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Government Spending And Economic Growth Nexus In Sub-Saharan Africa: An Econometric Analysis

Mathew Owusu-Mensah
Christiana Afriyie Manu
Peter Arhenful
Accra Technical University, Accra, Ghana

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Abstract

Proponents of larger governments argue that government programmes provide essential public goods like education and infrastructure, which, in turn, stimulate the economy. On the other hand, individuals who advocate for more limited government assert that an increase in public spending will be detrimental to economic expansion due to the fact that many functions of government are inefficient and not in the public interest. Secondary data from World development indicator variables spanning from 1985 to 2021 were analysed. The dependent variable for the study was GDP per capita and the independent variables were institutional quality, government expenditure, capital stock and trade openness. The model used for the study are Pearson correlation, Pesaran's , Friedman's and Frees' cross sectional dependency test, IPS and CIPS unit root test, Pooled Mean Group and Dynamic Fixed Effect regression to test for the long-run cointegration and short-run relationship in 32 African countries. The results of the study suggest that there exists a long-run and short-run relationship between government expenditure and economic growth. Additionally, the study emphasises the importance of institutional quality as a significant determinant of this relationship. Therefore, it is recommended that all accessible government funds be allocated towards the objective of establishing durable and self-sufficient infrastructure.

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Keywords: Sub-Saharan Africa, Government Expenditures, Economic Growth, Dynamic Fixed Effect, Pooled Mean Group

Introduction

Economic growth is required for long-term sustainability for every country (Popescu, 2021). The rise in people's living standards and the expansion of the economy are inextricably linked. The primary aim in combating pervasive poverty and providing cause for optimism regarding the prospect of societal advancement is to expand the economy. In most cases, economic growth is computed as the percentage increase in a nation's real GDP from one year to the next (Ruiz, 2018). Providing certain public goods and providing protection (and security) are the two main functions of the government (Ostrom & Ostrom, 2019). Establishing the rule of law and upholding property rights are both components of the protection function, which is responsible for keeping citizens safe. This reduces the likelihood of criminal activity, safeguards individuals and their property, and strengthens the nation's defences against invasion from other countries.

The provision of power, roads, defence, education, and health care are all examples of public goods. However, this list is not exhaustive. Increasing the amount of money spent by the government on social and physical infrastructures is believed by some academics to be conducive to economic expansion. Spending by the government on areas such as healthcare and education, for example, can increase worker productivity and foster the expansion of a nation's overall output. Investing in infrastructure (including roadways, communication networks, and power plants), on the other hand, reduces the costs of production, encourages investment from the private sector, and increases the profitability of businesses, all of which contribute to economic expansion. Researchers such as Popescu (2021) and Onoja (2015) believe that increasing the size of the government's spending contributes to economic expansion.

The two primary categories of expenditures made by the government are as follows. These costs are recurrent expenditure and capital expenditure. The costs incurred by the government to carry out its ongoing responsibilities are referred to as recurrent expenditure. It is considered a spur-of-the-moment purchase for one's own personal use. "Government capital spending" refers to the amount of money spent by the government on investments that raise the country's total capital stock (Fournier, 2016). One of the many goals that governments work to achieve through spending is an increase in the income that is earned by each individual citizen.

In the most recent decades, policymakers have placed a greater emphasis on the discussion regarding the capacity of government spending to stimulate economic growth. It is not entirely clear whether the widespread

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adoption of government spending as a tool of fiscal policy has had a beneficial impact on the expansion of the economy (Hasnul, 2015). Despite the country's unusually high public debt rates and overall economic crisis, the Ghanaian economy continues to stand out in this fascinating field, thanks to some research on the subject. This is the case even though there has been much discussion about the relationship between government spending and economic growth (Reinhart & Sbrancia, 2015).

Spending by the government is an essential component in the fight against poverty in the vast majority of developing countries, the majority of which are located in Sub-Saharan Africa. This is something that can be accomplished if governmental spending is directed towards programmes (like infrastructure) that will narrow the wealth gap. Because of the swift increase in population and the rising demand for goods and services, governments are forced to spend money to meet the requirements of their constituents. The government may make purchases in an effort to encourage private investment, which will ultimately lead to an increase in GDP. More money is ultimately spent by governments as a direct consequence of this process (Olaoye et al., 2020). Sub-Saharan Africa is comprised of 48 countries that are divided into four sub-regional blocks.

The economic growth rate of Sub-Saharan Africa in 1980 was 4% and falls to -1.2 percent in 1983 and -0.9 percent in 1992. From 1980 to 2012, the GDP growth rate of Sub-Saharan Africa was 3.1% and later increased to 6.1% in 2006 before dropping to 4.2% in 2012 (World Bank, 2020). These GDP growth rate figures are particularly interesting because they show that growth rates in Sub-Saharan Africa are currently trending in an uneven and erratic way. This is one of the reasons why these figures are so interesting. Because of significant macroeconomic imbalances, the majority of Sub-Saharan African countries saw a gradual decline in their economic performance from the late 1970s to the early 1980s. This trend began in the 1970s and continued through the 1980s. These imbalances included widening budget deficits as well as expanding current account balances (Dramani, 2010).

In order to bring the macroeconomy back into balance and stimulate growth, governments have adopted more stringent fiscal policies, which have either increased taxes, primarily on the formal sector, or reduced spending (Ismaila & Imoughele, 2015). These decades were irretrievably lost for Africa's economic development. After some time had passed, the World Bank and the International Monetary Fund (IMF) made recommendations regarding programmes of structural adjustment to assist in the implementation of these policies (Thomson, Kentikelenis & Stubbs, 2017). These programmes were implemented in a variety of nations, including Ghana, Kenya, Zambia, and Senegal, to name a few. For example, the National Development Plan, which was carried out in Kenya from 1997 to 2001 and was recognised by the

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government as structural reform, was put into effect during that time period. The plan acknowledged investment from the private sector as a primary engine of expansion during that time period (Bhattacharya, Oppenheim & Stern, 2015). In 1997, Kenya's gross domestic product (GDP) growth rate was less than 1%, but it increased to 3% that same year and then increased to 4% by the time the development plan was fully implemented in 2001. Despite this, between 1997 and 1999, government spending (as a percentage of GDP) remained unchanged at 16%; however, in 2000, it decreased by 1%. In 2001, it reached a percentage of 16 percent (World Bank, 2020).

Advocates of bigger governments frequently contend that government-run programmes are accountable for providing crucial public goods, such as infrastructure and education. Serageldin and Grootaert (2017) have posited that governments play a significant role in fostering economic growth through various means. Several factors are involved in the provision of a functional society, such as the establishment of a legal and social structure, the provision of judicial services, defence and police protection, and the safeguarding of property rights. Additionally, addressing market imperfections, constructing economic infrastructure, regulating externalities, and allocating funds to promote social cohesion and enhance labour force productivity are essential components of this process (Liu, Li & Yang, 2018). In addition, it is plausible that governmental endeavours can incentivize entrepreneurs to establish their own enterprises, amplify private investment, and ultimately facilitate the growth of the economy through the synergistic collaboration of public and private capital formations (Ostrom & Ostrom, 2019).

Conversely, advocates of limited government contend that an expanded government could impede economic development due to the inefficacy and misalignment of many of its pursued initiatives with the authentic concerns of the broader public. This assertion is made based on the premise that a government with a larger size of operations tends to have a higher number of employees. The inefficiencies in the delivery of government output may arise due to various factors such as the bureaucratic decision-making process in the public sector, the political strategy of promoting the interests of cohesive minorities at the cost of society, and the activities of interest groups that advocate for the diversion of resources towards rent-seeking endeavours to redistribute income in their favour.

Furthermore, it has been argued that a number of the monetary and fiscal policies implemented by the government may have the effect of distorting economic incentives and diminishing overall system efficiency (Smets, 2018). In the present context, taxes and transfers are perceived as factors that reduce the motivation for engaging in employment and investment by causing market prices to deviate from their natural state (Collado, 2016).

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It has been extensively researched in the literature that for SSA countries, the association between output growth and public expenditure is directly proportional (Nurudeen & Usman, 2010; Usman & Agbede, 2015; Kimaro et al., 2017; Ademuyiwa & Adetunji, 2019). The effect of public spending on economic growth in SSA was the primary focus of these studies, rather than the varying degrees of economic success experienced by the various nations. None of these studies has differentiated between the African nations of sub-Saharan Africa that have higher and lower incomes (upper- and middle-income countries).

Policymakers will need to know which aspects of government spending contribute significantly and favourably to output growth in SSA's low- and middle-income economies. It will be possible to design policies that are specific to each income level of SSA countries with the help of policy action based on these empirical findings. This study adds to the body of knowledge on output growth and public spending by categorising SSA countries into three low and middle-income (upper and lower) groups.

The novelty of this study lies in the fact that it examines the relationship between public spending and economic growth while taking into account the varying levels of income in SSA countries. First things first, this study to the best of our knowledge is essentially the first one of its kind because it analyses SSA according to the classification of income levels used by the World Bank. This is extremely important to keep in mind when attempting to draw conclusions regarding the relationship between spending and output growth in the upper and lower countries of SSA. In some earlier studies (e.g. Eze et al., 2022; Njagi, Arsenijevic & Groot, 2018), SSA nations were classified according to their respective regional locations. Even though they are located in the same general region, some countries' economic outlooks couldn't be more different from one another. The policymakers will learn from the analysis based on income classification what the governments of low-income countries should spend and do in the process of allocating resources if they want to improve their economies.

Second, researchers do not take into account how institutional quality influences the link between public spending and economic growth (Usman & Agbede, 2015; Taiwo & Abayomi, 2011). Furthermore, given that SSA is frequently noted for having weak institutions (Liani, Nyamongo & Tolhurst, 2020). Moreover, it is noteworthy that the Southern and Eastern African regions have been consistently identified as possessing inadequate institutional frameworks (Shobe, 2017; Asamoah, Mensah, and Bondzie, 2019). Therefore, it is imperative to identify the precise institutional elements that impede financial progress in the region, consequently hindering its economic advancement. The reason for this is that the regions of Southern and Eastern Africa are often acknowledged for possessing inadequate institutional

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frameworks. Rodrik (2000) argues that non-market institutions are necessary for markets to function well, and sub-Saharan Africa (SSA) markets are no exception.

Related Literature

The definition of institutions used most frequently in recent literature is that provided by North (1991, 1993), who defines institutions as a society's rules of engagement (Aluko & Ibrahim, 2020). According to North, institutions are the constraints that humans have developed to structure human interaction. Formal restrictions include laws, rules, and constitutions. Informal constraints include things like standards of conduct, traditions, and self-imposed codes of conduct. Institutions exhibit enforcement traits as well. Institutional quality refers to an institution's suitability and effectiveness, which determines how well they can distribute resources and increase productivity. Despite the differences in these definitions, they all refer to the existence of social structures and systems that affect how different sectors of society—from non-market to market sectors—interact with one another. The sufficiency or quality of institutions is represented in this study by Rodrik's five primary institutional categories (Rodrik, 2000). Market efficiency is made possible by these five crucial institutions.

In his work, Rodrik enumerates several establishments, encompassing those dedicated to the safeguarding of property rights, regulation, macroeconomic stabilisation, social insurance, and conflict resolution (2000). Hence, in order to facilitate financial inclusion and expedite economic growth in Sub-Saharan Africa, it is imperative that these five establishments are functioning effectively within the financial markets. According to Rodrik, a crucial inquiry to make in this scenario is identifying the particular institutions that hold significance and determining the means of obtaining them. The inference can be drawn that it is crucial to delve deeper into the institutional foundations of market economies, rather than solely focusing on price reforms. This is exemplified by the interplay between neoclassical economics and developing societies. The likelihood of incentives leading to employment is minimal, and in the absence of sufficient institutions, this circumstance often results in unfavourable consequences.

According to Adam, Henstridge and Lee (2020), during 2022, Sub-Saharan Africa GDP growth rate was 3.57%, a 0.61% decline from 2021 and was -2.00% in 2020, a 4.6% decline from 2019. This decrease is as a result of the Coronavirus (COVID 19), which started in 2019 and crippled the world economy. Before, the COVID19 GDP growth rate of SSA has experienced an average annual growth rate of 2.4%, leading to a 50% rise in 2015 (Jena & Sethi, 2020). Several justifications have been presented for this reversal. Illustrative instances comprise enhanced macroeconomic strategies, escalated

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overseas assistance, and a noteworthy abatement in the indebtedness of sub-regional countries. Throughout the 2000s, the escalation of commodity prices and the proliferation of mineral resource extraction in various nations exerted a notable influence. During the period spanning from 1996 to 2011, there was a notable difference in the growth rate of GDP per capita between countries that possess abundant natural resources, such as Angola, Nigeria, and Zambia, and those that do not, such as Ethiopia, Rwanda, and Mozambique. Specifically, the former group experienced an average growth rate that was 2.2 times faster than the latter group. The nations endowed with abundant resources have made noteworthy contributions to the recent economic growth of Sub-Saharan Africa. Moreover, the emergence of fresh mineral findings indicates that they are likely to persist in their contribution in the times ahead. It is projected that by the year 2020, a mere four to five countries within the subregion will have yet to be exploited. According to the authors, the dissimilarity in growth performance can be accounted for by a greater pace of population growth in nations with limited resources compared to those with abundant resources (wherein the overall GDP escalated merely 1.3 times in contrast to 2.2 times in resource-rich countries relative to resource-poor countries).

The link between government expenditure and economic growth was first raised by Adolph Wagner in 1870, stating that public expenditure increases as national income rises (Wagner's law) (Inchauspe, MacDonald & Kobir, 2022). Then in 1961, Alan T. Peacock and Jack Wiseman confirmed Wagner's Law that public expenditure in the United Kingdom in the period between 1891 and 1955 has positive relationship with economic growth (Peacock & Wiseman, 1961).

According to Cakerri et al. (2014), the act of augmenting government expenditure through the acquisition of funds from private investors does not generate fresh spending capacity in the economy, a crucial element for the promotion of economic expansion. Rather than initiating new and lucrative endeavours that promote economic expansion, the government's borrowing from private investors leads to the redistribution of existing income. Rather than engaging in wealth redistribution among its populace, the nation's economic expansion is propelled by the generation of fresh purchasing power. Increased government expenditure exerts greater strain on the credit market, thereby stimulating a rivalry for credit availability between the public and private sectors, and subsequently leading to an escalation in interest rates. According to Najmuddin (2020), the theory posits that elevated interest rates have the potential to displace private enterprises and impede the pace of economic expansion. Furthermore, a country's national income multiplier is greater when it is funded by external financial resources rather than internal ones.

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The utilisation of external financial resources to finance public projects results in the infusion of new economic resources and mitigates the crowding out effects that arise from increased government spending (Shen et al., 2018). Hence, the utilisation of external financial resources for government spending is deemed more efficacious in stimulating economic growth and circumventing potential threats to the expansion of the private sector. The present argument posits that it is advisable for developing countries to restrict their domestic borrowing practises and factor in the necessity of obtaining external financial resources when expanding their public sectors.

The proportion of imports in overall expenditure is a contributing factor to the deceleration of economic growth resulting from government spending. Many government initiatives in developing countries are dependent on the importation of technology and other essential resources. Consequently, the allocation of public investment spending exhibits a reduced focus on domestic affairs, implying that a greater proportion of governmental demand is being financed by imports. According to Shen et al. (2018), a decrease in domestic bias in public investment can lead to a deceleration in economic growth as a result of heightened government spending. The primary outcome of the research indicates that fiscal policymakers ought to be mindful of the negative impact of an upsurge in imports on a nation's reserves and real exchange rates, particularly when such imports are funded by domestic financial resources. This assertion holds particularly true in cases where domestic financial resources are utilised to finance the payment for said imports (Shen & Yang, 2018). Hence, countries should think about the importance of setting up their own capacity to meet government demand rather than heavily depending on imports.

Finally, Gui-Diby (2021) posits that the impact of increasing government expenditure on economic growth is contingent upon the presence of a non-discriminatory tax system. Daun et al. (2015) provide a comprehensive analysis of the taxation system and assert that a nation may accumulate debt when its government spending surpasses its revenue. This phenomenon is prevalent in developing countries, such as the low-income region of Sub-Saharan Africa. The escalation of public debt leads to macroeconomic imbalances that are not sustainable. The private sector may curtail its investment plans in response to the fiscally unsustainable situation where government expenditure surpasses government revenue. The deceleration of private investment can impede economic growth due to its adverse multiplier impact.

To mitigate distortions, it is advisable for governments to evaluate the efficacy of their taxation systems in accordance with the taxation theory of the respective country. Taxation systems ought not to pose a threat to the

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sustainability of the private sector. Rather, they should be conducive to promoting cooperation between the public and private sectors.
Additionally, developing country governments should think about how crucial it is to eliminate budget deficits in order to prevent debt accumulation. Budget deficits can be reduced through a combination of government spending cuts and increased tax revenues.

The subsequent sections present research on the correlation between government expenditure and economic development. Nevertheless, the aforementioned research failed to account for the potential impact of incorporating institutional quality into the analysis of the relationship between expenditure and growth, leading to outcomes that lack credibility.

The study conducted by Olayungbo and Olayemi (2018) explores the interconnections among non-oil revenues, government expenditures, and economic growth in Nigeria spanning from 1981 to 2015. The study encompasses the temporal span from 1981 to 2015. Following the identification of the enduring association between the variables, an evaluation of the error correction model was conducted. The impact of government spending on economic growth was found to be unfavourable in both the short and long term, while non-oil revenue was found to have a positive effect on economic growth.

Taiwo and Abayomi (2011) conducted a study that is similar to the present one, utilising the Ordinary Least Squares (OLS) method to examine the relationship between categorical government spending and the growth of Nigeria's economy. The present inquiry employs a combination of Ordinary Least Squares (OLS) approach and time series data in its research methodology. The research indicates that increased government expenditure has a positive impact on the growth of the Nigerian economy.

Facchini and Melki (2013) have presented findings that are consistent with the use of cointegration methods and data spanning from 1896 to 2008. The results indicate a correlation between the Gross Domestic Product (GDP) of France and the magnitude of its governmental apparatus over an extended duration. Bojanic (2013) employs the Generalised Method of Moments (GMM) in Bolivia, a technique that guarantees the ability to generate dependable and precise estimations (Bivand & Piras, 2015; Han & Phillips, 2010), while also addressing the issue of endogeneity (Bivand & Piras, 2015; Han & Phillips, 2010). The sources cited in the text are Chen et al. (2014) and Gopalan & Rajan (2016). The available evidence indicates that augmenting the government's military expenditures in Bolivia can lead to a swifter pace of economic growth.

Chen, Lee, and Chiu (2014) conducted a study using a dynamic panel to examine the correlation between defence spending and economic growth. The study covers a total of 137 nations and employs a two-step generalised

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estimating equation (GMM) methodology, which improves the capacity to generate precise estimations (Siddiqui & Ahmed 2013).

Furthermore, Chen and colleagues (2014) have classified nations into four sub-categories according to their income status, namely the lower-income group, middle-lower income group, middle-higher income group, and higher-income group. By adopting this approach, researchers can circumvent the study of nations that lack comparability as a unified entity. Diverse outcomes are documented based on the level of income. According to the study conducted by Kimaro et al. in 2017, there exists a positive correlation between income level and government spending in low-income Sub-Saharan African nations. Obialor (2017) conducted a study which found that expenditures allocated towards healthcare and education have a noteworthy and favourable impact on the growth of Nigeria's output. Kimani and Maingi (2021) conducted a study which found that an increase in government spending on infrastructure, investments, economic affairs, health care, and defence has a positive impact on income. The research revealed an inverse relationship between income levels and debt service costs.

Methods

This section is dedicated to discussing the research methodology that was used for the study. More specifically, this section discusses the model specification, variable measurement, and, finally, the estimation techniques employed for the data analysis. The stationarity properties of the variables were analysed, and the results of the stationarity analysis were employed to determine which estimation method should be used to calculate the error adjustment, short-run relationship, and long-run relationship.

Dependent Variable

Economic growth refers to the expansion in the output of goods and services within a specified timeframe. There are multiple methods for quantifying economic growth. Gross Domestic Product (GDP) is a commonly utilised metric by economists to gauge economic growth. However, there are some who prefer to employ human development as an alternative measure. The study employs the GDP per capita as the standard for gauging economic growth (as seen in Dudzevičiūtė, Šimelytė & Liučvaitienė, 2018; Ahuja & Pandit, 2020). The Gross Domestic Product (GDP) refers to the gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2015 billion U.S. dollars, for normalisation the log of GDP per capita was used.

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Independent Variables

Government Expenditure: This is the amount that is paid out by the government, and it takes into account all of the organization's recurring costs that are connected to the purchase of goods and services (including compensation of employees). Also accounted for are the vast majority of the costs associated with national defence and security; however, the expenditures made by the government on military activities that are not considered to be part of capital formation are not accounted for. Data are in constant 2015 billion US$, for normalisation the log of Government Expenditure was used.

Capital Stock: The data provided encompasses estimations for four distinct categories of assets, namely structures (encompassing both residential and non-residential structures), machinery (inclusive of computers, communication equipment, and other machinery), transportation equipment, and other assets. Structures encompass not only residential and non-residential buildings, but also software, other intellectual property products, and cultivated assets.

The file denoted as the capital detail file encompasses a diverse range of topics, including but not limited to the current-cost net capital stock (Kc), capital stock deflator (Kp), capital investment at current national prices (represented by the Ic variables), and capital consumption at current prices. The document delves into additional subject matters, such as capital investment at present national prices, which is denoted by the Ip variables. Each of these subjects is further subdivided into their corresponding categories (Dc). The subsequent elucidation pertains to the correlation: The formula for investment in an asset at constant national prices is expressed as $I_{at} = Ic/Ip$.

The variable K represents the capital stock of a given asset, which is measured at constant national prices and is determined by the equation $1 - at^2$. The expression presented is a mathematical formula that involves the variables K and I, as well as the variable t, which represents time. Specifically, the formula calculates the value of a variable at a given time, where the value is determined by multiplying the value of the variable at the previous time point $(t - 1)$ by the constant K and adding the product of the current value of the variable and the constant I. The data is derived from the Penn World Table 9.0 (PWT 9.0) and it measured in the log of capita stock.

Institutional Quality: The institutions in Rodrik's (2000) collection were used to compile an index of institution quality. The set of institutions includes institutions for social insurance, property rights, regulation, macroeconomic stabilisation, and institutions made with principal component analysis (PCA).

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Source of Data

The data set covers the time period from 1985 to 2021 and is composed of observations pertaining to 32 countries. The World Development Indicators (WDI, 2020), the Risk Guide and the World Governance Indicators (WGI), and the Penn World Table were the sources that were used to compile the data (PWT).

Table 1: Source of Data

Symbol	Variable Name	Source	Description
ln(GDPPC)	Per Capita GDP	WDI	GDP divided by the midyear population.
ln(INS)	Institutional Quality	ICRG/AUTHOR	A measure of institutional quality is created by combining the five variables of institutional quality and democracy. This is the PCA-derived created measure of financial development.
Ln(GVTEXP)	Government Expenditure	WDI	All current government expenditures expressed in constant 2015 US dollars.
ln(CS)	Capital Stock	PWT 9.0	The relative price of the capital stock is derived from asset-specific investment data
ln(TOP)	Trade Openness	WDI	Export-Import difference

Source: Authors' Own Compilation (2023)

Econometric approach

The present investigation employed the Panel Unit Root Econometric Test. The IM, Pesaran (2005), and Shin (IPS) W-stat (2003) tests were specifically employed. The utilisation of estimation strategies such as Pooled Mean Group and Dynamic Fixed Effect (DFE) was based on panel cointegration.

Panel Unit Root Test

It is imperative to ensure that all variables exhibit stationarity prior to proceeding with the appropriate analytical techniques for data analysis. This

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task ought to be executed irrespective of whether the variables are of identical magnitude or of a heterogeneous magnitude. To achieve this objective, we employed the IPS W-stat (2003) test, which is a first-generation panel unit root test, in combination with the second-generation panel unit root test proposed by Pesaran (2005) called Cross-Sectional Augmented IPS (CIPS). Both of these experiments were conducted to ascertain the statistical significance of the panel unit root. However, (CIPS) takes into the account of cross sectional dependency in the data set. This is because cross-sectional dependence can emerge due to various factors such as unobserved commonalities, externalities, regional and macroeconomic connections, and residual interdependence that has not been accounted for. This study considers the Cross-Sectional Augmented IPS (CIPS) as a prominent second-generation test, which was introduced by Pesaran (2005). In his work, incorporates the following factors to construct a formula for a panel unit root test that accommodates cross-sectional interdependence: The CIPS statistics is given in equation (1) as

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} t_i(N,T) \quad (1)$$

where $t_i(N,T)$ is the t-statistic of the OLS estimate for the equation $y_{it} = \alpha_i + y_{it}^{o}$

Pooled Mean Group (PMG) Estimator

The salient feature of the PMG model is its ability to accommodate cross-country heterogeneity in short-run coefficients, including intercepts, the rate of convergence to long-run equilibrium values, and error variances. However, it mandates homogeneity in long-run slope coefficients across all countries. The most distinctive feature of the PMG is hereby identified. The aforementioned differentiation between the two types of coefficients is of utmost significance. This approach proves to be particularly advantageous in cases where there exist grounds to expect that the association between the variables in the steady-state equilibrium will remain consistent across all nations or a specific subset of nations. It is conceivable to anticipate that the association between the variables in the state of long-term equilibrium will remain constant. The short-term adjustment can be customised to the specific requirements of a given nation, considering factors such as its vulnerability to financial crises and external shocks, as well as its stabilisation policies and monetary policy, which can have a significant impact on outcomes. However, for the methodology to be deemed valid, consistent, and efficacious, several prerequisites must be fulfilled.

In order to establish a long-term association between the variables of interest, it is necessary for the error-correction term's coefficient to possess a

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negative value that is equal to or greater than -2. Secondly, for the sake of consistency in the ARDL model, it is imperative to assume that the residual resulting from the error-correction model is serially uncorrelated, and that the variables employed in elucidating the data can be regarded as exogenous. The fulfilment of these requirements can be achieved through the incorporation of ARDL (p,q) lags into the error-correction model for both the dependent (p) and independent variables (q). Furthermore, the relative magnitude of the dimensions of T and N holds significant significance as it governs the feasibility of employing the dynamic panel methodology. This technique aids in mitigating partiality in the mean estimators and resolves the issue of heterogeneity when both T and N possess a substantial populace. According to Eberhardt and Teal's (2010) argument, a crucial element in comprehending the process of growth is the manner in which heterogeneity is addressed. Failure to meet these conditions may lead to inconsistent estimation of PMG.

Dynamic Fixed Effects (DFE) Model

The PMG estimator and the Dynamic Fixed Effects estimator (DFE) exhibit a high degree of comparability. Similar to the PMG estimator, the DFE imposes constraints on the slope coefficient and error variances to ensure that these parameters are comparable across countries over a prolonged period. The validity of the DFE model is contingent upon the satisfaction of an extra constraint. This particular restriction requires that the coefficient of speed of adjustment and the coefficient of short-term effect must be equivalent.

Conversely, the model integrates intercepts that are specific to individual countries. The DFE platform offers users the capability to cluster their data, a process that enables the estimation of intra-group correlation and standard error (Blackburne and Frank, 2007). Baltagi, Gri, and Xiong (2000) have noted that the model is vulnerable to a simultaneous equation bias if the sample size is small. The reason for this phenomenon can be attributed to the endogeneity that is present between the error term and the lagged dependent variable.

The presence of a lagged dependent variable in the model is responsible for this bias. The efficacy of the PMG estimator is contingent upon the presence of persistent connections among the variables utilised in estimations, alongside a suitably augmented lag order of the dynamic specification of the model, to ensure that the regressors are weakly exogenous and the residual is serially uncorrelated. The rationale behind utilising the PMG estimator lies in its ability to estimate the likelihood of a specific variable remaining constant throughout a given period (Karaduman, 2015). Conversely, the DFE maintains consistent slope parameter values across both the short and long term. The autoregressive distributed lag model with a lag order of (p, q, q, q) is specified as the DFE and can be seen in equation (2).

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$$\Delta lnGDPPC_{it} = \sum_{j=1}^{p} b_{ij} lnGDPPC_{it-j} + \sum_{j=0}^{q} d_{ij} lnGOVTEXP_{it-j} + \sum_{j=0}^{q} f_{ij} lnINS_{it-j} + \sum_{j=0}^{q} h_{ij} lnCS_{it-j} + \sum_{j=0}^{q} k_{ij} lnTOP_{it-j} + v_i + e_{i.t} \quad (2)$$

The equation (2) was then transformed into a panel ECM below:

$$\Delta lnGDPPC_{it} = \psi_i(lnGDPPC_{it-1} - d_i^{\psi} lnGOVTEXP_{it} - f_i^{\psi} lnINS_{it} - h_i^{\psi} lnCS_{it} - k_i^{\psi} lnCS_{it}) + \sum_{j=1}^{p-1} b_i^* \Delta lnGDPPC_{it-1} + \sum_{j=1}^{p-1} d_i^* \Delta lnGOVTEXP_{it-1} + \sum_{j=1}^{p-1} f_i^* \Delta lnINS_{it-1} + \sum_{j=1}^{p-1} h_i^* \Delta lnCS_{it-1} + \sum_{j=1}^{p-1} k_i^* \Delta lnTOP_{it-1} + v_i + e_{i.t} \quad (3)$$

Where; $\psi_i = \sum_{j=1}^{p} b_{ij}^* - 1$, $d_i^{\psi} = -\sum_{j=0}^{p} \frac{d_{ij}}{\psi_i}$, $f_i^{\psi} = -\sum_{j=0}^{p} \frac{f_{ij}}{\psi_i}$, $h_i^{\psi} = -\sum_{j=0}^{p} \frac{h_{ij}}{\psi_i}$, $k_i^{\psi} = -\sum_{j=0}^{p} \frac{k_{ij}}{\psi_i}$ and $b_{im}^* = -\sum_{m=j+1}^{p} b_{im}$, $d_{im}^* = -\sum_{m=j+1}^{p} d_{im}$, $f_{im}^* = -\sum_{m=j+1}^{p} f_{im}$, $k_{im}^* = -\sum_{m=j+1}^{p} k_{im}$.

The coefficient ψ_i denotes the error correction component, which is expected to possess negative statistical significance and exhibit a smaller magnitude in instances where a cointegration metric is present, indicating a faster rate of convergence towards the long-term equilibrium. The coefficients d_i^{ψ}, f_i^{ψ} measure the long-run impacts of the independent variables on growth while the d_{im}^*, f_{im}^* measure the short-run impacts of the financial development, institutional quality and capital on growth per capita. Also, v_i stands for fixed effects and $e_{i.t}$ is the disturbing component.

Results and Discussion

This section presents the outcomes of the investigation, including the correlation analysis, Cross Sectional Dependency test, CIPS unit root test, Dynamic Fixed Effect test . The study variables are accompanied by descriptive statistics.

Descriptive statistics

Table 2 displays the descriptive of the study variables. The Log(GDPPC) range observed in low-income countries falls between 5.12 and 7.76, with an average value of 6.33. The Log(GDPPC) mean value for middle-income countries falls within the range of 6.25 to 9.15, with an average of 7.64. On average, countries with low and middle income have government spending logs of 20.54 and 21.95, respectively. This implies that in contrast to nations with lower income, nations with middle-level income exhibit greater expenditures and possess a higher Gross Domestic Product per capita. The

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mean institutional quality of low-income nations was 1.58, with a narrow standard deviation of 0.19. Middle-income countries exhibited higher levels of capital, with values ranging from 0.94 to 1.87. The mean value of trade openness in low-income countries is 20.15, while in middle-income countries it is 21.95.

Table 2: Descriptive statistics

Income	Variables	Obs	Mean	Std	Min	Max
Low Income	$lnCS$	629	9.22	0.82	7.11	11.50
	$lnINS$	629	1.58	0.19	0.72	1.88
	$lnTOP$	556	20.15	1.43	15.48	23.77
	$lnGDPPC$	629	6.33	0.46	5.12	7.76
	$lnGVTEXP$	556	20.54	1.36	17.39	23.71
Middle Income	$lnCS$	518	10.39	0.95	8.61	12.73
	$lnINS$	518	1.62	0.16	0.94	1.87
	$lnTOP$	518	21.34	1.52	11.98	25.55
	$lnGDPPC$	518	7.64	0.69	6.25	9.15
	$lnGVTEXP$	518	21.95	1.09	18.53	24.98
All	$lnCS$	1147	9.75	1.05	7.11	12.73
	$lnINS$	1147	1.60	0.18	0.72	1.88
	$lnTOP$	1074	20.73	1.59	11.98	25.55
	$lnGDPPC$	1147	6.92	0.87	5.12	9.15
	$lnGVTEXP$	1074	21.22	1.42	17.39	24.98

Principal component analysis for Institutional Quality Index

The index of institutional quality was derived by Rodrick through the utilisation of principal component analysis on five institutional variables (200). The aforementioned are the five categories of institutions, namely Institutions for Property Rights, Institutions for Regulation, Institutions for Macroeconomic Stability, Institutions for Social Insurance, and Institutions for Conflict Management. According to Table 3, a factor exhibited an eigenvalue exceeding one and a proportion surpassing 0.5. The institutional variables can be classified into a single factor, which explained 55.3% of the total variance.

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Table 3: Principal Component Analysis for Institutional Quality Index

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.2232	2.2592	0.5530	0.5530
Comp2	0.9640	0.1971	0.1225	0.6755
Comp3	0.7669	0.2309	0.1007	0.7762
Comp4	0.5359	0.1211	0.0878	0.8640
Comp5	0.4148	0.3196	0.0693	0.9333
Comp6	0.0952		0.0667	1

Cross Sectional Dependency

Gui-Diby (2021) highlights that cross-sectional dependence is a common occurrence in panel regression and emphasises the importance of addressing it to attain desirable results. The cross-sectional aspect of the study employed various tests, namely Pesaran's test, Friedman's test and Frees' test cross sectional dependency test. The results are elaborated in Table 4, presented subsequently. The results of all three tests indicate the presence of cross-sectional dependency in the panel data.

Table 4: Cross-Sectional Dependency

cross sectional independence	Test value	P-value
Pesaran's test	25.793	0.0000
Friedman's test	285.896	0.0000
Frees' test	9.352	0.0000

Unit Root Tests for Lower Income Countries

Table 5 displays the results of the panel unit root tests. According to the findings, economic growth and financial development are integrated at order one I(1), whereas capital and institutional quality are I(0) variables. Theoretically, panel cointegration estimation using pooled mean group (PMG) and dynamic fixed effect estimators is possible when the variables have a mix of I(1) and I(0) properties (DFE). Table 5 shows the results of the panel unit root

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Table 5: Panel Unit Root Test Without Breaks

	Serries	All		Low Income		Middle Income	
	Serries	IPS W-stat (2003)	Cross-Sectional Augmented IPS (CIPS)	IPS W-stat (2003)	Cross-Sectional Augmented IPS (CIPS)	IPS W-stat (2003)	Cross-Sectional Augmented IPS (CIPS)
$lnGDDP_t$	Level	-0.245	2.934	-1.199	1.531	0.985	2.679
	1st Diff.	-9.198***	-12.035***	-6.786***	-10.330***	-6.273***	-6.526***
$lnCS$	Level	1.774	4.700	-1.652**	1.293	-3.503***	-0.986
	1st Diff.	-7.934***	-13.376***	-3.860***	-5.129***	-3.198***	-5.760***
$lnins$	Level	-5.794***	-3.983**	-4.057***	-2.760***	-4.187***	-2.886***
	1st Diff.	-20.446	-18.304***	-16.066***	-14.028***	-12.688***	-11.779***
$lnGEXP$	Level	1.774	4.700	2.876	4.106	0.275	2.515
	1st Diff.	-7.934***	-13.376***	-5.929***	-9.712***	-5.286***	-9.199***
$lnTOP$	Level	2.487	0.584	2.490	2.325	0.756	-1.566*
	1st Diff.	-14.250***	-21.157***	-12.220***	-14.092***	-7.763***	-15.864***

*** represents unit root significant at 1%, ** represents unit root significant at 5%

Estimates of Long-run, Short-run Coefficients and Error Correction Term

Table 6 displays the results of the PMG and DFE techniques for the impacts of government spending on economic growth in the short and long term, while taking into account the influence of institutional quality. The error correction term obtained from the PMG, and DFE methods are also presented in Table 6.

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Table 6: Estimates of Long-run, Short-run Coefficients and Error Correction Term

	All		Middle Income		Lower Income	
VARIABLES	PMG	DFE	PMG	DFE	PMG	DFE
Long-Run Coefficients						
$lnGEXP$	0.0909	0.0416	0.1915***	-0.0557	0.1928***	0.1357
	(0.0761)	(0.1005)	(0.0417)	(0.1992)	(0.0667)	(0.0861)
$lnCS$	0.0410	0.1022	0.2865***	0.2189	0.0991	-0.0628
	(0.0410)	(0.1164)	(0.0516)	(0.2083)	(0.2453)	(0.1792)
$lnins$	3.4602***	1.5096***	0.9412***	1.2902**	3.1873***	1.8854***
	(0.5677)	(0.4435)	(0.1116)	(0.5418)	(0.4906)	(0.5929)
$lnTOP$	0.0799***	0.1023**	-0.0420	0.1308*	0.0759***	0.0815*
	(0.0247)	(0.0456)	(0.0299)	(0.0676)	(0.0247)	(0.0457)
Short run						
Error correction	-0.0313***	-0.0604***	-0.0752***	-0.0596***	-0.0397**	-0.0648***
Term (ECT)	(0.0080)	(0.0169)	(0.0245)	(0.0225)	(0.1671)	(0.0233)
$\Delta lnGEXP$	0.0828***	0.0263***	0.0721***	0.0270**	0.0839***	0.0259***
	(0.0172)	(0.0083)	(0.0236)	(0.0136)	(0.0297)	(0.0094)
$\Delta lnCS$	0.0210	0.0065	0.0539	-0.0142	0.0420	0.0235
	(0.0279)	(0.0203)	(0.0395)	(0.0283)	(0.5427)	(0.0270)
$\Delta lnins$	-0.0215	0.0008	0.0153	0.0157	-0.04124	-0.0328
	(0.04877)	(0.0333)	(0.0264)	(0.0447)	(0.0887)	(0.0479)
$\Delta lnTOP$	0.0058	-0.0036**	0.0199	-0.0040	-0.0035	-0.0034
	(0.0086)	(0.0018)	(0.0167)	(0.0043)	(0.0040)	(0.0022)
Constant	-0.0798***	0.0396	-0.0767***	0.0555	-	0.0379
	(0.01717)	(0.0704)	(0.0273)	(0.0957)	0.1441***	(0.0759)
					(0.0522)	
Hausman	17.32**		1.36		0.98	
No. of Country	29		15			14
Observations	1044		540			504

Note: *** Significance at 1% level; *** Significance at 1% level

According to Table 6, the adjustment coefficients for both methods (PMG and DFE), regardless of the country's type of economy, are between 0 and -1 and are significant at 1%. For the combined data, the error correction terms from PMG and DFE are -0.0313 and -0.0604, respectively. This means that, according to the PMG estimate, only 3.13% of the system's disequilibrium is corrected within a year.

The present study utilised the Hausman h-test to assess the relative efficacy and coherence of the two methods. The results indicate that the computed Hausman statistic is 17.32 and follows a $\chi 2(1)$ distribution. This section culminates in the rejection of the PMG estimator, which, despite being the most efficient under the null hypothesis, fails to meet the necessary criteria. Consequently, the Dynamic Fixed Effect model is the favoured option.

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According to the DFE model applied to combined data, a noteworthy correlation exists between government expenditure and economic growth in the short term. However, the aforementioned correlation between government expenditure and economic growth is deemed insignificant in the long term. Over time, it was found that the calibre of institutions and degree of trade openness significantly aided in fostering economic development.

Subsequently, we proceed to recalibrate the models for low-income and middle-income countries situated in sub-Saharan Africa, with the aim of ascertaining the degree to which the aforementioned discovery fluctuates with respect to income bracket. Table 5 displays the outcomes, while the Hausman statistic attains a value of 1.36, signifying that the PMG estimator, which is effective under the null hypothesis, is not refuted. Consequently, the PMG model was deemed necessary for nations with low-income status. The findings suggest a noteworthy correlation between public expenditure and economic expansion in both the immediate and extended periods. The aforementioned outcome is in line with Kouassi's (2018) claim that government expenditure plays a crucial role in fostering economic growth in developing countries. According to their explanation, government spending generates employment opportunities for individuals who lack the means to establish their own industries. The allocation of funds by the government generates job prospects, thereby fostering economic growth.

The findings of the evaluation of the approximations for middle-income nations were analogous to those of the low-income nations. According to the results of the Hausman test, the PMG model is the preferred choice. According to the PMG's findings, the influence of government expenditure on economic growth was noteworthy, encompassing both immediate and prolonged time frames. The results corroborated the study conducted by Olaoye, Eluwole, Ayesha, and Afolabi (2020) which indicated a favourable relationship between government expenditure and economic advancement in the Economic Community of West African States (ECOWAS) during the duration of the research.

The variable of institutional quality was found to have a significant impact on economic growth in all models. Over the course of time, irrespective of the state of the economy, the quality of institutions assumes a pivotal role in the advancement of the economy. The aforementioned outcome substantiates the claim made by Olaoye and Aderajo (2020) that the efficient operation of an institution can lead to favourable consequences in various governmental endeavours. Agostino, Dunne, and Pieroni (2016) posit that economic growth is only impeded by government spending when an institution is weak.

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Conclusion

There is a mounting apprehension regarding the influence of governmental expenditures on the economic development of Sub-Saharan Africa. The present study delved into the extent to which the existence of institutional attributes can augment the association between government expenditure and economic expansion, surpassing a mere scrutiny of immediate impacts. The study's findings suggest that government spending can have a positive impact on both short- and long-term economic growth in low- and middle-income countries, provided that institutional quality is present. The utilisation of an estimable form of the model and its application to 32 countries provides confirmation of the theoretical proposition that economic growth is enhanced by government investment spending in the presence of institutional quality. The impact of institutional quality on the correlation between government spending and economic growth necessitates the inclusion of this variable in any analysis. Failure to account for institutional quality may result in inaccurate estimations of the relationship between government spending and economic growth (Government spending and economic growth).

In light of the potential implications of these findings, it is suggested that institutions should possess a strong and autonomous structure, devoid of any unethical conduct, in order to enable the populace to fully capitalise on the government's investments in economic expansion. It is imperative to optimise the utilisation of public funds in constructing infrastructure that is both self-sustaining and resilient.

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