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RESEARCH ARTICLE

Inflation, Economic Growth and Government Expenditure in Sub-Saharan African Countries

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Abstract

The primary function of the government in any economy includes security and provision of public goods for the economy, which will make the government expend some money on behalf of the economy, which is expected to lead to economic growth and likely lead to inflation; this is because higher spending leads to increase in inflation. This study empirically determines the influence of government spending on inflation and economic growth among selected Sub-Sahara countries using panel study. Result obtained from the study rejected the null hypothesis of random effect is the efficient and appropriate model and accept the alternative hypothesis of fixed effect is the efficient and appropriate model for the study. Causality tests revealed that there is no causal relationship between inflation and government expenditure variables. There is a unidirectional causality from government expenditure to economic growth and finally, there is a unidirectional causality from economic growth to inflation. Conclusively, government expenditure significantly and positively influence economic growth rate for all the countries under observation while there is an inverse relationship between government expenditure and inflation. The study therefore recommends that economic managers of the sub-Sahara countries should ensure adequate and efficient policy towards their respective government expenditure with the aim of expanding it, which is expected to lead to continual economic growth.

Keywords: Government expenditure, Neo-classical model, Economic growth, Sub-Saharan Africa.
JEL Codes: F45, E31, E62, I28

1. Introduction

In most economy of the world, the primary function of the government includes provision of protection with security and ensuring availability of identified public goods for the economy. Protection with security ensures establishment of rule of law and enforcement of property rights which curbs criminality, protect life and property, and see to the nations' defense from external assaults. Also, basic public goods in form of infrastructural facilities such as good roads, adequate education, standardized health, stable power supply are provided by the government (Abu and Abullahi 2010). These identified functions induce government spending to actualize them. Therefore, government expenditure indicates a significant part of any economic policy which is used as operative policy instrument to put the nation on the path of strong and long term economic growth (Ahuja & Pandit, 2020). Egiyi (2021) described economic growth as the rise in the nations' gross domestic product (GDP) which is subjected to the way the GDP is measured. Likewise, economic growth is a process of increasing the production capacity of an economy that is realized in the form of an upturn in national and regional income (Suryani & Rony, 2020). Scholars have supported with evidences that increase in government expenditure on socio-economic and physical infrastructures encourage economic growth positively through reduction in production costs, raise in returns on private capital investment etc. (Abu and Abullahi, 2010; Ogundipe & Oluwatobi, 2014).

Globally, nations including the developing countries strive towards improving their society welfare by empowering the citizen to afford basic necessities of life and become economically valuable to their nations. To achieve these, the government works towards improving the Gross Domestic Products (GDP), attain balance of payment equilibrium, increase business activities and preserve price stability. In the same vein, when there is persistent rise in the general level of prices of goods and services in an economy over a specified time, such economy is facing inflation and this erodes the citizens the purchasing power of their currency and reduce their consumption. This will inevitably lead to decline in GDP; make investment unattractive due to uncertainty and impact BOP negative especially by its inability to equally compete with other countries. This implies GDP is negatively related to inflation. (Mukoka, 2018). Inflation can be measure as the annualized percentage change in the general price index (usually the Consumer Price Index) over time (Ahmed and Igbinovia, 2015). Generally, irrespective of the government spending and economic growth an economy is witnessing, volatile and increase in inflation impacts it negatively especially if it grows on double digit in its annual growth while stable and lower inflation rate aid economic growth (Getachew, 2018).

Initially, economic theory idea such as classical economic thought says market forces play a major role in stabilizing the price of goods and services for instance they assumed surplus/deficit output reduces/increase price and maintains stable price which was rebuffed after United State of America (USA) faced the great depression around 1927 when the economy witnessed persistent increase in price (inflation), increased unemployment rate and surplus production. Therefore in 1936, increase in government participation was opined to correct the market failure. One of the mechanisms adopted by the government was fiscal policy which involved higher government spending to increase investment and employment opportunity. It is assumed that higher government spending in various activities stimulates higher consumption or investment spending which attracts higher price for goods and services in the economy. The higher desire for spending encourages producer to produce

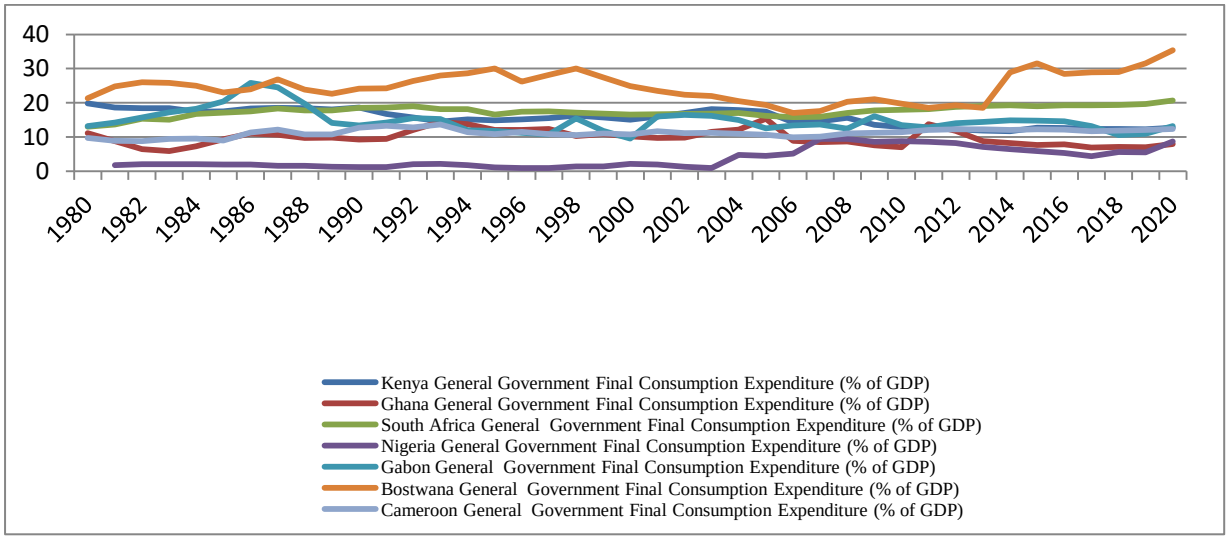
goods and services that demanded by the consumers. Such situation enables the country to achieve economic growth with higher inflation. (Getachew, 2018).

It is in the light of these that this study examined the influence of government spending on inflation and economic growth among selected Sub-Sahara countries. Specifically, the study investigated the short and long run with causal relationship among government spending, inflation rate and economics growth from Kenya, Ghana, South Africa, Nigeria, Gabon, Botswana and Cameroon based on GDP growth rate and data availability for the period considered. The study adopted econometric analysis which involves panel study to see the fixed-effects and random effects in estimating the yearly data spanning the period of 1980-2020 obtained for the selected countries. The rest of the paper is divided into four Sections. The next Section contains literature review and this is followed by methodology in Section 3. Section 4 contains analysis and discussion of results and finally summary, conclusion and recommendations

2. Literature Review

A nation's government expenditure can also be referred to as the nations' developmental expenditure; it focuses on her prosperity and evenly growth development among regions and groups making up the nation. It is usually embarked upon for future purposes and benefits in form of project investments which can be seen physically or non-physical projects. It is feasible in developmental engagement like provision of infrastructural facilities, nation's educational development, health service improvement etc. it generally leads to improvement in the citizen welfare which will lead to change, employment generation and economic growth (Suryani & Rony, 2020). Execution of such developmental project is divided into sectors, sub-sectors and finally to budget section. Any form of government expenditure embarked upon signifies government policy at achieving public welfare. Performing such roles makes government do things like allocations functions which involve assigning economic resources to be optimally utilized and bring about production efficiency, distribution function which ensure the economic resources are adequately and efficiently circulated, and stabilization function which involves government effort towards maintaining economic stability and equilibrium (Olivier, 2017).

Figure 1: General Government Final Consumption Expenditure (% of GDP) for the Selected Sub-Sahara Countries

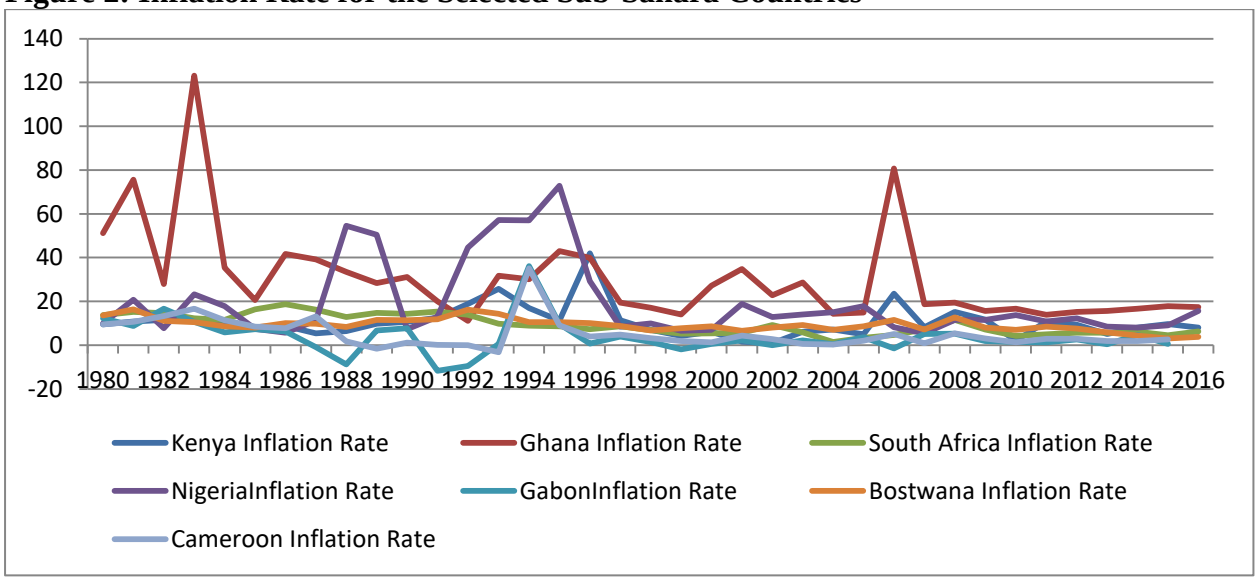


Source: World Development Indicators, 2021

Figure 1 depicts government final consumption expenditure which is a percentage of the each nation GDP from 1980 to 2020 from the seven countries selected for the study. The figure shows Botswana led the selected countries in expending on the economy, followed by South-Africa and Gabon. The observation also indicated that Nigeria is the least in expending in the economy through government final consumption expenditure which is actually reflecting in the current of the economy developmental projects.

Explicitly, inflation rate is measured as the percentage change in the price index (consumer price index (CPI), wholesale price index, producer price index) of the nation. Getachew (2018) noted that CPI measures the price of a representative basket of goods and services obtained by the rational consumer, which is calculated based on the periodic survey of consumer prices. Due to the diverse basket weights, changes in goods and services price do significantly affect inflation and CPI do have some shortcomings such as it does not reflect the particular goods purchased by the government, it does not reflect change in the quality of goods purchased overtime, it does not capture changes in the price of substitutable goods and often does not change. However, CPI is the most widely used measure of inflation because it represents the cost of living and measure people welfare. GDP Deflator can also be used to monitor price movement, calculated on annual basis. Inflation can be classified into two such as demand-pull inflation which occurs when aggregate demand exceed available supply to the economy as shown in the Philips curve, this result from an increase in government purchases, increase in foreign price level, or increase in money supply (Asari, Baharuddin, Mohamad, Shamsudin & Jusoff, 2011). The second one is cost-push inflation, also known as commodity inflation or supply shocks inflation. This can arise from sudden reduction in the total supply due to the rise in price or cost of commodity/ production especially where there is no alternative (Thomas, 2006).

Figure 2: Inflation Rate for the Selected Sub-Sahara Countries

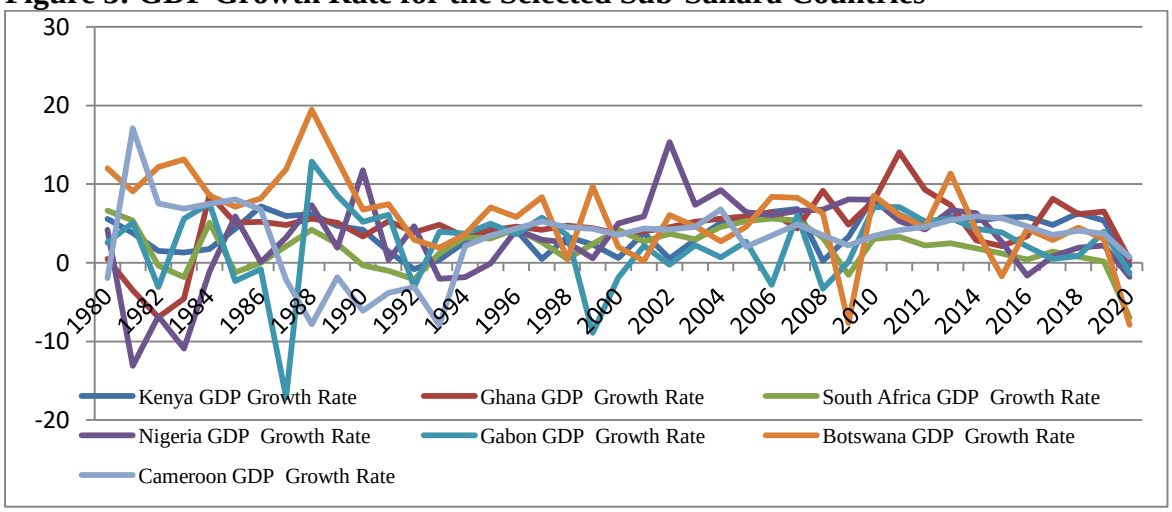


Source: World Development Indicators, 2021

Figure 2 depicts inflation rate from 1980 to 2020 from the seven countries selected for the study. The figure shows Ghana inflation rate was relatively higher compared to others followed Kenya. Observation for Nigeria shows it is relatively better compared to other countries.

Economic growth depends largely on government expenditure and the strength of the government to allocate its public resources efficiently (Suryani & Rony, 2020). This study adopted the GDP growth rate for each country to a proxy for economic growth.

Figure 3: GDP Growth Rate for the Selected Sub-Sahara Countries



Source: World Development Indicators, 2021

Figure 3 depicts growth rate from 1980 to 2020 from the seven countries selected for the study. The figure shows Botswana GDP growth rate was relatively better throughout the years, except for some periods where Nigeria's GDP growth rate was better. Ghana too was relative improving its economy concerning its GDP.

2.2 Theoretical Review

The mercantilists view on government spending, inflation and economic growth held sway from 1650 to 1776 during which Adam Smith's book "Wealth of Nations was printed. During this period, the British achieved increased economic growth based on trade and commerce. The Mercantilists viewed export surplus as a source of growth while balance of payment (BOP) deficit was seen as a negative growth factor. Therefore, to experience export surplus imports was discouraged in favour of exports to secure economic growth (Pentecost, 2000). Subsequent to the mercantilists, view was the classical economic view, which came into light with the "Wealth of Nations" publication in 1776. It was also questioned by another publication in 1936 by John Maynard Keynes in a book titled "The General Theory of Employment, Interest and Money". According to the theory, Adam Smith and David Ricardo, embraced Richard Quesnay's social class analysis and revised these classes as landlords, capitalists and workers. Working on their selfishness, the capitalist compete with one another in the labour market which leads to rise in the labour wage rate but reduces capitalist profit which in turn benefits the workers and landlords. This fall in turnover discourages the capitalist who created the wealth. There will therefore be a negative impact on productivity of the capitalist due to the rise in price; this will eventually leads to decline in the nation's economic growth (Pentecost, 2000). In addition to the classical view was the monetarists view, which is theory is traceable to Irving Fisher. It was opined from Quantity Theory of Money (QTM), which states that the quantity of money in circulation is the main determinant of the value of money or the price level. The equation is given as MV=PQ, where M is the stock of money; V represents velocity of money circulation; Q represents the volume of transactions which take place within the given period; while P stands for the general price level in the economy. This equation can be transformed by substituting Y (total amount of goods and services exchanged for money) for Q, the equation of exchange becomes MV = PY. The introduction of Y provides the linkage between the monetary and the real side of the economy. In this analysis, P, V and Y are endogenously determined while M is the policy variable and it is exogenously determined by the monetary authorities. The monetarists stressed those changes in the quantity of money affects only the price level or the monetary

side of the economy, with the real sector of the economy totally separated. This implies variations in the supply of money do not affect the real output of goods and services, but the values or the prices at which they are exchanged only. A major strength of the model is the attention given to the long-run supply side of the economy (Dornbush, Fischer & Kearney, 2002). Following the monetarists view was the New Classical consideration, which is grounded on the rational expectations theory and continuous market clearing approach. The connection between inflation and economic growth was clarified by the inter-temporal substitution approach and the surprise model in the New Classical economics (Lucas, 1988). The inter-temporal substitution approach proposed that rational workers supply more labour when real wage increases and reduces labour supply when real wage declines. Increase in labour supply leads to higher productivity thereafter lead to increase in economic growth. (Lucas & Rapping, 1969).

Recently, several scholars have indicated theoretical and diverse ways through which government expenditure can leads to economic growth. Such means and factor includes source of finance and efficiency that leads to expenditure (Riedl 2008; Cakerri, Petanaj, & Muharemi, 2014), a country's share of government expenditure to its share of total import (Wenyi, Yang & Zanna, 2015) and the form of a nations taxation systems (Gui 2014). Riedl (2008) and Cakerri et al., (2014) stressed that borrowing from the private investors to finance government expenditure does not lead to increase in citizen spending power which is a requirement for economic growth. Such borrowing by the government can only leads to the redistribution of income while what is required for economic growth is generation of new productive projects capacity. Economic growth induces increased purchasing power for the citizens not income redistribution. When increase in government expenditure leads to competition between public and private sectors on the existing credits, this increases pressure in the credit market which will eventually leads to higher interest rate. This was validly supported by by Gisore, Kiprop, Kalio, Ochieng and Kibet (2014), who indicated that higher interest rate on the economy dislocate private sectors and decreases economic growth.

Wenyi et al. (2015) further identified share of imports total spending by the government can influence economic growth positively or negatively depending on the type of economy especially the developing economy where approved projects for the economy rely on the importation of technology and other needed resources. This indicates government spending is financed by import, which is detrimental to the country reserves and real exchange rate especially when government expenditure is financed by local source of income. Countries are therefore advised to look into meeting their nations demand instead of depending on importation for their economic growth and development. Gui (2014) likewise opined that government expenditure can diminishes or improves economic growth if the tax system is characterized by distortion or non-distortionary, this was in support of what Afonso, Ebert, Schuknecht and Thone (2005) described on tax system. They explained that if a nation's government expenditure is greater than government revenue, which is the prevalent situation in developing countries in Sub Saharan Africa low income region, it will leads to increase in the nation's debt accumulation. The cumulative public debt will lead to unsustainable macroeconomic imbalances, this will prompt the private sectors to decrease reduce their investment projects because of future increase in tax due to unmanageable fiscal situation. This actually multiplier effect and slow down economic growth. The hypothesis therefore concluded that the developing country government should consider tax efficiency to reduce distortion. Any tax system improves the sustainability of both the public and the private sector. Conclusively, developing nations' governments should consider effective management of defeating deficits in their budgets which is to overcome debt accumulation. Decreasing government budget deficits can be achieve through minimizing government expenditure or increasing government revenues or both round.

2.3 Empirical Review

Several economists have studied the relationship among government expenditure, inflation and economic growth using several methodologies involving time-series data for single country and panel data for several countries. References are made to some of them. Melkamu (2021) analyzed the influence of public debt and economic growth in Sub-Sahara countries using real per capita GDP as proxy for economic growth applying panel data analysis from 2005 to 2018 in 18 sub–Saharan African countries. The study was motivated because public debt was seen as possible solution to finance deficit budget. The study employed two-step system Generalized Method of Moment (2SSYS-GMM) method in analyzing the two-way connection between the two simultaneous equations in the model. Results from the study displayed a negative and statistically significant bidirectional relationship between public debt and economic growth of the SSA countries considered in the panel. Result also revealed that gross national saving, export and broad money had significant positive effect on economic growth. The researcher therefore recommended that the government should engage debt fund in a more industrious ways to support the economy and instead of looking for more debt, the economy should focus to maintain and improve the national savings, export promotion and money supply management.

Muhammad Azam and Saleem Khan (2020) studied the threshold effects in the relationship between inflation and economic growth digging for further empirical evidence from the developed and developing world specifically from 27 countries which comprises of 16 developing and 11 developed economies covering the period between 1975 and 2018. The research employed non-average inflation data that is a balanced panel for a longer period of time. Tests such as fixed effects and feasible generalized least squares (FGLS) are adopted to estimate the inflation threshold and its effects on growth. Results from the study revealed that there was a significant negative relationship between inflation and growth above the threshold level of inflation. It was gathered that inflation obstruct growth when inflation exceeds the turning point 12.23% and 5.36% in Panel-1 and Panel-2, respectively, and with the greatest negative effects in Panel-2. Result also showed that gross fixed capital formation, government spending, household spending and real exports improve economic growth while population growth rate have negative effect on the region's growth rate.

Impact of inflation on economic growth: evidence from Nigeria was critically analyzed by Olugbenga and Oluwabunmi (2020) using annual data that covers the period from 1980 to 2018 using autoregressive distributed lag on the selected variables such as real gross domestic product used as proxy for the GDP, inflation rate, interest rate, exchange rate, degree of economy`s openness, money supply, and government consumption expenditures. Results from the findings showed that exchange rate significantly but negatively impacted on economic growth, while there was a positive and significant from interest rate and money supply on economic growth. There was impact from other variable in the study. Evidence of unidirectional relationship exists from interest rate, exchange rate, government consumption expenditures and gross domestic product from the causality test. Conclusively the study recommended that government should maintain inflation to avoid its adverse effect on economic growth.

In a quantitative study conducted by Suryani and Rony (2020) on the effect of government expenditures, domestic investment, foreign investment to the economic growth of primary sector in Central Kalimantan which adopted multiple linear regression, secondary data which are time series in nature from 1990 to 2019 were analyzed. Results from the study discovered that government expenditures, domestic investment, and foreign investment had significant and positive to the economic growth of primary sector. Mukoka (2018) employed time series data on inflation and economic growth (GDP) spanning 1990 to 2017 to study the impact of inflation on Economic growth in Zimbabwe. Ordinary Least Squares (OLS), Stationarity and

Co-integration tests was conducted for the study. Study showed data employed was stationary at first and second levels using the Johansen Co-integration Test. Results conducted showed that there was no association between inflation and gross domestic product in Zimbabwean economy. This indicated that curbing inflation is not a precondition for promoting economic growth there. However, inflation should be kept at single digit while all that can bring about increase in price level should be maintained with appropriate policy. Getachew (2018), who empirically studied the relationship between inflation, supports this and economic in Ethiopia, the study concluded that inflation with annual growth rate of double digit especially for Ethiopia will exhibit negative effect on the country's economy.

Bernard, Edward and Owoo (2018) in their study on health and economic growth nexus, analyzed evidence from selected 35 sub-Saharan African (SSA) countries using panel data obtained from 1997 to 2016. Tests conducted includes panel co-integration tests, panel Granger causality tests and the dynamic OLS estimator. Results from the analysis indicated that health is a significant determinant of long-run economic growth in selected countries as per capital health expenditure increases growth by 0.207%. The dynamic panel least square estimation technique revealed a positive effect of institutional quality on economic growth. Finally, there was a bidirectional link between economic growth and health. Edmund, Choong and Lau (2017) critically evaluated the impact of government expenditure and efficiency in relation to economic growth of Sub Saharan African low income countries using panel data from 2002 to 2015 extracted from 25 Sub-Saharan African low income countries from World Development Indicators database. Analysis adopted for the panel study includes panel unit root tests of Im-Pesaran-Shin and Fisher ADF tests, co-integration test of Pedroni and Generalized Methods of Moments (GMM) to answer the two research questions. Results obtained from the study showed that improving spending on government expenditure will lead to increase in economic growth of low income countries in Sub Saharan Africa. Though, results from the study showed government expenditure does not influence government efficiency. The study, therefore, admonish policy makers from the low-income sub-Sahara countries to consider their justification for spending in improving the economic growth of their respective countries.

In a study conducted on government expenditure and economic growth in Nigeria: a cointegration and error correction modeling, Ojonugwa and Agbede (2015) examined the relationship among variables using annual time series data obtained from Central Bank of Nigeria from 1970 to 2010 for the analysis. Result from the long-run analysis exhibit a positive and significant linear relationship between the two kinds of government expenditure adopted and economic growth while result show that in the short-run, economic growth had a positive and significant linear relationship with recurrent expenditure with negative but significant association with capital expenditure. Unidirectional causality was observed from the Vector Error Correction Model which was from recurrent expenditure to economic and from economic growth to capital expenditure. However, a bi-directional causality was observed from capital expenditure to recurrent expenditure and vice versa. Conclusively, the study prescribed government should stimulate economic growth by allotting adequate proportion of the budget to capital expenditure in the national budget. Mohammed, Okoroafor and Awe (2015) examined the relationship between unemployment, inflation and economic growth in Nigeria using annual data from 1987 to 2012 for the variables. Ordinary least square was adopted for the study. Long run result showed that interest rate and total public expenditure significantly impacted economic growth in Nigeria, while there was an inverse relationship between inflation and unemployment has adverse effects on growth in Nigeria. There was evidence of short run disequilibrium among variables. The causal link observed was among inflation, unemployment and economic growth in Nigeria. The paper conclusively admonishes the government to work on or improve the nations' macroeconomic

policy to achieve a bearable and enabling environment that will bring about general economic growth.

Government expenditures and economic growth: the Nigerian experience was critically analyzed by Robinson, Eravwoke and Ukavwe A (2014) using time series data between 1980 and 2010 and employed ordinary least square (OLS) to ascertain the short-run link between variable while Augmented Dickey Fuller (ADF) test was used to describe the long-run link between the variables in the model. Government expenditure was split into public debt expenditure, expenditure on health and expenditure on Education for the purpose of the study. Results obtained from the analysis showed there was an inverse relationship between government expenditures on health and economic growth. There is also indication that the government expenditure on education cannot adequately supply all the needs of the Nigerian expanding sector. However, if government expenditure is properly harnessed, it could foster increase in nation's foreign and local investment and increase economic growth.

3. Methodology

The study employed econometric analysis using panel data of seven Sub Saharan African countries on government final consumption expenditure, inflation rate and economic growth which was sourced from World Development Indicators (WDI) from their annual reports and data bases from their website. Data obtained was from 1980 to 2020 for each country on each variable totally 861. Data used as proxy for government expenditure is general government final consumption expenditure, which is a percentage (%) of GDP. It was previously referred to as general government consumption. It in detail comprises of all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditures. Data utilized as proxy for economic growth is the GDP growth which is in annual growth rate percentage. It captures market prices based on constant local currency of each country. Its totals calculation is based on constant 2010 U.S. dollars. Data on inflation used was calculated as an annual percentage change in consumer prices index, which reveals annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. It is usually calculated using Laspeyres formula.

Following the work of Mesghena (1998), the analytic model deployed in this study stems from the neoclassical production function, which ignored the technology level (A). The production function is expressed as:

$$Y = f(K, L) \quad (1)$$

Y represents the level of output, K denotes the stock of domestic physical capital, and L depicts the labour force. Following the works of Feder (1982), Grossman (1988) and Ram (1996), we extended the equation (1) by incorporating total government expenditure (G). Thus, the production function becomes:

$$Y = f(K, L, G) \quad (2)$$

However, we consider inflation and economy size to be the determinants of government consumption spending. This is consistent with the postulate that increase in real income induces increase in public expenditure Wagner (1883). Obviously, increasing size of the economy results from increased usage of capital, labour and other economic resources. Since capital is embedded in financial resources, the implication is that its increased usage requires increase in government spending. Similarly, the rising inflation being experienced in the Sub-Saharan African countries has the potential to mount upward pressure on government spending over time, Therefore, we are argue in this paper that inflation and economy size are key determinants of government consumption expenditure.

Based on the above, and going forward, we transform equation (2) as follow:

$$GOVTSP_t = f(INF_t, ECONGRW_t) \quad (3)$$

where GOVTSP is government spending, INF is inflation and ECONGRW is economic growth.

From equation (3), we specify the following Least Squares econometric model of the relationship between government spend, inflation and economic growth:

$$GOVTSP_{it} = \emptyset_0 + \emptyset_1 INF_{it} + \emptyset_2 ECONGRW_{it} + \varepsilon_{it} \quad (3)$$

where $GOVTSP_{it}$, INF_{it} and $ECONGRW_{it}$ are as defined earlier. GDP growth Rate. i (I = 1, 2, 3, …, 7) depict the cross0sectional dimension of the scode scope (7 Sub-Saharan African countries). t represents the regular point in time at which the data values are considered over the period of 1980 to 2020. $\emptyset_0$ is the intercept of the model and it depicts the value of the government expenditure when inflation and growth of the economy are at zero levels. ϵ_{it} depicts the error term, which is introduced to accommodate the influence of other factors that are not explicitly included in the model.

Equation (3) expresses the nexus between government consumption spending, on the one hand, and inflation and economy growth, on the other hand, in the Sub-Saharan African countries. *A priori*, we expect some positive level of government spending even at zero inflation rate and economy size. Similarly, we expect the coefficient of the size of the economy to take up a negative sign. However, it is our pre-estimation expectation that the coefficient of inflation rate will be negatively signed. We hinge our expectations on the fact that increase in economy size induces expanding state activity, which is in turn matched by increase in government spending. On the other hand, fiscal policy thrust of the government is usually contractionary (decrease in government spending) when inflationary pressure rises. Therefore, we symbolise our expectations as follows: $\phi_0 > 0$; $\phi_2 > 0$; and $\phi_1 < 0$.

4.0 Results and Discussion

In this section, we present and discuss the results of the analysis of data. This provides us the basis for the conclusion and recommendations we proffer in the last section of this paper.

4.1 Descriptive Analysis Results

Table 1: Descriptive Statistics

	GOVERNMENT FINAL CONSUMPTION	INFLATION RATE	GDP GROWTH RATE
Mean	13.95774	11.68441	3.521788
Median	13.30723	8.623949	4.149262
Maximum	35.35077	122.8745	19.44997
Minimum	0.911235	-11.68611	-17.14604
Std. Dev.	6.656025	14.53039	4.430720
Skewness	0.313580	3.893551	-0.647876
Kurtosis	3.270292	25.11392	6.097536
Jarque-Bera	5.557776	6550.165	134.8147
Probability	0.062108	0.000000	0.000000
Sum	3991.913	3341.740	1010.753
Sum Sq. Dev.	12626.26	60172.68	5614.545
Observations	286	286	287

Source: Authors' computations, 2022

This descriptive statistics above is based on individual sample for the three variables. Total 859 raw data were utilized and sample analyzed as both government expenditure and inflation have a missing data for a country for a year. From the measures of central tendency the mean value representing the average value for government expenditure, inflation and economic growth was 13.9577, 11.6844 and 3.5217 respectively. The median which represents the middle value after sorting observations in ascending or descending order is 13.3072, 8.6239 and 4.1492 respectively for expenditure, inflation and economic growth. While the maximum values are 35.3507, 122.8745 and 19.4499 and the minimum values are 0.911235, -11.68611 and -17.14604 respectively for government expenditure, inflation and economic growth. The standard deviations which are 6.6560, 14.5303 and 4.4307 in respective arrangement explain how far the observations in this study are far from the sample average. Kurtosis and skewness serves as measure of normality. The Kurtosis values of 3.2702, 25.1139 and 6.0975 measures the peakness or flatness of the data and it shows all data have normal distribution government expenditure is mesokurtic in nature, while inflation is highly leptokurtosis in nature. The skewness which measures the degree of asymmetry of the series shows both government expenditure and inflation are positively skewness with long right tail and but higher value in inflation while economic growth generally is negatively skewed on the negative left tail.

The probability values of 0.0621, 0.0000 and 0.000 for government expenditure, inflation and economic growth respectively clearly indicates the probability value of government expenditure is not significant at 5%, therefore the unit root test for government expenditure was done at first difference, it was not stable at levels. While inflation and economic growth are highly statistically significant, therefore we clearly reject the null hypothesis of the normal distribution.

4.2 Unit Root Test Results

Table 2: Unit Root Tests

	Im, Pesaran and Shin W-stat			Fisher ADF		
Variable	Level	First difference	Integration order	Level	First difference	Integration order
$GOVTSP_{it}$	-1.55661 (0.0598)	-10.0748 (0.0000) ***	(1)	22.8957 (0.0620)	116.692 (0.0000) ***	(1)
INF_{it}	-4.98196 (0.0000) ***	-15.1246 (0.0000) ***	(1)	54.9194 (0.0000) ***	185.760 (0.0000) ***	(1)
$ECONGRW_{it}$	-5.22260 (0.0000) ***	-12.9572 (0.0000) ***	(1)	54.7294 (0.0000) ***	156.234 (0.0000) ***	(1)

Null hypothesis: Presence of unit root. The asterisk *** indicates significant at 1 per cent level of significance. Figures in the brackets are the probability values and figures without brackets represent test statistic values.
Source: Authors' computations, 2022

The results for panel unit root tests indicated that variables contain unit root at the level for government expenditure while inflation and economy does not contain unit root. After conducting first difference, findings revealed that all variables does not have unit root. One can conclude from this that fluctuations in government expenditure in Sub-Sahara countries are temporary.

4.3 Hauseman Test

Table 3: Hausman Test Results
Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	8.535308	2	0.0140

** WARNING: estimated period random effects variance is zero.

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
GDPGROWTHRATE__ANNUAL___	0.102652	0.032087	0.001791	0.0955
INFLATIONRATE	-0.165376	-0.130180	0.000207	0.0144

Source: Authors' computations, 2022

4.4 Regression Analysis Results

Table 4: Regression Results

Period random effects test equation:
Dependent Variable: GENGOVERNMENTFINALCONSUM
Method: Panel Least Squares
Date: 05/03/22 Time: 12:19
Sample: 1980 2020
Periods included: 41
Cross-sections included: 7
Total panel (unbalanced) observations: 285

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.54628	0.659669	23.56681	0.0000
GDPGROWTHRATE__ANNUAL___	0.102652	0.100030	1.026214	0.3058
INFLATIONRATE	-0.165376	0.031134	-5.311655	0.0000

Effects Specification

Period fixed (dummy variables)

R-squared	0.126302	Mean dependent var	13.97616
Adjusted R-squared	-0.025332	S.D. dependent var	6.660426
S.E. of regression	6.744259	Akaike info criterion	6.793463
Sum squared resid	11007.38	Schwarz criterion	7.344541
Log likelihood	-925.0685	Hannan-Quinn criter.	7.014376
F-statistic	0.832940	Durbin-Watson stat	0.172951

Prob(F-statistic)	0.757812

Source: Authors' computations, 2022

Result from the Hausman's Test indicates that the result is statistically significant at 5% level of significance from 0.014 obtained from the probability value. We therefore reject the null hypothesis of random effect of the efficient and appropriate model and accept the alternative hypothesis of fixed effect, which is the efficient and appropriate model for the study.

4.5 Result of Fixed Effect Analysis

Table 4: Fixed Effect Results

Dependent Variable: GENGOVERNMENTFINALCONSUM
Method: Panel Least Squares
Date: 05/03/22 Time: 12:39
Sample: 1980 2020
Periods included: 41
Cross-sections included: 7
Total panel (unbalanced) observations: 285

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATIONRATE	-0.034431	0.012975	-2.653624	0.0084
GDPGROWTHRATE__ANNUAL___	-0.107216	0.038154	-2.810072	0.0053
C	14.75800	0.271517	54.35390	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.841719	Mean dependent var	13.97616
Adjusted R-squared	0.837131	S.D. dependent var	6.660426
S.E. of regression	2.687952	Akaike info criterion	4.846506
Sum squared resid	1994.123	Schwarz criterion	4.961847
Log likelihood	-681.6270	Hannan-Quinn criter.	4.892743
F-statistic	183.4664	Durbin-Watson stat	0.408926
Prob(F-statistic)	0.000000		

Source: Authors' computations, 2022

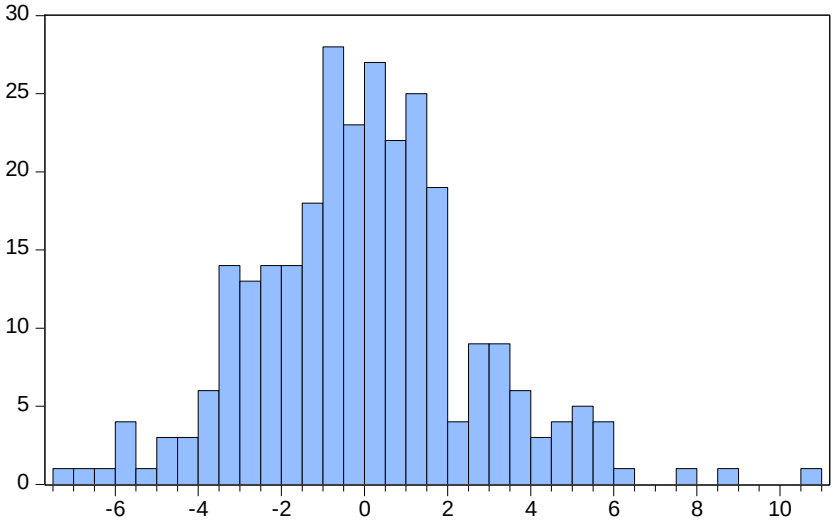
Fixed effect result is showing a relationship between government consumption and inflation rate. Also, there was a negative relationship between government consumption and GDP growth rate. However, result from the redundant fixed effects test maintained a negative relationship between government consumption and inflation rate but a positive relationship between government consumption and GDP growth rate. From the result above, when inflation rate increases by 1%, government consumption decreases by 0.034431 i.e. 3.4%. Likewise when GDP growth rate increases by 1%, government consumption decreases by 0.107216 i.e. 10.72%. Result also indicates that both variables are statistically significant at

1% level of significance from the values of 0.0084 and 0.0053 obtained respectively on inflation rate and GDP growth rate.

The value of 0.837131 i.e. 83% obtained from the adjusted R squared showed that both inflation rate and GDP growth rate significantly accounted for changes in government expenditure/consumption, while other factors not mentioned in the study account for the remaining 27%. F-statistic result of 183.46 with probability value of 0.000 signifies a joint significance of variables at 1%.

4.6 Test of Normality

Table 6: Normality Test Results



Series: Standardized Residuals	
Sample 1980 2020	
Observations 285	
Mean	2.57e-17
Median	-0.024126
Maximum	10.84637
Minimum	-7.364626
Std. Dev.	2.649823
Skewness	0.396625
Kurtosis	4.121412
Jarque-Bera	22.40589
Probability	0.000014

Source: Authors' computations, 2022

From above, the data is normally distributed and significant at 1% as evidenced by the Jarque Bera statistic value of 22.40589, with P-value of 0.000014.

4.7 Cross-Section Test

Table 7: Results of Cross-Section Tests

Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in residuals
Equation: Untitled
Periods included: 41
Cross-sections included: 7
Total panel (unbalanced) observations: 285
Test employs centered correlations computed from pair wise samples

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	112.4435	21	0.0000
Pesaran scaled LM	13.02991		0.0000
Bias-corrected scaled LM	12.94241		0.0000
Pesaran CD	-1.157892		0.2469

Source: Authors' computations, 2022

Since Breusch-Pagan LM, Pesaran scaled LM and Bias-corrected scaled LM are all significant at 1% with probability value of 0.000, we therefore concluded that there is cross section dependency among variables.

4.8 Causality Test

Table 8: Results of Causality Tests
Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 04/03/22 Time: 01:18
Sample: 1980 2020
Lags: 2

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
INFLATION_RATE does not homogeneously cause GENERAL_GOVERNMENT_FINAL	1.75926	-0.42864	0.6682
GENERAL_GOVERNMENT_FINAL does not homogeneously cause INFLATION_RATE	2.64526	0.60636	0.5443
GDP_GROWTH_RATE__ANNUAL_ does not homogeneously cause GENERAL_GOVERNMENT_FINAL	1.48691	-0.74652	0.4554
GENERAL_GOVERNMENT_FINAL does not homogeneously cause GDP_GROWTH_RATE__ANNUAL_	4.32297	2.56847	0.0102
GDP_GROWTH_RATE__ANNUAL_ does not homogeneously cause INFLATION_RATE	5.00081	3.36078	0.0008
INFLATION_RATE does not homogeneously cause GDP_GROWTH_RATE__ANNUAL_	2.64321	0.60505	0.5451

Source: Authors' computations, 2022

Note: Null hypothesis is that there exists no causal relationship between the variables. Alternative hypothesis is that there exists a causal relationship between the variables. When the significance level is less than 5%, we reject the null hypothesis and conclude- there exists a causal relationship between the variables.

Table 9: Summary

	W-Stat. Prob.	Zbar-Stat.	
INFLATION_RATE does not homogeneously cause GENERAL_GOVERNMENT_FINAL	1.75926 (0.6682)	-0.42864	There is no causal relationship between the variables
GENERAL_GOVERNMENT_FINAL does not homogeneously cause INFLATION_RATE	2.64526 (0.5443)	0.60636	
GDP_GROWTH_RATE__ANNUAL_ does not homogeneously cause GENERAL_GOVERNMENT_FINAL	1.48691 (0.4554)	0.74652	There is a unidirectional causality from government expenditure to economic growth relationship
GENERAL_GOVERNMENT_FINAL does not homogeneously cause GDP_GROWTH_RATE__ANNUAL	4.32297 (0.0102)**	2.56847	

GDP_GROWTH_RATE__ANNUAL_ does not homogeneously cause INFLATION_RATE	5.00081 (0.0008)*	3.36078	There is a unidirectional causality from economic growth to inflation
INFLATION_RATE does not homogeneously cause GDP_GROWTH_RATE__ANNUAL	2.64321 (0.5451)	0.60505	

Source: Authors' computations, 2022

Pairwise Dumitrescu Hurlin Panel Granger Causality Tests revealed that there is no causal relationship between inflation and government expenditure variables. There is a unidirectional causality from government expenditure to economic growth and finally, there is a unidirectional causality from economic growth to inflation

5. Summary, Conclusion and Recommendations

This paper has studied the influence of government spending on inflation and economic growth among selected Sub-Sahara countries, using annual panel data from the seven countries between 1980 and 2020. Unit root was conducted and only government expenditure was not stationary at level but was stable at first difference. The panel cointegration result showed that there was significant but inverse relationship between government expenditure and inflation rate while there is a positive relationship between government expenditure and economic growth to a large extent. The model was estimated using the fixed effect panel analysis which employed panel least squares method. Results showed that inflation and economic growth explained 83% changes in government expenditure.

This study therefore concludes that results from this study aligned with Apriori expectations; such as seen from Pairwise Dumitrescu Hurlin Panel Granger Causality Tests which revealed that there is no causal relationship between inflation and government expenditure variables. There is a unidirectional causality from government expenditure to economic growth and finally, there is a unidirectional causality from economic growth to inflation. Essentially, government expenditure significantly and positively influence economic growth rate for all the countries under observation while there is an inverse relationship between government expenditure and inflation, which means as government expenditure increases, inflation for economy decreases and as government expenditure decreases, inflation rate rapidly increases. This is in line with Edmund, Choong and Lau (2017) and Melkamu (2021) findings that government expenditure accelerates economic growth of low income countries in Sub Saharan Africa.

Consequently, this study recommends that Economic managers of the sub-Sahara countries should ensure adequate and efficient policy towards their respective government expenditure with the aim of expanding it, which is expected to leads to continual economic growth. Government expenditure should focus on increasing general economic welfare; therefore projects to embark on should be those that will benefit the masses at large in each region. Since there is an inverse relationship between government expenditure and inflation, the selected sub-Sahara countries should look inward to sustain these macroeconomic issues which will deliberately improve government expenditure, as this is expected to have a positive impact on the economy in whole and eventually leads to stability.

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