

IMPACTS OF TAXATION ON ECONOMIC GROWTH IN AFRICA IN 2008-2018 - PANEL DATA ANALYSIS

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ABSTRACT

The debate over the effectiveness of taxes as a tool for promoting economic growth still needs to be solved, with several studies indicating mixed effects of taxes on economic growth. The purpose of this research is to assess the impact of taxation on economic growth in Africa. The study spans eleven years, from 2008 to 2018, and includes multiple variables for 21 African countries. GDP is a dependent variable used as a proxy for economic growth. Numerous GDP-determining predictors were utilized as independent variables; these variables were categorized into three groups: The supply side consists of human capital (population and literacy rate) and economic activities (trade and services). Demand side variables include consumption, government expenditures, net exports, and gross capital formation. Lastly, taxation variables consist of tax revenue, corporate tax rate, number of tax payments, personal income tax, and taxes on income, profits, and capital gains. The study conducted preliminary tests, including descriptive statistics, correlation matrix, and pooled least square estimations for panel data. Based on the results, all macroeconomic determinants have statistically significant effects on GDP except trade. Tax revenue and corporate tax rate positively affect GDP, while personal income tax rate and tax on income, profit, and capital gain negatively affect GDP. In general, taxation has a favorable effect on the economy of African countries because emerging countries use taxation as an internal key to generate revenue and improve economic growth.

Keywords: Economic Growth, Panel Data Analysis, Taxation

JEL: H2; H20; O4; O40

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Introduction

In almost all countries, taxation is the government's primary source of revenue. The revenue generated for government expenditures is not the only purpose of taxation; taxation contributes to economic equality, economic security, and the allocation of resources while also accelerating economic growth (Kadenge, 2021). Tax is a financial charge or other levy imposed by a state or the functional equivalent of a state on a taxpayer (an individual or legal

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entity). Generally, tax is recognized as a significant source of revenue for funding numerous government programs (Edame & Okoi, 2014). Every tax must be grounded on a statute with legal force; no reasonable tax can be imposed without a valid statute (Olufemi et al., 2018).

Countless studies have been conducted to estimate the impact of taxes on economic growth. With so many studies focusing on a limited number of datasets, something resembling a consensus would have emerged (Alinaghi & Reed, 2020). Failure to account for other factors influencing economic growth, such as government spending and monetary policy, may understate or overstate the impact of taxes on growth. Some tax changes, such as corporate tax changes, may have more excellent long-run effects than short-run effects, and a study with only a limited time series would miss this effect. Finally, tax reforms have many moving parts: Certain taxes may increase, while others may decrease. It can make it challenging to categorize specific reforms as net tax increases or decreases, leading to incorrect interpretations of how taxes affect growth (Durante, 2021).

The effect of taxation can be negative or positive on economic decisions influencing the growth rate. Consequently, increased taxes reduce investment returns (human and physical capital) and Research and Development (R&D). It implies that less capital is saved and fewer new ideas are developed, leading to slower growth. Taxation is also advantageous. Government spending on infrastructure, education, and health care can enhance productivity; taxation provides the wherewithal to finance such activities and can contribute to a rise in the economic growth rate (Myles, 2009).

Taxation is an essential factor for the growth of African economies. Most less developed countries have few sources for generating income, such as agriculture, so they rely on taxation to boost economic growth. However, there needs to be more consistency in the findings regarding the impact of taxation on economic growth. As a result of this factor, this Research was conducted to investigate the impact of taxation on economic growth in Africa by controlling variables of demand and supply. The study covers eleven years between 2008-2018; the years were selected based on data availability. The study analyzed several variables in 21 African countries, selected according to their income level and data availability, as shown in Table 1.

Table 1: Explanatory Countries According to The Level of Income

Low Income Countries	Lower Middle-Income Countries	Upper Middle-Income Countries	High Income Countries
Ethiopia	Angola	Botswana	Seychelles
Mali	Congo Rep,	Mauritius	
Madagascar	Egypt	South Africa	
Mozambique	Ghana	Namibia	
Togo	Kenya		
	Lesotho		
	Morocco		
	Nigeria		
	Tanzania		
	Zimbabwe		

For the current 2023 fiscal year, low-income economies are defined as those with a GNI per capita of 1,085USD or less, calculated using the World Bank Atlas method in 2021; lower-middle-income economies are those with a GNI per capita between 1,086 USD and 4,255 USD. Upper middle-income economies have a GNI per capita between 4,256USD and 413,205USD, and high-income economies have a GNI per capita of 13,205USD or more.

Taxation and Economic Growth Africa Context

OECD (2020) has collated tax revenue data for countries worldwide, along with 30 African countries where average tax revenue as a percentage of GDP is lower than in other areas. Averaging out, the tax-to-GDP ratio for these 30 countries was 16.5% lower than the OECD's 34.3% and the 23.1% of Latin America and the Caribbean (LAC).

Several African countries depend heavily on non-tax revenue, such as foreign assistance (Kenya) and rents from natural resources, such as oil in Nigeria and Angola and bauxite in Zambia (JICA, 2013). These countries' economies are volatile; tax revenue cannot stabilize and predict their finances. The nagging question is whether tax revenue as a percentage of national income is increasing in African nations. It is significant given the recent crash in oil and other commodity prices (Onakoya et al., 2017).

However, Graham & Bamba (2020) argued that Africa's current tax system still needs to generate the necessary revenues. The weak link is a need for more domestic revenue mobilization. Why? African countries use a tax system borrowed from developed countries that is unsuitable for African economies where informality is high, and imports are primarily of necessities such as food and fuel, which are difficult to tax.

The idea that taxes influence economic growth has become politically divisive, with much debate in the press and among advocates (Ogbonna & Appah, 2016). It is due to different views regarding the causes of economic growth. Some believe in Keynesian taxation theory (demand-side factors), others believe in Neoclassical taxation theory (supply-side factors), and those believe in a blend of the two or something else altogether. Critical parameters such as historical and geographical variation also illuminate the debate. However, the economy is sufficiently complex that data can support almost any theory (Mcbride, 2012).

Literature Review

The study provides a further understanding of the impact of taxation on economic growth in African countries. Tax is an obligatory contribution to state revenue levied by the government on individual income and corporate earnings or added to the price of specific goods, services, and transactions (Oxford Dictionary, 2023). Every tax must be grounded on a statute with legal force. A reasonable tax can only be imposed with a valid statute (Okafor, 2012). There are two main tax categories: revenue taxes and correctional taxes. The government relies on revenue taxes to cover its expenditures. The purpose of corrective taxes is to encourage or discourage certain behaviors (UKEssays, 2018). In 2018 tax revenues collected by African countries from goods and services accounted for 51.9%, value-added tax (VAT) accounted for 29.7%, corporate taxes accounted for 19.2%, individual taxes 17.5%, social insurance, and property taxes contributed less, at 7.2% and 1.6%, respectively (Enache, 2020).

The classical taxation theory predominated for a very long time. As a result, taxes were only given the fiscal responsibility of raising state revenue (Smith, 2015). Taxation is a stimulant for economic growth because it raises the value of effective demand, encourages investment, and expands the economy (Ozo-Eson, 2005). Keynes's taxation theory, based on

demand-side factors, proposed that surplus savings be deducted through taxation. Therefore, the government must intervene to reduce income savings through taxation in order to finance investments and cover state expenditures. However, the neo-classical taxation theory based on supply-side factors suggests that a restricted taxation policy would allow the market to provide independently, significantly expanding the taxation basis (Ortiz-Ospina & Roser, 2016).

Babatunde et al. (2017) carried out research between 2004 and 2013 into how taxation affected Africa's GDP growth. GDP and tax were shown to be normally distributed and stationary using a pre-estimation test of descriptive statistics and unit root tests. This research shows that tax revenue boosts economic growth in Africa by positively correlating with GDP.

Andrašić et al. (2018) studied the effect of taxes on economic growth in 35 OECD countries from 1996 to 2016. The empirical analysis included a panel fixed effect model that estimated the effect of tax revenue on growth, keeping in mind that taxes are not the only factor influencing economic growth; the analysis also considered inflation, unemployment, government spending, and investment. They found a positive relationship between tax revenue and economic growth.

Keho (2013) used Data Envelopment Analysis (DEA) to discover that higher taxes are associated with lower economic growth. Thus, shifting the tax burden from direct to indirect taxes will likely boost growth. In contrast, Taha et al. (2011) discovered in their study that taxation changes do not affect economic growth.

Nguyen & Darsono (2022) focus on the relationship between tax revenue, investment, and economic growth while accounting for the non-linear effects of tax revenue. The study discovers a negative impact on economic growth from tax revenue.

Data and Research Methods

The study employed exploratory and ex-post facto designs. The exploratory design collected relevant materials from textbooks and journal articles; in contrast, the ex post facto design was chosen because it does not allow the study to control the variables, mainly because they have already occurred and cannot be manipulated (Ogu, 2021). The sample consists of 21 African countries. The data cover the period from 2008 to 2018. This study involves secondary data from The World Bank database, World Development Indicators, Tax Foundation, and Human Development Indexes.

Data Analysis and Empirical Model

The study analyzed the data obtained by using both descriptive statistics tools as well as econometric tools. Descriptive statistics provide the researcher with a prior understanding of the data. Before making any estimates, examining and comprehending the data is critical. Also, the study employed a correlation matrix that shows how data are related and pooled least square estimation model for panel data and will be analyzed by STATA 14.

Wooldridge (2018) stated that the ordinary least squares (OLS) method is used when creating econometric regression models. The function will be divided into three parts to determine the relationship between Taxation and economic growth in Africa. This study employed several predictors to determine GDP, divided into the supply side, which contains variables such as population, literacy rate, and economic activities such as trade and services. The demand side contains variables such as consumption, Government expenditure, Net exports, and Investment. Lastly, Taxation contains variables such as tax revenue, number of tax payments, corporate tax rate, and personal income tax.

The working function is written as:

$$GDP = f(XS_{it}, XD_{jt}, T_{it}) \quad (1)$$

Where:

- t : Denotes period;
 XS_i : A set of variables on the supply side. That is population, literacy rate, trade, and services.
 XD_j : A set of variables on the demand side. That is, consumption, Government expenditure, Net exports, and Investment.
 T_i : Taxation, which represents (Taxes on income, profits, and capital gains; Number of tax payments; Corporation Tax; and Personal income tax).

Therefore, the general equation is

$$GDP_{it} = \beta_0 + \beta_{ij} \sum_{j=1}^5 Taxation + \beta_{ik} \sum_{k=1}^4 SupplySide + \beta_{il} \sum_{l=1}^4 DemandSide + \epsilon \quad (2)$$

Description:

- GDP : Gross Domestic Product
 $Taxation$: j= 1 - Tax revenue
 2 - Number of tax payments
 3 - Corporate tax rate
 4 - Personal income tax rate
 5 - Taxes on income, profit, and capital gain
 $SupplySide$: k= 1 - Number of populations
 2 - Literacy rate
 3 - Service
 4 - Trade
 $DemandSide$: l= 1 - Consumptions
 2 - Government Spending
 3 - Net exports
 4 - Investments
 Σ : Denotes the summation of the variables
 i : Denotes the number of countries
 t : Denotes the number of years
 β_0 : Denotes the intercept (the predicted value of Y when X is zero)
 $\beta_j, \beta_k, \beta_l$: the slope/regression coefficient (i.e., the rate at which Y is expected to change as X increases/decreases). Whereby:
 β_j is a coefficient of taxation
 β_k is a coefficient for the supply side variables
 β_l is a coefficient for the demand side variables. ϵ is the error term with zero expectation ($E(\epsilon)=0$). (That is, the variation of the regression coefficient is expected to be zero)

Finding and Discussion

Descriptive Statistics

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Kurtosis	Skewness	Obs
GDP constant	9.33E+12	2.19E+13	6E+09	1.14E+14	7.968635	2.958342	231
Tax revenue	8.57E+11	2.1E+12	8.89E+08	1.51E+13	23.27588	4.539447	214
Number of tax payments	33.64602	14.20574	6	61	-0.38067	-0.18251	226
Corporate tax rate	28.59186	5.32457	15	40	0.312958	-0.72614	221
Income tax rate	28.5065	10.9095	3	51.5	-0.14756	-0.32305	220
Taxes on income, profits, and capital gains	3.28E+11	7.6E+11	2.07E+08	5.06E+12	19.08555	4.101181	213
Population	33520993	41084817	86956	1.96E+08	4.347287	2.067311	231
Literacy rate	5053662	5667973	8624	27889388	4.407488	1.991502	189
Service	4.08E+10	7.01E+10	5.96E+08	2.96E+11	4.160134	2.292037	231
Trade	82.19482	39.6404	20.72252	225.0231	1.621794	1.210438	228
HH Consumption	5.22E+10	8.65E+10	4.49E+08	3.92E+11	3.73346	2.185415	226
Government spending	1.03E+10	1.67E+10	90394800	8.34E+10	7.413313	2.699013	226
Net export (Net trade)	-2.6E+09	7.74E+09	-3.5E+10	2.6E+10	5.024629	0.003841	228
Gross capital formation	1.63E+10	2.13E+10	0	8.64E+10	1.7333	1.634524	229

The descriptive statistics on the variables used in the analysis summarize the statistics: sample means, standard deviation, skewness, kurtosis, and maximum and minimum of the variables. It consists of 231 observations in total, ranging from the year 2008 to 2018. GDP constant registers the highest mean of 9.33E+12 with a standard deviation of 2.19E+13, minimum of 6E+09, maximum of 1.14E+14, kurtosis of 7.968635 and skewness of 2.958342. At the same time, net export indicates the lowest mean of -2.6E+09, with a standard deviation of 7.74E+09, minimum of -3.5E+10, maximum of 2.6E+10, kurtosis of 5.024629 and skewness of 0.003841. All variables have positive values except net export, consisting of positive and negative values.

Correlation Matrix Relationship Between GDP Constant Price, Fiscal Instruments, and Supply Side

Table 2 shows how the variables in the sample data from 2008 to 2018 are related. According to the table, the coefficient of correlation of a variable to itself is 1.0000. It indicates that a variable has a perfect relationship with itself. A significant positive relationship exists between GDP constant and Tax revenue ($r=0.761$, $p<0.01$). GDP constant and number of tax payments were found to have a significantly weak positive relationship ($r=0.343$, $p<0.01$). GDP constant and corporate tax rate have an insignificant relationship. GDP constant and personal income tax rate have an insignificant relationship. GDP constant and Tax on income, profit, and capital gain have a significant positive relationship ($r=0.708$, $p<0.01$). GDP constant and population has a significant moderate positive relationship ($r=0.529$, $p<0.01$). GDP constant

and literacy rate have a significant moderate positive relationship ($r=0.559$, $p<0.01$). GDP constant and services have a significantly weak positive relationship ($r=0.294$, $p<0.01$). GDP constant and share of trade have a significant negative relationship ($r= -0.395$, $p<0.01$).

Table 2: Pairwise Correlations for Fiscal Instrument and Supply Side

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) GDP constant	1.000									
(2) Tax revenue	0.761*** (0.000)	1.000								
(3) No. of tax payments	0.343*** (0.000)	0.235*** (0.001)	1.000							
(4) Corporate tax rate	0.049 (0.470)	0.020 (0.772)	0.323*** (0.000)	1.000						
(5) Income tax rate	-0.055 (0.413)	-0.056 (0.430)	0.107 (0.118)	0.282*** (0.000)	1.000					
(6) Tax on income, profit, and capital gains	0.708*** (0.000)	0.971*** (0.000)	0.206*** (0.003)	0.090 (0.204)	-0.060 (0.398)	1.000				
(7) Population	0.529*** (0.000)	0.081 (0.240)	0.045 (0.498)	0.040 (0.553)	-0.002 (0.982)	0.087 (0.207)	1.000			
(8) Literacy rate	0.559*** (0.000)	0.163** (0.030)	0.116 (0.116)	0.077 (0.306)	0.064 (0.398)	0.172** (0.022)	0.987*** (0.000)	1.000		
(9) Service	0.294*** (0.000)	-0.037 (0.588)	-0.256*** (0.000)	0.054 (0.420)	0.098 (0.147)	0.022 (0.754)	0.720*** (0.000)	0.655*** (0.000)	1.000	
(10) trade	-0.395*** (0.000)	-0.295*** (0.000)	-0.119* (0.077)	0.103 (0.131)	-0.084 (0.215)	-0.286*** (0.000)	-0.610*** (0.000)	-0.607*** (0.000)	-0.434*** (0.000)	1.000

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Correlation Matrix Relationship Between GDP Constant Price and Demand Side

Table 3: Pairwise Correlations for Demand Side

Variables	(1)	(2)	(3)	(4)	(5)
(1) GDP constant	1.000				
(2) Household consumption	0.340*** (0.000)	1.000			
(3) Government spending	0.092 (0.169)	0.827*** (0.000)	1.000		
(4) Net export	0.094 (0.156)	-0.175*** (0.009)	-0.045 (0.502)	1.000	
(5) Gross capital formation	0.326*** (0.000)	0.926*** (0.000)	0.891*** (0.000)	-0.062 (0.355)	1.000

Table 3 shows that GDP constant and household consumption have a significant weak positive relationship ($r=0.34$, $p<0.01$). GDP constant and government expenditure are insignificant. GDP is constant, and net exports are insignificant. GDP constant and gross capital formation have a significant weak positive relationship ($r=0.326$, $p<0.01$).

Pooled Least Square (PLS) Model Estimation**Table 4: GDP Constant Price, Disaggregation by GDP Above and Below the Mean GDP on Fiscal Instruments and Supply Side**

List of Independent Variables	Dependent Variable is GDP Constant Price 2010=100		
	All Sample	Sample with GDP Below Average	Sample with GDP Above the Average
Constant	-2.544e+12 (3.131e+12)	7.112e+11* (4.267e+11)	-2.193e+13** (1.052e+13)
Total Tax Revenue (\$PPP2010=100)	3.204*** (0.414)	2.549*** (0.223)	-1.634 (1.612)
Number of Tax Payment	3.235e+10 (1.986e+10)	2.846e+08 (2.357e+09)	1.965e+12*** (4.158e+11)
Corporate Tax Rate	1.859e+11*** (5.164e+10)	1.354e+10* (7.156e+09)	-2.126e+12 (2.013e+12)
Personal Income Tax Rate	-5.134e+10 (5.080e+10)	-1.217e+10** (6.193e+09)	2.060e+12 (2.362e+12)
Tax on income, profit and capital gain	1.586 (1.127)	-2.504*** (0.322)	8.812** (3.995)
Population	257,297*** (56,781)	28,430** (14,050)	1.170e+06*** (266,637)
Literacy Rate	-658,788* (391,414)	-40,480 (77,829)	-6.347e+06*** (2.215e+06)
Service	-9.212 (6.828)	-0.252 (1.041)	-181.9*** (54.06)
Trade	-8.522e+09 (7.533e+09)	-1.393e+09 (8.843e+08)	-4.055e+10 (1.056e+11)
Observations	156	132	24
Number of id	20	17	3

Tax revenue is a significant 1% level and positively affects all and below mean GDP countries. They are increasing 1 US Dollar tax revenue. It leads to 3,204 USD in GDP. Tax revenue is essential for African countries' economic growth. Less developed countries have few sources for generating income, such as agriculture, so they rely on taxation to boost economic growth. A study by [Andrašić et al. \(2018\)](#) investigated tax revenue relation to GDP in 35 OECD countries from 1996 to 2016 using a fixed effect model. Findings discovered that tax revenue boosts GDP by 0.29% ([Takumah, 2014](#)). The estimations detected that tax revenue favorably impacts economic growth. According to [Babatunde et al. \(2017\)](#) findings, tax revenue is significant at a 5% level and positively related to GDP. That is, tax revenue promotes African economic growth. They stated that both high and low levels of taxation benefit economic growth, as supported by the economic effect of Ibn Khaldun's taxation theory, which acknowledges that tax rates positively impact production, output, and economic performance.

The corporate tax rate is positively significant at a one percent level in general and a 10 % below mean GDP. According to the study analysis, the corporate tax rate is African countries' most crucial taxation component. Corporate tax was insignificant in the above mean GDP countries, implying a weak tax structure and system in African countries, whereby formal sectors are subjected to a high corporate tax rate of 29% on average, which leads

to informal sectors and tax evasion. According to [Khalil's \(2019\)](#) research paper, Canonical correlation, correlation tests, and normality tests are used to assess the data's strength; the direct contribution of corporate tax to GDP and GDP per capita is quite positively significant, along with the employment rate, labor force, industrial production, and so on.

The income tax rate is significant at a 5% level and negatively affects GDP in countries below the mean GDP. This finding implies that the personal income tax rate is high in lower-income countries compared to the level of economic activities in these countries; hence, it reduces labor incentives to work, save, and invest, leading to decreased economic growth. These results go along with [Kaewsopa et al. \(2022\)](#), who investigated the impacts of personal income tax on GDP in China and Thailand following Thailand's 1997 economic crisis. The annual data was analyzed using the ordinary least squares (OLS) method. They discovered a positive effect on China's economy and a negative effect on Thailand's economy.

The number of tax payments is insignificant in general and below mean GDP countries, implying that the number of tax payments implemented by the government to taxpayers is high in these countries. Also, low-income countries depend on subsistence production, that is, goods for household consumption that do not hold high value to contribute to tax payments and revenue, hence no effect on economic growth. The number of tax payments is significant at a 1% level, positively affecting GDP in the above mean GDP countries. It shows that the number of tax payments is more applicable to high-income countries because their economic activities are valuable with high productivity and can foster economic growth by a high percentage.

Tax on income, profit, and capital gains are significant at a 1% level and have a negative effect in below-mean GDP countries and at a 5% level and have a positive effect in above-mean GDP countries. Thus 1% increase in income, profit, and capital gains tax lead to a 2.5% decrease in GDP in below mean GDP countries and 1% increase in income, profit, and capital gains tax leads to 8.8% increase in GDP in above mean GDP countries. It goes with [Pamba's \(2022\)](#) conclusion that Taxes on income, profits, and capital gains (CGT) have all been estimated to have a negative short and long-run coefficient. According to the findings, a 1% increase in government CGT would constrain South Africa's GDP growth over the study period. [Hungerford \(2010\)](#) argued that capital gains tax cuts are unlikely to impact long-term output or the path to long-run output (i.e., economic growth). A capital gains tax cut would primarily benefit high-income taxpayers, who benefit the most from any tax cut. A temporary capital gains tax cut could harm short-term economic growth.

The population is significant at a 1% level in general and in above-mean GDP countries, and at a 5% level in below-mean GDP countries with a positive effect on GDP ([United Nations, 2019](#)). Africa's population is the fastest growing globally and is expected to increase by roughly 50% over the next 18 years. Africa's population will remain the youngest in the world by 2035. Concurrently, the working-age population (15 to 64 years) is expanding by approximately 35% in 2019 and 43% in 2050 relative to the non-working age group. The report stated that this condition can promote higher economic growth from the demographic dividend. [Peterson's \(2017\)](#) study supports the notion that population is an essential factor in economic growth; it contributes to higher per capita GDP growth. He also argued that population growth rates increase more than 3% of the world's annual economic growth.

The literacy rate based on primary school enrolment significantly affects GDP at a 10% level with a negative effect on GDP in all sample countries; the literacy rate is insignificant in countries with below mean GDP, and in above mean GDP countries, it is significant at 1%.

Desai's (2012) study found that better education will result in higher GDP because human capital is a crucial growth driver. The result shows a strong positive correlation between literacy and GDP, implying that literacy significantly impacts India's economic progress. Also, Hanif & Arshed (2016) suggested that it may be beneficial for less developed countries to invest in education as a productive tool for governments to boost the country's GDP growth. However, according to his findings, increasing primary enrolment will only increase the economy's liabilities because these individuals still need to be more skilled to obtain better or more productive jobs.

Services are significant in above mean GDP countries with a negative effect on GDP. These findings go with significant work by Baumol (1967), which shows that increasing the service sector's share negatively affects economic growth. Dutt & Lee (1993) frequently claim that a relative service sector expansion is detrimental to economic growth. This study examines cross-section country-level data from three decades - the 1960s, 1970s, and 1980s - to see if this negative relationship is reflected in the data. It is discovered that the effect is either negative or positive depending on how the service sector's role is measured. Still, there is a strong case that the effect is usually negative.

Trade is insignificant; it does not affect GDP as a proxy for economic growth. According to Were (2015), trade positively impacts economic growth in developed countries, which is insignificant in less developed countries, including Africa. Kim (2011) investigated whether trade improves living standards and economic growth. The finding shows a significant positive impact on the economy and actual income in industrialized countries and insignificant in less developed countries.

Table 5: GDP Constant Price, Disaggregation by Population Above and Below the Mean Population

List of Independent Variables	Dependent variable is GDP Constant Price 2010=100		
	All Sample	Sample with Population Below Average	Sample with Population Above Average
Constant	-2.544e+12 (3.131e+12)	1.722e+12** (7.398e+11)	-1.721e+14*** (2.881e+13)
Total Tax Revenue (\$PPP2010=100)	3.204*** (0.414)	2.098*** (0.191)	7.616* (4.040)
No. tax payments	3.235e+10 (1.986e+10)	-7.565e+08 (6.758e+09)	1.966e+12*** (4.083e+11)
Corporate Tax Rate	1.859e+11*** (5.164e+10)	-3.184e+09 (1.889e+10)	9.638e+11 (6.191e+11)
Personal Income Tax Rate	-5.134e+10 (5.080e+10)	-8.225e+09 (1.411e+10)	1.142e+12 (7.421e+11)
Tax on income, profit and capita gain	1.586 (1.127)	-2.164*** (0.557)	-5.742 (11.34)
Population	257,297*** (56,781)	7,718 (51,498)	910,625** (463,961)
Literacy Rate	-658,788* (391,414)	289,210 (258,594)	-5.047e+06 (3.434e+06)

List of Independent Variables	Dependent variable is GDP Constant Price 2010=100		
	All Sample	Sample with Population Below Average	Sample with Population Above Average
Services	-9.212 (6.828)	-21.26* (11.38)	67.96*** (23.80)
Trade	-8.522e+09 (7.533e+09)	-2.655e+09 (2.076e+09)	9.014e+11*** (1.801e+11)
Observations	156	113	43
Number of id	20	14	7

On the supply side of the model, the population can influence all factors within the model: GDP, literacy rate, service, and trade. The population is significant at 1% level in general and 5% in above mean population countries. The characteristics and patterns of the population appeared differently in each country group. In general, countries with high income levels may be more successful in converting more of their citizens into human capital than countries with low-income levels. So, people in high-income countries can contribute more to their respective GDP growth (Hosen, 2019). Rapid population growth in low-income countries will likely be detrimental in the short and medium term because it results in many dependent children. In the long run, these countries will likely benefit from a demographic dividend as these young people mature into productive adults. It has also been argued that population growth caused by high levels of fertility, as is frequently the case in low-income countries, can reduce general well-being, as opposed to growth caused by lower mortality rates, which is generally thought to have more benign effects on savings and economic growth (Peterson, 2017).

Table 6: GDP Constant Price, Disaggregation by GDP Above and Below The Mean GDP on The Demand Side

List of Independent Variables	Dependent variable is GDP Constant Price 2010=100		
	All Sample	Sample with GDP Below Average	Sample with GDP Above the Average
Constant	4.825e+12 (4.466e+12)	1.284e+12** (5.198e+11)	3.397e+13*** (7.000e+12)
Household consumption	97.82*** (19.44)	8.000** (3.384)	-388.7*** (140.7)
Government Expenditure	-602.1*** (111.5)	-17.99 (15.52)	-1,942 (1,666)
Net Export	135.3* (73.51)	-5.291 (8.716)	-924.9 (809.4)
Gross capital formation	358.8*** (92.60)	18.28* (9.750)	2,996*** (779.4)
Observations	223	190	33
Number of id	21	18	3

Household consumption is significant at a 1% level and generally has a positive effect; that is, a 1 USD increase in HFCE leads to a 97.82 USD increase in GDP. HFCE is significant at a 5% level and positively affects below-mean GDP countries. A 1 USD increase in HFCE leads to an 8 USD increase in GDP. Also, HFCE is significant at a 1% level and has a negative impact in

above-mean GDP countries that is 1USD increase in HFCE leads to 388.7USD decrease in GDP. Long-term and short-term behavior influence household consumption decisions (Handriyani et al., 2018). The higher a person's household income, the higher their level of consumption expenditure and an increase in consumption expenditure has a positive effect on economic growth. According to Mankiw (2003), consumption decisions are critical for short-term analysis due to their role in determining aggregate demand.

Government expenditure is generally significant at a 1% level and negatively affects GDP. That is, a 1 USD increase in government expenditure leads to a 602.1 USD decrease in GDP. Dudzevičiūtė et al. (2018) examined 28 European Union countries; correlation analysis shows a significant relationship between government spending and economic growth in the eight EU countries. Positive correlations have been discovered in France, Belgium, Portugal, and Cyprus. Sweden, Negative correlations have been detected in Germany, Poland, and Slovakia. The relationship between GE and economic growth has been weak and statistically insignificant in the remaining countries.

Net export is significant at a 10% level and positively affects all sample countries. That is, a 1 USD increase in net export leads to a 135.3 USD increase in GDP. According to Sultanuzzaman et al. (2019), the Generalized Method of Moments (GMM) model examined the impact of export and technology on the economic performance of emerging Asian countries from 2000 to 2016. Following the Solow economic growth model, the results show that exports and technology have a positive and significant impact on the economic growth of emerging Asian economies. Similarly, long-run estimation determines trade and technology's significant and positive impacts on countries' economic growth.

Gross capital formation is significant at a 1% level and positively affects all sample countries; a 1 USD increase in GCF leads to a 358.8 USD increase in GDP. GCF is significant at a 10 % level and positively affects below mean GDP. A 1 USD increase in HFCE leads to an 18.28 USD increase in GDP; GCF is significant at a 1 % level and positively impacts above-mean GDP countries. A 1 USD increase in GCF leads to a 2,996 USD increase in GDP. Aslan & Altinoz (2021) investigate the relationship between economic growth, gross capital formation, and globalization. Countries are divided into four groups based on their continents: Europe, Asia, Africa, and America. This relationship is tested using the panel VAR approach for each country group. The results were that globalization and gross capital formation positively impacted African countries.

Conclusion

We have investigated the impact of taxes on economic growth in 21 African countries from 2008-2018. Empirical analysis has included a pooled least square estimates model, which has estimated the effect of tax revenue growth, number of tax payments, corporate tax, personal income tax, and tax on income, profit, and capital gain on key macroeconomic determinants as a gross domestic product which is a proxy to economic growth. However, taxes are not the only factors for economic growth; analysis has included supply-side determinants such as population, literacy rate, service, and share of trade and demand-side variables such as household consumption, government spending, net export, and gross capital formation. Based on the results, all macroeconomic determinants have statistically significant effects on GDP except trade. Tax revenue and corporate tax rate positively affect GDP, while personal income tax rate and tax on income, profit, and capital gain negatively affect GDP. They are increasing 1 US Dollar tax revenue. It leads to 3,204 USD in GDP. Similarly, A 1% increase in corporate tax rate will increase GDP by 1.86 % in general. In contrast, a 1% increase in income

tax will lead to a 1.2 % decrease in GDP in below-mean GDP countries, and a 1% increase in income, profit, and capital gains tax lead to a 2.5 % decrease in GDP in below-mean GDP countries.

Generally, taxation has a positive effect on African countries because developing countries in Africa have few sources for generating income, such as agriculture, so they rely on taxation as an internal key to generating revenue to boost economic performance. Given the harsh economic conditions, such as rising oil prices, exchange rates, and currency depreciation, the governments of these countries should deepen the development of comprehensive tax structures. These governments are also obligated to implement tax policies that consider appropriate tax structures, leading to the improvement and acceleration of economic growth in African countries. They should expand, nurture, and sustain their tax economic base to drive economic performance positively.

African countries anticipate an increase in tax revenues of at least 5 percent of GDP by 2030. The tax statistics analyzed in this report state that if significant adjustments are made, the region's governments will stay within this objective. African countries must devote much more attention to reforming their tax systems and adapting them to the shifting economic structure. The analysis discovered that tax revisions since 1999 have made taxes more responsive to changes in income. However, additional efforts are required to increase tax revenue by expanding the tax base and enhancing tax compliance.

Furthermore, the authorities in charge of collecting taxes should be strengthened further to ensure taxpayer compliance. Also, the government should be held to a higher standard of accountability and transparency when managing tax revenue for funding public goods and services, as this will increase tax compliance among taxpayers.

This paper has helped clarify the relationship between tax forms and economic growth and the nature of their influence. The quantitative measurement of tax forms and analysis in this paper has enabled information support for policymakers on which taxes are necessary for economic growth and how they affect the economy in African countries. The findings have provided economic policymakers with some guidance in determining tax policy in specific cases and in specific countries, where tax policy profiling should focus on creating the appropriate tax structure, enabling the improvement and acceleration of economic growth in African countries.

Declaration

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Conflict of Interest

There are no conflict of interest.

Availability of Data

The article used secondary data, therefore the data are accessible through the World Bank database, world development indicators, tax foundation and human development indexes. The analyzed data are available upon request.

Author Contribution

The author contributed on researching, writing the original article, analyzing data and reviewing.

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