish the impact of taxation on economic growth in Sub-Saharan Africa, we specify the endogenous growth model is expressed in linear form as follows:

$$\ln GDP it = \beta 0 + \beta 1 \ln TGS it + \beta 2 \ln TIPC it + \beta 3 \ln TIT it + \mu$$

Where:

GDP-Economic growth

TGS-Taxes on goods and services (current LCU)

TIPC-Taxes on income, profits and capital gains (current LCU)

TIT-Taxes on international trade (current LCU)

μ = stochastic error term

β_0 = constant term

β_1… $\beta3$= the coefficients

To empirically analyze the above functional form, the study applies a unit root test utilizing the Levin, Lin, and Chu (2002) and the Im-Pesaran-Shin (2003) unit root test to determine the order of integration of the variables within the model. The Levin, Lin, and Chu (2002) unit test assumes a common autoregressive parameter for all cross-sections whereas the Im-Pesaran-Shin (2003) test is based on the presumption of variety of the autoregressive parameter for all cross-sections. The Kao residual cointegration test would be applied to verify the presence of a long-run relationship between the variables within the model and finally, the model is estimated utilizing the Pooled Mean Group (PMG) estimation technique presented by Pesaran, Shin, and Smith (1999). PMG estimator is an intermediate estimator that permits the intercepts, short-run coefficients, and error variances to be different across groups, but the long-run coefficients are constrained to be homogeneous (Kang, 2006). PMG can be applied when all variables in the model are both of the same order and different order of integration i.e. I(0) or I(1) series, or a combination of I(0) and I(1) series.

4. Result and Discussion

The table below shows the simple descriptive statistic of the variables in the model. Table 1 reveals that the mean value of GDP is 16.83 billion US$ in the sample data. The maximum is 87.78 billion US$ with a minimum of 775.78.23 million US$. The result shows a large disparity between the highest and minimum values which is due to differences in the economy of the various countries in the model. While the
minimum value of taxes on goods and services is 215.88 million US$, the maximum is 3030.6 billion US$. This disparity could also arise due to the differences in taxation systems in the Sub-Saharan African countries in the sample.

Table 4.1 Descriptive Statistics of the Variables

Variables	Mean	Minimum	Maximum
GDP	16825856897.84284	775780697.6766249	87778582964.13878
TGS	402515761658.2333	215883900	3030618626459.98
TIPC	288577536546.4779	212374700	1428749683004.18
TIT	217572379744.9078	315963133	1186016103514.3

Source: Authors' Computation (2021)
Note: The summary statistics were computed before taking the natural logs of the variables

The analysis proceeds to test the stationarity properties of the variables. The Levin, Lin, and Chu (2002) and the Im-Pesaran-Shin (2003) unit root test were employed to determine the order of integration of the variables within the model. The results are presented in Table 2 below. The results on the table show that all the variables are stationary at first difference.

Table 4.2 Panel Unit Root Test Result

Variables	Levin et al		Order of Integration	Variables	Im et al		Order of Integration
	Levels	First Diff.			Levels	First Diff.	
lnGDP	-5.69828**	-	I(0)	lnGDP	-1.90920**	-	I(0)
lnVAT	-2.30053**	-	I(0)	lnVAT	1.49278	-6.59118**	I(1)
lnTIPC	-2.15991**	-	I(0)	lnTIPC	-0.33361	-2.64787**	I(1)
lnTIT	-0.97438**	-	I(0)	lnTIT	0.08849	-3.04683**	I(1)

Source: Authors' computation, 2021
Notes: *Values reported are t-statistics value.*
*** denote significance 5 percent.*

The test was conducted with the assumption of intercept and no trend in both Levin et al (2002) and Im et al (2003) specification

From the result in table 4.2, it can be seen that not very clear if most of the variables are integrated at levels (I(0)) or first difference (I(1)) as both unit root tests provided varying results. It would then be economically plausible to conduct a panel cointegration test on selected countries in Sub-Saharan Africa. It is used to decide if there is a long-term relationship in the model.

The Kao cointegration test is used in this study to estimate the long-run relationship between the variables. The result in Table 4.3 shows that the existence of a long-run relationship among the variables in the model as the ADF t-statistical probability value is less than a 5 percent level of significance. The null hypothesis is therefore rejected signifying the existence of a long-run relationship.

Table 4.3 Kao Residual Cointegration Test Result

ADF t-statistic	Probability
-1.494429	0.0475**

Source: Authors Computation, 2021
Note: *Null Hypothesis: No cointegration.*
*** denotes significance at 5 percent*

Due to the existence of a long-run relationship in the model, this paper employs the Pooled Mean Group (PMG) estimator to analyze the impact of taxation on economic growth in Sub-Saharan Africa. PMG estimator is recommended by Pesaran, Shin, and Smith (1999) as an important technique in estimating the non-stationary dynamic panels with parameters that are heterogeneous across groups. PMG specifically allows short-run adjustment is allowed to be country-specific. Table 4 shows the result of the PMG dynamic heterogeneous panel procedure. Akaike information criterion selected ARDL (2, 1, 1, 1) as the optimal lag length.

Table 4.4 PMG Regression Result

Dependent Variable: GDP	PMG
Convergence coefficient	-1.110960 (0.0000) **
Long-run Coefficients	
lnTGS	-0.004555 (0.0000) **
lnTIPC	1.362272 (1.362272)
lnTIT	0.003395 (0.4296)
Short-run coefficient	
Δ (lnGDP(-1))	0.231297 (0.0221)
Δ (lnTGS)	0.011293 (0.8932)
Δ (lnTIPC)	0.037154 (0.2868)
Δ (DlnTIT)	0.255728 (0.2975)
Auxiliary Parameters	
Hausman Test	1.260876 (0.7384)
No. of Countries	12
No. of Obs	216

Source: Authors' Computation, 2021
Note: Standard errors are in parenthesis.
t-statistics is in square bracket.
**denotes significance at 5 percent.

The independent variables TIPC and TIT reveal a positive impact on growth in Sub Saharan Africa at the 5 percent level of significance and TGS shows a significant negative impact on economic growth in the region at a 5 percent level of significance. This reveals that taxes on goods and services does not stimulate growth in the region while Taxes on income, profits, and capital gains; and Taxes on international trade are associated with faster growth in the long run. Distinctively, an increase in the present TGS (lnTGS) will lead to a 0.45 percent decrease in economic growth. In the short run, TGS is seen to have a positive insignificant impact on growth. This finding is also true for TIPC and TIT. The three types of tax exhibit an insignificant impact on growth in Sub-Saharan Africa in the short run. They are all seen to stimulate economic growth in Sub-Saharan Africa in the Short-run**.** The Hausman test result is insignificant at a 5 percent level of significance showing that we fail to reject the null hypothesis of long-run homogeneity which indicates the existence of a long-run homogeneous relationship amongst the countries in the model. The Hausman test result supports the use of the PMG technique. The convergence coefficient, which represents the error correction term, has the expected negative sign and is significant at 5 percent for our chosen PMG model. The result shows that the average value of the convergence coefficient is -1.11096.

Conclusion

This study sought to ascertain the impact of taxation on economic growth in Sub-Saharan Africa. To achieve this goal, this study estimated a Sub-Saharan Africa data set using the pooled mean group estimator. The Kao cointegration results established the presence of a long-run relationship between taxation and economic growth in Sub-Saharan Africa in the study period. The results also draw attention to the significant negative impact of taxes on goods and services for the total sample. Evidence arising from this study show taxes on income, profits, and capital gains; and taxes on international trade are drivers of economic growth in Sub-Saharan Africa in the long run. This agrees with the endogenous growth theory that predicts that the driving force of economic growth depends on internal factors such as the effect of taxation (Ugwunta and Ugwuanyi, 2015). The study, therefore, recommends that the government of Sub-Saharan African countries should establish an appropriate tax system and ensure the optimal contribution of taxation to economic growth. Notably, the government should improve efforts to eliminate fraud, tax evasion, corruption and improve the mechanisms for the collection of taxes.

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