FINANCIAL ARCHITECTURE AND ECONOMIC PERFORMANCE: EVIDENCE FROM NIGERIA, GHANA AND COTE D'IVOIRE

Abiodun Hafeez Akindipe*[1]

Abstract

The extent of the impacts of financial architecture (whether bank-oriented or market-based) on the economy depends on the level of financial development. Most countries in West Africa have similar financial structure. Their financial architectures are bank-based and the levels of financial development are relatively low compared to the rest of the world. It is in this light this paper seeks to examine the impacts of the nature of financial architecture on economic performance of selected countries in West Africa given the level of financial development. Due to the non-availability of data for certain indicators, three countries in West Africa (Cote d'Ivoire, Ghana and Nigeria) are considered. Annual data from 1995 to 2018 are employed using Blundell and Bond System Generalized Method of Moment (GMM).

Based on the System GMM results, financial architecture exerted marginal impacts on growth of the selected countries. However, when financial architecture was augmented by financial development, financial architecture had a positive impact on growth. Though financial development had a negative effect on growth, all other control variables had the expected signs. The negative impact of financial market development on growth was because most countries in West Africa have a relatively low level of financial development. Therefore, for financial architecture to significantly and positively influence economic growth in these selected countries, the level of the financial market development has to be improved.

Keywords: *Financial architecture, GDP per capita, GMM, West Africa, Financial development*
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*Author's E-mail: hafeezakindipe@Gmail.com
[1] Nigeria Institute of Social and Economic Research (NISER)

1.0   INTRODUCTION

The relative importance of banks and financial markets in providing capital has been a long-standing issue in corporate finance. This can be considered in macroeconomic terms as to whether an economy's financial architecture (FA, hence forth) i.e. the degree to which the financial system is either market-based or bank-oriented, has some effect on the performance of the real sectors. The lack of unified approach in the literature on the prediction of different theory that emphasize specific features of markets or banks warrants the need for in-depth study on the role of FA in an economy (Tadesse, 2001). However, considering varying opinions, the middle ground would be to argue that the influence of a particular architecture depends on a variety of country-specific factors. These factors include but not limited to the contractual environment of the country, the informational structure of the participating firms, level of financial development (FD, thereafter) and technological characteristics of the economy (Rajan and Zingales, 1998).

West Africa is a diverse region consisting of four middle-income and twelve low-income countries. The region is generally underdeveloped in terms of finance. The FA of the region is dominated by banks and only few countries in the region have well established financial markets. West African stock markets, apart from Nigeria, remain the smallest in any country, both in terms of the number of listed companies and market capitalization (Allen, Otchere and Senbet, 2011). The banking system is characterized by a large number of money deposit banks investing in government financial assets such as treasury bills. This accounts for the poorly developed financial market in the region as most banks shun private sector's credit in favour of safer assets such as government securities (Allen, Otchere and Senbet, 2011). The poorly developed financial system results in less effectiveness of FA in the region.

Since it has been argued in the literature that the role of FA in the performance of the economy depends on level of FD and the nature of FA, it is pertinent to examine the impacts of FA on economic performance in West African countries, where FA is bank-based and the FD is relatively low compared to other regions of the world. So far, only three countries (Ghana, Cote d'Ivoire and Nigeria) have well established stock market. Therefore, the study is limited to panel data analyses of these three countries. The data span from 1995 to 2018 using the measure of FA employed by Levine and Demirguc-Kunt (1999) and private sector credit to GDP ratio as an indicator of level of FD in the selected countries. Following this introduction, the next section focusses on stylized facts on financial structure and economic performance in the selected West Africa countries. While section 3 reviews the literature, section 4 discusses the methodology. Results are analysed in section 5 and section 6 concludes the study.

2.0   Stylized Facts on Financial Structure and Economic Performance in the Selected West African Countries

It has been argued in a large body of literature that the economic growth of a particular economy depends on its financial structure. This is most likely to be true in developing countries where the financial system is underdeveloped and bank-based. For instance, the financial sectors in the West African region are largely dominated by the banking industries and the share of total financial assets controlled by markets are very low. This argument is buttressed by figure 1 which displays FD as measured by both market and bank indicators vis-à-vis GDP growth rates for the selected West African countries. In the figure, bank assets to GDP ratio stand out for Nigeria and Ghana as they dominate the total value of listed assets in the stock market as measured by the respective countries' market capitalization. In Nigeria, for example, while the average ratio of bank assets to GDP between 1995 and 2017 was 14.94 per cent, that of stock market capitalization to GDP was 12.71 per cent. The closeness in the value of these two measures was due to financial sector development agenda of policymakers in this country to promote market-based financial system in the recent time. Similarly, Despite the regional concentration of Francophone countries' capital market in Cote d'Ivoire, bank assets outweigh capital market assets as a share of GDP on average. Within the period under consideration, the value of the average share of bank assets in GDP for Cote d'Ivoire was 21.56 per cent compared to 18.67 per cent of market capitalization.

Figure 1: Trend of Financial Development and GDP Growth in Ghana, Cote d'Ivoire and Nigeria
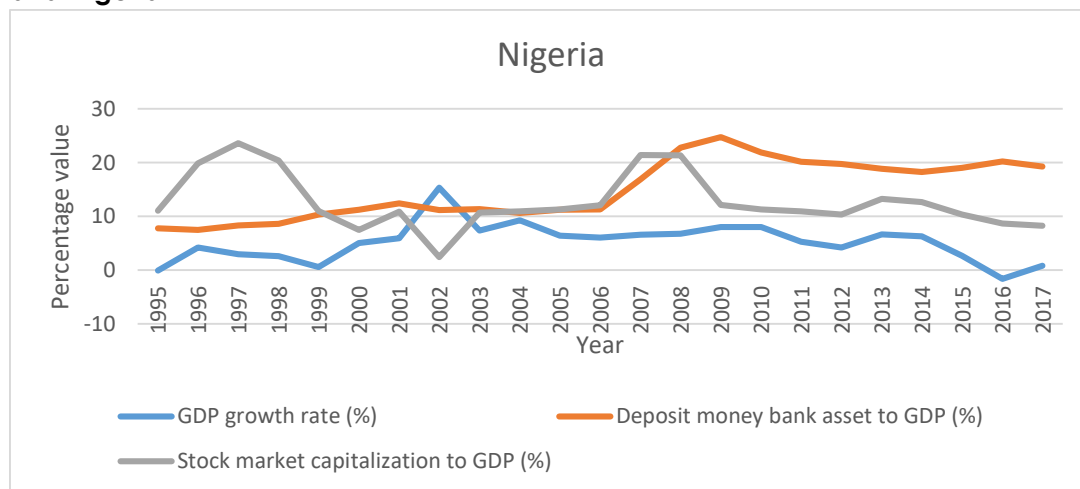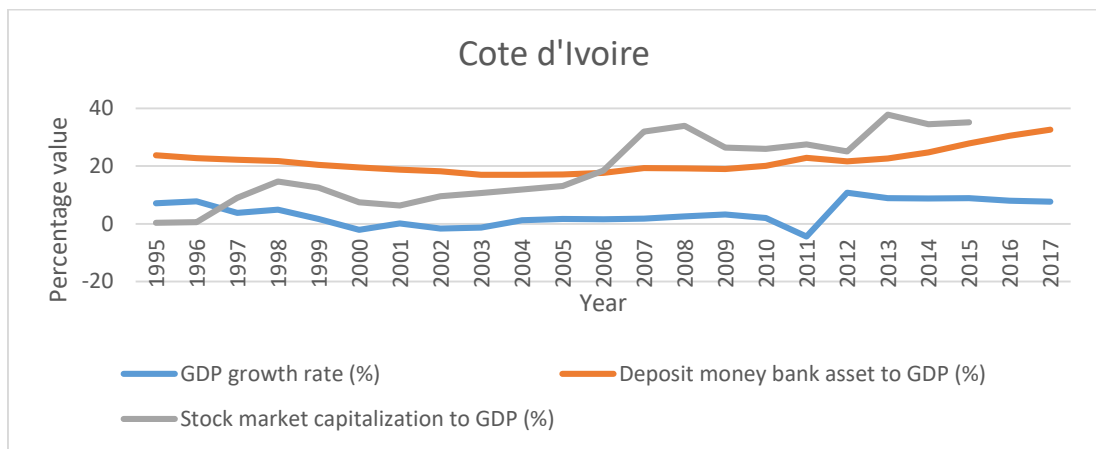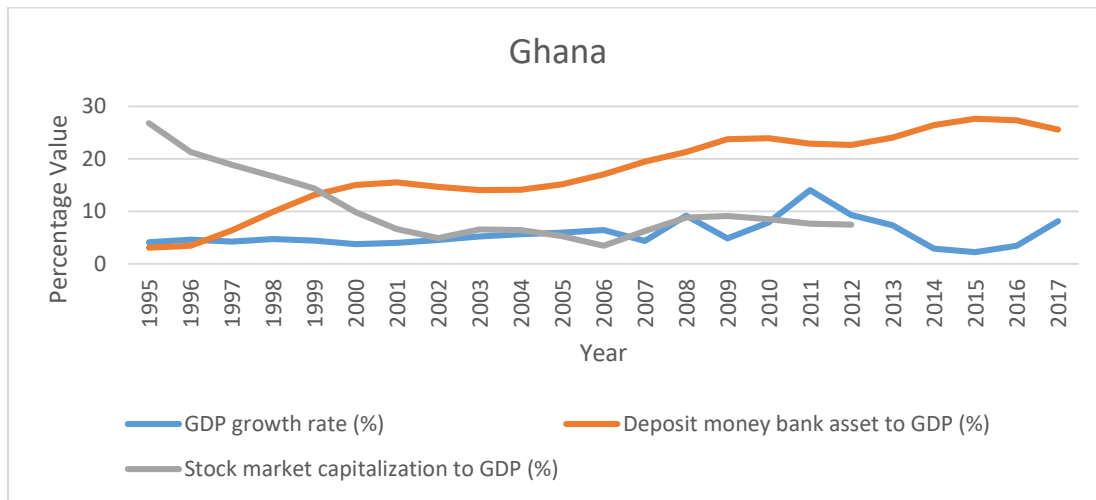
Source: Author's computation

Furthermore, even though governments in West Africa have introduced various policy reforms to achieve much-needed legal regulatory frameworks, information infrastructure and regulatory institutions, West Africa's financial sectors continue to be less developed compared to other emerging market regions. West Africa's stock markets face serious challenges in terms of the depth measured by market capitalization and listing. Except for Nigeria, West Africa stock markets remaining the smallest of any region, both in terms of number of listed firms and market capitalization. However, West Africa and Africa in general possesses certain advantage that will enable the region to surpass some of its emerging market counterparts in terms of financial sector development in coming decades and beyond. The West Africa region

is opened to new entrants including foreign players compared to other emerging market economies. The growing presence of foreign players will improve the structure of the financial system in the region. This suggests that the viable investment opportunity that the West African stock markets offer will improve risk-return tradeoffs facing global investors. Thus, the countries in the region should speed up the harmonization talks to establish uniform rules and operational procedures that will foster FD.

3.0   Literature Review

There are three competing theories regarding FA and economic growth in the literature. These theories can be categorized as the bank-based, market-oriented and financial service theory. The bank-based theory points to the restriction of the financial system based on the market and emphasizes banks' role in economic growth. Ray and Chakraborty (2006) argued that given the level of development of the economy, the benefits of banks varied. These advantages include the convenience of capital mobilization and the choice of good projects that can encourage economic growth and development. Banks can also support growth more effectively than markets, as greater market development is a barrier to innovative projects (Levine, 1997). By working closely with the firms, banks have the benefit of selecting promising entrepreneurs. Corporate governance and resource allocation are therefore enhanced in the bank-based financial system (Guel, 2018).

The market-based view, however, focuses on the advantages of encouraging the stock market. This theory highlights big banks' flaws as they can discourage improvement in invention by extracting information rents and distorting competitiveness by shielding companies closely linked to the bank (Levine, 2002). Since a country's FA transits from a bank-based to a market-oriented system as development takes place, corporate governance and economic growth are improved by highly liquid and well-functioning markets. The theory therefore suggests that there is a reduction in the inefficiencies associated with the bank-based system.

The importance of bank-based and market-based structures is played down by the third view, which is the theory of financial services. It is noted in Levine (1997) that financial agreements, such as contracts, markets and brokers, consolidate inadequacies and strengthen financial services. The adherents of this theory have stressed the creation of an atmosphere conducive to sound financial practices. Peia and Roszbach (2014) point out that the positive effect of FD on the economy cannot be assured when banks and financial markets are inefficient. The reason for this is that markets and banks provide diverse elements of the financial system which do not compete, but strengthen the financial structure. Financial theory, therefore, implies

that the emphasis should be put on designing a financial framework that optimizes all structures.

Most FA and economic growth empirical studies have concentrated on advanced countries. For example, Weinstein and Yafeh (1998) examined the benefits of Japan's financial structure based on the country's low growth in the 1990s. The findings showed that banks' dependency on company's profitability led to higher business costs as banks collected rents from corporate clients. In order to explain how financial systems vary around the world, Levine and Demirguc-Kunt (1999) conducted a cross-country analysis of bank-based and market-based financial systems for 150 countries. It was found that as countries become wealthier, banks, other financial intermediaries and stock markets all expand and become more active and productive. Tadesse (2001) used a panel of 36 countries to analyze the nexus between FA and the growth of the real sector. He reported that market-based systems performed better among countries with established financial sectors than bank-based systems, and bank-based systems performed better among those with underdeveloped financial sectors. However, using a panel of 48 developing and advanced economies, Levine (2002) assessed the role of the financial system in growth. The results of the Robustness Test indicated that in explaining economic growth, the financial structure is not important.

Mixed results have also been provided by studies on African countries. In order to determine whether the FA is relevant for growth in South Africa, Guel (2018) used time series data from 1975 to 2016. The results of the autoregressive distributed lag indicated that financial structure did not matter in economic growth of South Africa. In addition, Mahonye and Ojah (2014) used the pool OLS to test the relationship between financial system and growth using 15 African countries from 1995 to 2011. Their results also indicated that financial structure did not influence the growth of these countries.

Finally, Mathenge and Nikolaidou (2018) investigated financial structure and growth in Sub-Saharan Africa from 1980 to 2014 using a difference GMM. Their findings indicated that when explaining growth in the area, the financial structure is not significant. Thus, while most studies have shown financial structure does not matter, most especially in less developed economy, some studies have argued that a market-oriented FA is more effective in advanced economies with highly developed financial markets. The argument in this study is that Africa countries with a bank-based FA and less developed financial system should have a FA that would be highly effective on economic growth.

4.0   Methodology

4.1   Variable Measurement

FA can be calculated in different ways. The FA measure used in this research stems from the work of Levine and Demirguc-Kunt (1999). The FA is measured as a continuous variable based on measurements of the relative size, activity and efficiency of the country's stock market relative to that of the banking sector. The construction of the FA variable represents both banking sector and the stock market's mean-removed averages of size, activity and efficiency. The size of the FA is measured in the financial system as the relative size of the stock markets to that of the banks. The size of the stock market is proxied by the market capitalization to GDP ratio, while bank credit ratio is employed to measure the size of the banking sector. Claims made by non-bank intermediaries and public sector lending are excluded. Larger ratio values suggest greater market orientation.

The activity dimension measures the activity of the stock markets in contrast to that of the banks. This is demonstrated by the ratio between the overall value of the shares exchanged as a share of GDP and the credit ratio of the banks. The FA's efficiency measures the relative efficiency of the stock markets with respect to the banking sector. The measure of stock market efficiency is the total value traded ratio, while bank return on assets is the indicator of the banking sector efficiency. This indicator of banking sector efficiency differs from the overhead costs of banks used by Levine and Demirguc-Kunt (1999). The reason for this disparity is attributable to the lack of bank overhead cost data available for the three West African countries selected. The FA's efficiency is then calculated as the product of the total value-traded ratio and the bank's return on assets. The FA which is the conglomerate of all three dimensions (size, activity and efficiency), is constructed after removing the mean of each series of the average of market capitalization for the bank ratio, total value traded for the bank credit ratio and the product of total value traded and bank return on assets.

There is no consensus in the literature on the set of explanatory variables as determinants of growth in growth regressions. Over 50 explanatory variables described in the literature as determinants of growth are highlighted by Levine and Renelt (1992). Most research, however, only use a subset of these. This study includes government expenditure (GE) to proxy government size, life expectancy (LE) to proxy human capital, and inflation (INF) for macroeconomic stability, based on the availability of data and peculiarities of West African countries.

4.2   Model specification

In order to empirically examine the relationship between FA and economic performance, the work of Levine (2002) is followed. Levine (2002) employed a standard growth model by assuming a Cobb-Douglas production framework that uses capital (K) and labour (L) in output production (Y). This takes the following form:

$$Y = f(AK^{\alpha}L^{1-\alpha}) \tag{1}$$

Where A measures technological efficiency. To capture the role of FA in economic growth, the above equation is augmented with the indicator of FA. Taking the log of equation (1) and augmenting it with FA yields equation (2) below:

$$y_{it} = \beta_0 + \beta_1 FA_{it} + \beta_2 X_{it} + \varepsilon_{it} \tag{2}$$

Where i = 1,2…N and t =1,2…T

FA_{it} = FA

X_{it} = the set of control variables

ε_{it} = Error term

Equation (2) is the estimation equation and the sign and the significance of β_1 is important for this study as FA_{it} is the key indicator variable for FA. If β_1 is significant, it implies FA matters for growth. A significant and positive β_1 suggests that market-based financial system stimulate growth more than bank-based system. However, a significant and negative β_1 indicates that bank-based system enhances economic growth more than market-based system (Mathenge and Nikolaidou, 2018; Tadesse, 2001)

Based on equation (2) and considering the conditioning set of explanatory variables, the econometric model is specified as:

$$y_{it} = \beta_0 + \beta_1 FA_{it} + \beta_2 LE_{it} + \beta_3 GE_{it} + \beta_4 INF_{it} + v_{it} \tag{3}$$

Since it is suggested in literature that countries with more developed financial system tend to be more market-oriented, it is important to account for FD in the estimation. This is done to see if FD augments FA. Also, an interactive term between FA and FD is included to determine whether the presence of FD can enhance the impacts of FA on economic growth. Equation (4) below is estimated to measure the impact of the interaction.

$$y_{it} = \beta_0 + \beta_1 FA_{it} + \beta_2 LE_{it} + \beta_3 GE_{it} + \beta_4 INF_{it} + \beta_5 FD_{1t} + \beta_6 FD*FA + v_{it} \tag{4}$$

FD_{it} is the level of financial development and based on the work of Levine (2002), the ratio of credit to the private sector to GDP is used as a measure of FD.

4.3.   System Generalized Method of Moment

System GMM is a type of dynamic panel data that improves the standard GMM estimator's poor performance. In the dynamic error components model, which has important asymptomatic efficiency gains, this estimator relies on relatively mild constraints on the initial condition and the nonlinear moment conditions available (Blundell and Bond, 1998). In addition to lagged levels of the dependent variable as instruments for equations in the first differences, the GMM method uses lagged differences of the dependent variable as instruments for equations in the first differences (Baltagi, 2005).

The level or untransformed equation would be instrumented with differences, contrary to the difference GMM estimator where lagged levels are weak tools for first differences if the variables are similar to random walk in the GMM method. System GMM explains how the original level equation is applied to the system and how additional instruments to maximize performance can be brought to bear. This only requires the assumption that the first differences of these instruments are uncorrelated with the unobserved country effects. The general framework for this estimator can be specified as:

$$y_{it} = w_{it}\delta + X_{it}\beta + \varepsilon_{it} \quad i = 1,...,N; \qquad t = 1,...,T \tag{5}$$

$$\varepsilon_{it} = u_i + \eta_{it} \tag{6}$$

Where w_{it} is a vector of predetermined covariates (which may include the lag of y) and endogenous covariate, all of which may be correlated with u_i; y_{it} represents the regressand for individual i over period t; X_{it} denotes the exogenous regressors, ε_{it} is the error term; u_i is the individual specific effects and η_{it} is the remainder disturbance term. The estimation equation for the system GMM can be specified as:

$$\ln y_{it} = \beta_0 + \delta \ln y_{it-1} + \beta_1 \ln FA_{it} + \beta_2 \ln LE_{it} + \beta_3 \ln GE_{it} + \beta_4 \ln INF_{it} + \beta_5 \ln FD_{1t} + \beta_6 FD*FA + \varepsilon_{it} \tag{7}$$

4.4   Data Description

This study used panel data of three countries (Nigeria, Ghana and Cote d'Ivoire) from West Africa between 1995 and 2018. These data were obtained from Global FD Database (GFDD) and World Development Indicator (WDI). The composition of the panel is unbalanced because data for financial variables for certain years are not available for these countries. For instance, FA variable constructed consists of 63

observations as the data ranged from 1995 to 2015 for each country. The estimation includes both economic and financial variables. Economic variables are sourced from WDI while financial data are from GFDD. The benefit of sourcing GFDD financial data is that stock and flow variables are taken into account, which was a weakness in previous literature on financial structure and growth (Mathenge and Nikolaidou, 2018). The focused variables in this study are GDP per capita (GDPC), government expenditure as percentage of GDP (GE), private sector credit to GDP ratio (FD), life expectancy (LE), the consumer price index measure of inflation (INF) and the constructed FA variables based on size, activity and efficiency (FA).

5.0   Discussion of Results
5.1.   Descriptive Statistics

As previously stated, the FD of West African countries is less advanced relative to the rest of the world. Table 1 shows that the mean value of FD is 12 percent and varies from 2.8 percent to 22.1 percent. The standard deviations indicate a high variance in the actual per capita GDP, which further means that the sample's revenue levels vary widely. In our estimations, this accounts for heterogeneity. All the variables are positively skewed except FD and GE with negative skewness. In terms of kurtosis, INF and FA are leptokurtic while other variables are platykurtic.

Table 1.   Descriptive Statistics

Variables	Obs	Mean	Std. De.	Min	Max	Skew.	Kurt.
FD	69	.124	.047	.028	.221	-.133	2.213
LE	69	.536	.051	.459	.635	.261	1.98
INF	72	.123	.126	.004	.728	2.624	11.731
GE	72	.094	.041	.009	.153	-.708	2.526
FA	63	.187	1.036	-.599	5.84	3.774	18.827
GDPC	72	1503.579	452.759	873.275	2563.9	.904	2.951

Source: Author's Computation

5.2.   Estimation Results

Table 2 depicts the results of the system GMM estimation for the FA model both without interaction and with interaction terms. Starting with the model without the interaction term, it is observed that FA has a significant negative effect on economic growth. This is consistent with the literature that argued that market orientation of financial system is inversely related to growth in a country with less developed financial system. Most of the control variables have the expected signs. For instance, inflation influences growth

negatively as a 1 per cent rise in inflation will lead to 0.001 per cent decline in growth. However, a rise in life expectancy, which is an indicator for human capital, would lead to an increase in economic growth by 0.11 per cent. Also, government expenditure has a significant positive impact on growth at 1 per cent significant level.

When an interaction term is introduced to the model, the results change slightly. For example, degree of market orientation of FA now has a positive effect on economic growth. This buttresses the argument that FD matters for market-oriented FD to promote growth.   This can be explained better with the results of the interaction term. The interaction term also has a positive effect on economic growth. This shows that the presence of a developed financial system will make a market-oriented financial system have a positive effect on economic growth. Other control variables except FD and government expenditure have negative effects on economic growth.

Figure 2.   Results of the System Generalized Method of Moment

	Without Interaction		With Interaction	
lnGDPC	coefficient	Std. Error	Coefficient	Std. Error
Constant	-0.2139	0.2161	-0.5707	0.3261*
$lnGDPC_{it-1}$	1.0040	0.0310***	1.0912	0.0774 ***
$lnFA_{it}$	-0.0077	0.0045*	0.0319	0.0516
$lnFD_{it}$	-0.0240	0.0151	-0.0489	0.0169***
$FA*FD_{it}$			0.0123	0.0142
$lnLE_{it}$	0.1122	0.1237	0.2208	0.1549
$lnGE_{it}$	0.0100	0.0007***	-0.0022	0.0092
$lnINF_{it}$	-0.0014	0.0089	-0.0075	0.0066
Wald test	5.77 (0.056)*		Wald test	14024.98 (0.000)***
Arellano-Bond test for AR(1)	-1.89 (0.057)*		Arellano-Bond test for AR(1)	-1.35 (0.176)
Arellano-Bond test for AR(2)	-0.21 (0.834)		Arellano-Bond test for AR(2)	-0.21 (0.834)
Sargan test	17..01 (0.001)***		Sargan test	17.01 (0.001)***
Hansen test	0.00 (1.000)		Hansen test	0.00 (1.000)

Source: Author's Computation. Note: *,** and *** denote 10 per cent, 5 per cent and 1 per cent level of significance respectively. Figures in parentheses are probability value

Although the negative effect of FD on growth is inconsistent with the existing view that financial services provision is important for growth, it has been noted in the literature that a constrained financial system can be an obstacle to growth (Kenny and Mosses, 1998). Given West Africa's poorly developed financial system, the negative impact of FD on growth is expected. Thus, a required condition to reap the benefits of economic growth in a country is a presence of well-functioning financial system. A supporting view can also be found in Griel et al. (2009) that the nexus between FD and growth is marginally weak and that FD at intermediate level is considered important for growth if the financial system is relatively developed.

These results are robust to various sensitivity check. The null hypotheses of Arellano-Bond test for AR (2) are not rejected for both models. This validates the applicability of the system GMM estimator for the models. Also, the Hansen tests show that the instruments used in models are valid as the null hypotheses are not rejected. The Wald test results indicate that all the explanatory variables jointly affect economic growth as the Chi square values are significant at 1 per cent. All these tests buttress the robustness of the models.

6.0   Conclusion

Although the impacts of FA on growth have been extensively studied, there have been very few studies in West Africa on the issue. The explanation is primarily that there is a scarcity of stock market data in West Africa. West Africa's capital markets are still at a transitional stage and only three countries in the country have stock markets operating. This makes a study on FA an uneasy one. By providing an empirical evidence from West Africa, this study used data from the recently revised GFDD to fill this void in the literature. The study was conducted using panel data of 3 countries between 1995 and 2018. Using Blundell and Bond system GMM, the findings showed that FA had a significant negative effect on growth when there was no interaction term in the model. This supports existing literature that market-oriented financial system does not have a meaningful effect on growth in a country with minimal developed financial system. However, when FA was augmented with an indicator of FD, the signs of FA became positive and the interaction term also had a positive effect on growth. This shows that the presence of developed financial system enhances the impact of market-oriented financial system on growth. It was also found that the growth control variables used in the study had the expected signs. A rise in life expectancy, for example, has been shown to have a positive impact on growth, whereas high inflation has had a negative and significant impact on growth.

In addition, the analyses showed that FD, proxied by private sector credit to GDP ratio had a negative impact on growth. Although this is contrary to generally held views, studies have been performed to confirm the adverse growth effects of FD. Favarra (2003) and Griel et al. (2009) for instance, found a negative effect of FD on growth. Given the low level of FD in West Africa, it is not surprising to find that FD is having a negative effect on growth. For an economy to experience positive gains of economic growth, a well-functioning financial system is a necessary precondition. Therefore, there is need for policy makers in West Africa to promote the development of the financial sector in their various economies before the impacts of market-oriented financial system on growth can be felt in their respective economies.

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LOGISTICS, TRADE FACILITATION AND TRADE FLOWS PERFORMANCE IN SELECTED AFRICAN COUNTRIES: ARE THERE IMPLICATIONS FOR INCREASED INTRA-AFRICAN TRADE?

Hassan O. Ozekhome[*1]

Abstract

The quest to achieve greater trade in African countries that will promote regional integration cannot be realistic unless improved logistics capability and good trade facilitation are encouraged. It is against this backdrop that this paper empirically investigates the link between logistics, trade facilitation and a battery of other explanatory variables on trade flows performance, against the backdrop of implications for increased intra-African trade, using data that covered the period 2008-2019 for thirty- eight selected African countries. Different panel data estimators were utilized, including the panel fixed effect, the panel estimated generalized least squares (random effect and fixed effect with cross-section weights), the fully modified OLS (FMOLS) and the system-GMM estimation techniques that was used for the robustness check. The empirical findings show a weak positive impact of logistics on trade flows performance in African countries. Trade facilitation, openness of the domestic economy, exchange rate and financial development are other variables that have positive and significant effects on African trade. The ease of doing business variable is positively and moderately related to trade. The institutional quality variable, which captures the adherence (non-violation) to trade treaties/protocols, including the coordination and harmonization of trade policies and long-lasting political, structural and economic reforms needed to advance trade is negative and significant, implying the existence of a poor trade environment. Based on these findings, it is recommended that strong logistics capability be developed, alongside improved trade facilitation with respect to the simplification, harmonization, modernization and transparency of complex trade procedures to significantly reduce trade transaction costs. Other policy measures include the adoption of a sound, stable and competitive exchange rate, improved ease of doing business environment, and strong institutional framework that will enhance trade and regional integration across the African continent.

[*]Corresponding author's email: hassanozeks1@gmail.com
[1] Department of Economics, Glorious Vision University, Edo State, Nigeria.
 The views expressed in this paper are those of the author.

1.0   INTRODUCTION

Regional integration evolves from strong trade links. The quest for increased Africa and intra-African trade espoused in the African Continental Free Trade Agreement (AfCFTA) cannot materialized without robust a logistics base, efficient trade facilitations and appropriate institutional framework that promotes such. African trade has, over the years, been low due to poor trade logistics and trade facilitation. The traditional literature on trade expansion has tended to focused greatly on the removal of artificial and policy barriers to trade, neglecting the role of trade logistics and trade facilitation (see Cho & Diaz, 2011; Ozekhome, 2016). Recent literature (see Jouanjean, Gachassin & Te-Velde, 2015; Amoako-Tuffor, et al. 2016) have however advanced that the removal of impediments to trade as advanced in the traditional trade literature may not translate to actual increased trade flows in the face of poor trade logistics and weak trade facilitation in the form of prohibitive international trade costs. Studies such as Njinkeu, Wilson and Fosso (2008), Kotan and Saygili (2009), Nguye, and Tongzon (2010) and Marque-Ramos (2011) maintained that improved logistics and efficient trade facilitation can enhance international trade and thus, encourage greater trade integration. Aside been important determinants of trade, logistics and trade facilitation play significant roles in understanding the dynamics of domestic economic and international competitiveness, firm outsourcing and proliferation of regional and continental trade agreement (Anderson & Wincoop, 2004).

In a bid to enhance trade and economic cooperation, conquer new markets and diversify sources of supply across African economies, the African Free Trade Intercontinental Area (AfCFTA) was launched on July 7, 2019, during the 12th Extraordinary Summit of the African Union, held from July 4 to 8, 2019 in Niamey, Niger. Nigeria became a signatory on Sunday 7 July, 2019, a year after 44 countries had already signed the treaty on March 21, 2018, in Kigali, Rwanda, in a landmark trade agreement. As a continent with large market potentials, the AfCFTA offers great potentials, in terms of fast-tracking development through greater regional trade and integration. The AfCFTA seeks to leverage on the existing regional trade blocs to increase trade output, diversify sources of supply and create greater regional and international competitiveness.

The value of intra-African exports is projected to increase considerably as a result of the AfCFTA (Economic Commission for Africa- ECA, 2019). Through the singular removal of tariffs on goods, the AfCFTA is projected to increase the value of intra-African trade approximately by 15 percent, translating to about $50 billion, and 25 percent, representing $70 billion, depending on the liberalization efforts. Comparably, the share of intra-African trade is expected to increase by nearly 40 percent to over 50 percent,

depending on the liberalization drive within the commencement of the implementation of the reform (2020) and 2040 (UNCTAD, 2019). The report also had it that by removing tariffs to the tune of 90 percent on goods, progressively liberalizing trade, and addressing a host of other non-tariff barriers, intra-African trade could increase by over 50% and even double within 10 years, and create a $3.4 trillion economic block if the AFCTA become fully operational (ECA, 2019). This according to the report, will, usher in a new era of development for the continent through greater productivity, increased domestic economic competitiveness, amongst others. Critical to the beneficial trade agreement espoused in the AfCFTA are sound logistics base and improved trade facilitation that are hinged on fruitful trade coordination and harmonization agreements. Overall, the implementation of the AfCFTA is expected to boost Africa's regional and international trade.

While some studies have examined the role of logistics on international trade (see Nordas Pinali, & Grosso, 2006; Nguyen & Tongzon, 2010; Marque-Ramos, 2011), and some others examined the link between trade facilitation and economic transformation (see Jouanjean et al, 2015; Amoako-Tuffor et al., 2016), the tri-variate link between logistics, trade facilitation and intra-regional trade is yet to receive notable empirical attention in the literature, especially when considered against the backdrop that, the push towards greater economic integration cannot be realized without strong regional trade links. More importantly, not any of the known studies, in addition to other related studies at the regional levels have investigated trade performance in Africa in the context of logistics, the ease of doing business, trade credits and infrastructure, as opposed to the traditional focus of explaining trade in terms of artificial and non-artificial barriers. This study, therefore, seeks to fill this gap using evidence across thirty-five African countries in a panel framework. Accordingly, this study is relevant from the perspective of adducing empirical evidence that could inform policies and strategies necessary to enhance trade, given the current drive for increased regional trade and economic integration in Africa. In this regard, the paper will address issues of policy relevance to the African region, in the light of recent policy discussions to create the enabling environment that would promote trade integration in the African region, espoused in the AfCFTA.

Following this introductory section, the rest of the paper is organized as follows: Section 2 provides the stylized facts on logistics, trade facilitation and trade flows across Africa. Section 3 reviews the literature, which consists of the theoretical, empirical and policy issues associated with logistics, trade facilitation and trade flows. The methodology, model specification and discussions on the data are covered in Section 4, while

Section 5 presents the empirical results and analysis. The conclusion and policy recommendations are presented in section 6.

2.0   Stylized Facts

Available statistics show that logistics performance index (LPI) has been generally poor in Africa, due to the weak infrastructure, weak institutions, technological deficiency administrative bottlenecks and lack of political will, amongst others that pervade the African continent. The poor logistics performance is adduced as one of the reasons for the high international trade costs, low competitiveness of African goods in the international market, as well as poor intra-African trade (Jouanjean et al., 2015, Ozekhome & Oaikhenan, 2019). The logistics performance index of some selected African countries are reported in the Table 1.

Table 1: Logistics Performance Index of selected African countries (2008-2019) (Average)

Country	Average Score	Custom Efficiency	Infrastructure	International Shipment	Logistics Competence	Tracking and Tracing	Timeliness
Algeria	2.45	2.50	2.42	2.26	2.48	2.38	2.68
Angola	2.25	1.75	1.82	2.38	2.01	2.54	3.01
Benin	2.63	2.38	2.36	2.52	2.74	2.84	2.96
Botswana	3.24	3.12	3.16	3.14	3.20	3.28	3.56
B-Faso	2.63	2.70	2.40	2.52	2.62	2.46	3.05
Cameroon	2.54	2.14	2.10	2.69	2.53	2.60	3.16
C-Verde	3.34	3.15	3.40	3.20	3.10	3.62	3.55
Cote d'Ivoire	2.54	2.16	2.37	2.44	2.57	2.95	2.73
Egypt	2.65	2.60	2.52	2.56	2.58	2.71	2.92
Ethiopia	2.32	2.15	1.80	2.38	2.42	2.54	2.68
The Gambia	2.67	2.52	2.36	2.80	2.76	2.64	2.94
Ghana	2.50	2.38	2.52	2.44	2.48	2.50	2.68
Guinea	2.52	2.40	2.32	2.48	2.50	2.52	2.85
Guinea-Bissau	2.58	2.46	2.42	2.70	2.46	2.52	2.93
Liberia	2.43	2.20	2.25	2.32	2.42	2.56	2.84
Kenya	2.59	2.25	2.24	2.80	2.30	2.88	3.08
Mali	2.35	2.28	2.19	2.22	2.20	2.32	2.87

Niger	2.35	2.20	2.22	2.23	2.28	2.50	2.72
Nigeria	2.59	2.18	2.84	2.50	2.46	2.45	3.10
Senegal	2.86	2.45	2.64	2.74	2.73	3.08	3.52
Sierra-Leone	2.48	2.22	2.44	2.50	2.38	2.56	2.78
South-Africa	3.48	3.22	3.42	3.26	3.59	3.73	3.68
Tanzania	2.61	2.56	2.04	2.78	2.40	2.57	3.33
Togo	2.37	2.24	2.22	2.25	2.32	2.43	2.74
Uganda	2.80	2.84	2.36	3.02	2.60	2.46	3.52
Zambia	2.29	2.18	1.86	2.42	2.06	2.36	2.85

Note: Overall index ranges from 1=low to 5=high, with a high score representing high performance.

Source: Author's computation: Underlying data from World Bank Logistics Performance Index Database

Table 1, shows that African countries have consistently had low logistics performance indices. The countries have been regarded as performing poorly in terms of logistics, custom efficiency, international shipments, infrastructure, logistics competence, timeliness and tracking, and tracing, with the exception of Botswana, Cape Verde an South Africa, using an overall index performance of 5 as highest scale, with a high score representing high performance and 1 representing low scale. The low intra-Africa trade is attributed to weak logistics capability, poor trade infrastructure, poor trade policy, weak supply response to regional market opportunities, lack of export competitiveness, near-absence of trade diversification, poor trade policy, structural bottlenecks and weak institutions e.t.c. (Ozekhome, 2019).

In terms of indicators of regional trade and trade facilitation in Africa, available evidence show that the intra-African exports as a percentage of total African exports in the period 1995 to 2017 was 13.5 percent, compared to 69 percent in Europe, Asia (59 percent), and North America (31 percent). The share of exports from Africa to the rest of the world hovered around 80% to 90% in 2000 –2017, an indication of a high export dependence, with Oceania being the only other region in the world that has a higher export dependence. Intra-African exports stood at 16.6% of total exports in 2017, compared to 68.1% in Europe, 59.4% in Asia, 55.0% in America and 7.0% in Oceania. In terms of overall trade performance, intra-African trade, expressed as the average of intra-African exports and imports, was approximately 2% during the period 2015–2017. The comparative figures for America, Asia, Europe and Oceania were 47.4%, 61.1%, 67.1% and 7.2%, respectively (UNCTAD, 2019). Africa's share of world

trade output (i.e contribution to total world trade) is less than 2%. In absolute terms, total trade from Africa to the rest of the world averaged US$760 billion in current prices in the period 2015–2017, compared to $481 billion from Oceania, $4,109 billion from Europe, $5,140 billion from America and $6,801 billion from Asia (UNCTAD, 2019).

Further statistical evidence show that 70% of African exports are mostly primary intermediate products, representing limited value addition. Africa's merchandize exports grew by 13%, during the period 2015-2017, a better performance than import growth. The 10 countries with the highest intra-African exports in 2015–2017 were Eswatini (70.6%), Namibia (52.9%), Zimbabwe (51.6%), Uganda (51.4%), Togo (51.1%), Senegal (45.6%), Djibouti (41.9%), Lesotho (39.9%), Kenya (39.3%) and Malawi (38.3%). The 10 countries with the least share of intra-African exports were Chad (0.2%), Guinea (1.6%), Eritrea (2.3%), Equatorial Guinea (3.5%), Cabo Verde (3.6%), Angola (3.9%), Libya (4.5%), Guinea Bissau (4.7%), Liberia (5.1%) and Algeria (5.5%). In 23 developing countries (13 in Africa) and LDCs for the period 2010–2013, 35% of the most difficult non-tariff measures applied by partner countries to manufacturing exports relate to rules of origin and related documentation. In the same vein, the most recurrent complaints registered on the non-tariff barriers reporting, monitoring and eliminating mechanism of the Tripartite Free Trade Agreement pertain to rules of origin (11% of filed complaints) (UNCTAD, 2019).

Between 2008 and 2010, intra-African trade ranged between 4.2 and 5.06 per cent of total trade. Intra-regional trade (import and export) declined within the period 2011-2018, as -regional export hovered between 4.9 and 5.1 per cent of total trade during the same period, and that of imports fluctuated between 10.5 and 9.3 per cent. Deriving from these facts, both intra-regional exports and imports as percentage of total trade fell below 15 per cent, an indication that over 85 per cent of African trade is done with other regions or countries (African Competitive Report, 2018; Economic Development in Africa Report, 2019). The diminishing trend in intra-African trade is attributed mainly to weak logistics and poor trade facilitation (World Bank, 2017). According to the World Bank Competitive Reports (2018), the region has been characterized by diminishing and negligible share of trade. Its share of world trade was 1.23 percent in 1990, 0.65 percent in 2000, and 0.35 percent in 2018.

The transaction cost of trade resulting from poor logistics capability and weak trade facilitation, are in the order of $1662, compared to that of East Asia & Pacific of $965, Europe and Central Asia, with $1022, the Organization of Economic Cooperation and Development (OECD) high-income countries with $985, and a World average of $1150. Freight cost accounts for over 21 percent of the value of imports for Nigeria, 24 percent

for Mali, 23 percent for Niger and 22 percent for Cape Verde, 20 percent for South Africa, amongst others (UNCTAD, 2019). Further statistics from the World Bank (2015, a), show that the transaction cost to trade, defined as the average of cost to export and import in Sub-Saharan Africa was USD 2,088 in 2008, USD 2,2081 in 2010 and USD 4,820. The corresponding cost to trade in the same periods in East-Asia & Pacific in 2008, 2010 and 2012 were USD 845, USD 830, and USD 855, respectively. Comparably, in the Middle –East and North Africa, the cost to trade for the same periods were USD 1,093, USD, 1,120 and USD 1,137, respectively, while that of the OECD- high income countries stood at USD 1,062, USD 1,064.5 and USD 1,069, respectively, with a world average of USD, 1,450, USD 1,523.5 and USD 1,632.5. Overall, Africa region had the highest cost to trade in the three periods, higher than the corresponding world averages. The increased high transaction cost of trade due to poor logistics and trade facilitation have undermined trade in the region; thus warranting an empirical investigation on the effects of logistics and trade facilitation (measured by transaction costs of trade) on trade performance in the Africa region.

3.0   Literature Review
3.1.   Conceptual Issues

Logistics performance index is a composite index that measures the ground efficiency of trade or supply chain logistics performance. It encompasses freight transportation, warehousing, port and trade and infrastructure boarder clearance, payment system and other functions outsourced by producers and merchants to dedicated service providers. The logistics performance (LPI) is the weighted average of the country scores on seven key dimensions:

1. The efficiency of the clearance process (i.e.; speed, simplicity and predictability of formalities) by border control agencies, including customs.
2. Quality of trade and transport-related infrastructure (e.g., ports, railroads, roads, information technology);
3. Ease of arranging competitively priced shipments;
4. Competence and quality of logistics services (e.g., transport operators, customs brokers);
5. Ability to track and trace consignments;
6. Domestic logistics costs, and;
7. Timeliness of shipments in reaching the destination within the scheduled or expected delivery time (Amoako-Tuffor, et al., 2016, cited in Ozekhome & Oaikhenan, 2019,b).

Several components of trade logistics exist that interact to affect the supply chains and ultimately, trade flows. They include transport infrastructure, information flows, time delays, logistic service, and trade facilitation. Transport is a critical aspect of trade logistics that is required to expedite trade. For instance, the availability of shipping containers and terminals are important to trade. Others include roads, railway lines, sea-lanes, air corridors, facilities such as signaling and traffic control, ports and airports, e.t.c. The availability of well-connected high-speed roads and efficient rail system, for instance, ensures that goods are able to reach their final destination within the scheduled or expected delivery time once dispatched from airport or container terminals. Well-developed information communication technology is also important to trade (Ozekhome & Oaikhenan, 2019,b).

Trade facilitation on the other hand, is concerned with processes and procedures that simplify, harmonize, standardize and modernized trade in order to reduce international trade transaction costs. It includes transparency of custom border and beyond-border procedures, infrastructure, domestic regulations and institutions that enhance trade. Trade facilitation has the capacity to encourage African trade and regional economic integration through multiple channels that include reduction of transaction cost of trade, increased competition, export diversification and promotion, permitting international and regional value chain, amongst others.

3.2.   Theoretical Review
3.1.   Logistics, Trade Facilitation and Trade Performance

According to the international trade logistics theory, improved logistics and trade facilitation will encourage external markets, better and efficient allocation of resources and promotion of trade flows across countries and regions. Accordingly, prohibitive trade transaction costs, due to poor logistics and trade infrastructure will undermine trade and regional integration (see Njinkeu, Wilson & Fosso, 2008; Kotan, & Saygili, 2009; Mbekeani, 2010; Nguye, & Tongzon, 2010). Shephered and Wilson (2007); Portugal- Perez and Wilson (2008, a, b); Nguye, and Tongzon, (2010) and Amoako-Tuffor, et al. (2016), for instance, showed that aside constituting the most important factors determining trade volume and patterns, logistics and trade facilitation significantly influence the variation in trade between/among countries and regions. Improved logistics and infrastructure also play critical roles in the determination of foreign direct investment, outsourcing of firms, proliferation of regional trade and financial agreements (Jack, Meissner & Novy, 2008). Better-quality logistics and trade infrastructure will encourage external markets, more efficient and optimal allocation of resources and the promotion of trade flows, particularly in export-led growth sectors (Ozekhome, 2019).

Good trade logistics and trade facilitation will encourage the simplification, harmonization and modernization of trade processes and procedures, and in turn, stimulate trade and regional integration (Kotan, & Saygili, 2009; Mbekeani,, 2010; Amoako-Tuffor, et al 2016). The theoretical contention is that quality logistics, favourable trade policies, supported with good macroeconomic environment and institutional settings, will simplify trade processes, reduce transaction cost of trade, and thus, encourage greater trade flows between or among countries and regions. The position is that the removal of artificial and non-artificial barriers to trade might not be sufficient to enhance trade flows, in the face of considerable transactions costs, arising from poor logistics and weak trade facilitation that deter trade. Added to this is the fact that complex clearance process and procedures by border control agencies, including customs due to the non-synchronization of trade might cause considerable delays in transacting trade, ultimately causing lower trade (Anderson & Wincoop, 2004; Nordas et al., 2006, Portugal- Perez & Wilson, 2008, c). The simplification, coordination, harmonization, modernization and transparency of trade procedures due to trade-enhancing processes, will accordingly, encourage regional trade and economic integration. Supporting this theoretical position, the World Bank (2017) submitted that better and more beneficial regional integration could be provoked through greater regional trade flows, anchored on good logistics, trade facilitation and regional trade and transport infrastructure. Effective and efficient logistics and good trade facilitation, supported with favourable macroeconomic policies and institutional framework, will, significantly reduce trade costs, and thus promote regional trade and economic integration.

The simplification, harmonization and coordination of trade processes and procedures through enhanced logistics and trade facilitation have the capacity to trigger regional trade efficiency, stimulate technological development, induce greater domestic output and productivity, and thus, promote trade and regional economic cooperation. The idea is based on notion that countries with greater level of logistics base and favourable trade facilitation will experience greater trade and international competition. The importance of favourable trade environment and the necessary infrastructure that encompass logistics capability, result-oriented trade facilitation, stable macroeconomic policy environment and quality institutional structures cannot be overemphasized, as greater international competition would generate stronger externalities that will stimulate trade and growth (Ozekhome, 2019).

3.3   Review of Empirical Studies
3.3.1. Logistics and Trade

Qualey (1999) investigated the effects of several logistics indicators on trade flows and found a positive relationship between logistics and trade performance. Kung (2001) examined the link between logistics capability and regional economic integration. He found that logistics aided regional trade and integration.

Limao and Venables (2001) found evidence that improvement in infrastructure was quantitatively significant to the determination of trade costs and that poor infrastructure which accounts for 40-60 percent of transport cost for coastal and landlocked economies, resulted in lower trade flows. Using a sample of countries from Africa and the rest of the world, the results showed that a 10 percent increase in transport costs due to poor logistics and infrastructure, would lead approximately to 20 percent reduction in trade volumes. In a related study, Clark Dollar and Micco, (2004) examined the link between port efficiency, maritime transport cost and bilateral trade. They found that the efficiency of ports was relevant for a large proportion of trade transactions, with a significant impact on international trade. Specifically, they found that an improvement in port efficiency by 50 percent would lead to a rise in bilateral trade by 25 percent.

Wilson, Mann & Otsuki (2005) assessed the probable benefits of logistics on trade volumes. They employed a decomposition approach, and found that improvement (deterioration) in logistics and hard infrastructure reduced (increased) trade costs significantly and thus increased (reduced) trade volumes. The findings of Devlin and Yee (2005) also supported the positive link between logistics efficiency and foreign trade.

Grosso (2006) found evidence that the lower the time to trade and trade transaction costs, the greater the probability of trade occurrence. In another dimension, Wilson, Mann and Otsuki (2008) found that that apart from traditional determinants of bilateral trade, infrastructural services, port efficiency, institutions, and to a lesser extent, regional trade agreements and socio political variables had significant positive effects on trade and growth. In a similarly related study, Nnana (2006) examined the requirements for regional integration in the ECOWAS sub-region. He concluded that the creation of strong institutional framework, good infrastructural architecture, as well as harmonization of policies would help to facilitate economic integration in the region. The study by Keane and Feinberg (2007) found that the reduction of transaction cost of trade is favourable to greater international trade, exchange and

enterprise. Among the factors that engenders the reduction in trade costs, logistics played a significant role.

The findings by Arvis et al (2007) showed that logistics performance index (LPI) connected with customs clearance process, border management, transport infrastructure and regulations is significantly related to trade in developing countries. Njinkeu, Wilson & Fasso (2008) used cross-sectional data to examined the impact of trade reforms, custom environment, port efficiency, regulatory environment and infrastructure on trade across selected African countries. The results from the panel analysis showed that improved service infrastructure and port efficiency were the key drivers of intra-African trade. Since trade is one of the principal channels through which logistics impacts on growth, the study concluded that logistics positively influenced growth.

Behar and Manners (2008) used a new and comprehensive measure of logistics quality to estimate least squares logarithmic transformation of logistics augmented gravity model. The results showed that logistics in the exporting and trading partner country had important impact on bilateral exports. Specifically, an improvement by one standard deviation in the exporting country's logistics raised exports by about 60 percent. Kotan and Saygili (2009) used quarterly data and examined the link between logistics, trade facilitation and macroeconomic policy (exchange and inflation rates) on trade flows. They employed two different models, Engle-Granger approach and Bernanke–Sims Structural VAR model. The results showed that in the long- run, logistics and macroeconomic policy (nominal exchange rate and inflation rate) influenced trade. Mbeakeani (2010) and Portugal-Perez and Wilson (2012) found evidence for the positive role of soft infrastructure in the maximization of the benefits of hard infrastructure investment. Using evidence from a sample of African countries, both authors found positive link between trade infrastructure, trade expansion and regional integration.

Nguyen and Tongzon (2010) examined the link between transportation, the development of logistics sector and international trade, using a VAR model. The results obtained showed that logistics had a strong influence on international trade. Similarly, Marque-Ramos (2011) examined the effect of logistics on international trade for the Spanish economy. He found a positive link between logistics and trade flows. Albert, Phil and Nelson (2011) assessed the effect of logistics on international trade, and found that logistics significantly influenced trade. According to the findings, some of the factors contributing to high trade cost were poor logistics, lack of transparent border clearance and cumbersome customs and administrative procedures. The literature

highlighted the importance of the logistics markets to complement hard infrastructure projects in alleviating constraints and increasing incentives to trade in developing countries (see Hoekman & Nicita, 2011; Kessides, 2012). Using a comprehensive new international logistics index, Behar Manners and Perez (2011) found that an improvement by a one standard deviation in the quality of logistics would put Rwanda at balance with Tanzania by raising exports by 27%.

Jouanjean (2015) examined the impact of various logistics components on trade in Africa. He used a variant-decomposition approach that includes transport infrastructure, institutions, and customs clearance and procedures. The results showed that logistics had a significant impact on international competitiveness, as well as the involvement in international trade. The impressive trade performance in the high-performing Asian economies was believed to have been made possible by the improved trade facilitation and other trade reforms carried out, which included sound macroeconomic policy environment and appropriate institutional framework (World Bank, 2015,b).

Ozekhome (2019a) investigated the effect of international trade costs on trade flows in the West African Monetary Zone (WAMZ). He used panel data estimation technique and the Fully Modified Ordinary Least Squares (FMOLS) and found a negative and significant relationship between international trade costs and trade flows. He suggested policies to reduce international trade costs in order to stimulate trade in the zone. In a similar vein, Ozekhome and Oaikhenan (2019,b) investigated the nexus between logistics and trade flows, using evidence from selected ECOWAS countries for the period 2008 -2017. The results from the Hausman Taylor (H-T) and system-GMM estimation show that logistics is positively related to trade in the sub-region. On the basis of this finding, the authors suggest policy measures to improve the logistics base in order to enhance trade in the sub-region.

3.2.   Trade Facilitation and Trade

Zhang and Song (2001) employed time series technique to investigate the link between trade facilitation and trade performance in China. They used cost of trade transactions associated with a unit consignment as proxy for trade facilitation. The results showed that trade transaction costs was a significant determinant of Chinese trade. Clark, Dollar and Micco (2004) examined the effect of trade facilitation in terms of maritime transport costs on bilateral trade in a group of Asia and Pacific countries. The findings showed that high transport costs discouraged bilateral trade. The study by Longo and Sekkat (2004) investigated the obstacles to intra-African trade. Using a panel of African countries, they found that poor trade facilitation, expressed in terms

of cost to trade limited intra-African trade. Persson (2007) used a sample of countries drawn from African, Caribbean and Pacific regions that are in the process of economic cooperation with the European Union (EU) to investigated the impact of transaction costs (in USD) and time delays on trade flows. The findings showed that that time delays and high trade costs constituted obstacles to trade.

Djankov, Freud and Pham (2006) provided evidence in support of the positive impact of improvements in trade facilitation on trade flows and growth. They estimated a modified gravity equation using World Bank data on the days it takes to transport a standard cargo from the factory gate to the ship in 126 countries, and found that for each day a product was delayed in transit, trade declined by 1 percent. Haring, Palson and Raballand (2007) examined the connection between trade costs and trade volume in West and Central Africa. The results from the Generalized Method of Moments (GMM) showed that high transport cost negatively affected trade performance in the regions. They suggested policy measures to reduce trade costs through the provision of good trade facilitation.

Keane and Feinberg (2007) investigated the relationship between trade costs and international exchanges among 45 sampled countries. They decomposed trade costs into cost to export and import and found that higher trade flows was positively related with lower cost of trade. Portugal-Perez and Wilson (2008, a) assessed the impact of trade facilitation (using costs to trade as a proxy) on Africa's trade, including the implications for barriers and opportunities for trade reform. They found high trade costs as barriers to trade, while lower trade costs enhanced trade. In another dimension, Portugal-Perez and Wilson (2008, b) examine whether trade facilitation (proxied by hard and soft infrastructure) matter for trade and integration in Asia. The findings showed that good infrastructure and policy reforms are significant to trade.

Behar and Manners (2008) assessed the impact of different trade facilitation variables that include trade costs and infrastructure on trade in a group of industrialized economies. The results showed that trade is significantly influenced by trade. Leseer and Moisser-Leeman (2009) investigated the link between cross-border trade and trade facilitation in Sub-Saharan African countries. The finding showed that trade facilitation had a positive but weak impact on trade in Sub-Saharan Africa.

Kessides (2012) found that the simplification, harmonization and coordination of trade processes brought about by trade facilitation and institutional structures have the capacity to encourage trade. He suggested improvements in the efficiency of customs, port clearance procedures and reduction of red tapism as efficient ways to

reduce barriers to regional trade. A UNECA (2013) study on the impact of trade facilitation on Africa's trade revealed that high cost to trade due to poor trade policy represented significant hindrances to regional integration in Africa.

Amoako-Tukkor, Balcin, Calabrese and Mendez-Parra (2016) examined the link between trade facilitation (measured as transport infrastructure) and economic transformation in Africa. They found that the provision of good trade and transport infrastructure matter to rapid economic transformation. They therefore recommended the provision of hard and soft infrastructure to encourage trade in Africa. A World Bank (2017) studied the link between trade and regional integration showed that high trade transaction costs, poor trade policy and weak institutional environment were deterrents to increased trade and integration in poor countries. Nyanzi, Babyenda and Bbale (2017) examined the determinants of regional integration in East Africa community. The findings showed that regional integration was significantly influenced by the coordination and harmonization of trade policies. They, accordingly, suggested effective and efficient trade policy reforms to encourage regional integration.

Adegboye, Arodoye and Irughe (2019) examined the effect of domestic institutions, among other factors, on economic integration in the ECOWAS sub-region, through the facilitation of better compliance with convergence criteria. Using data for the period 2000- 2015 and a panel of all fifteen (15) ECOWAS countries, the results from the logit regression found that political institutions and ethnic tensions are the strongest factors that determine the integration of the bloc. The authors recommended strong institutional framework that will help in the negotiation of regional agreements reforms. These, according to them, will, provide effective backgrounds to apparently overcome insurmountable obstacles that may exist between domestic expectations and overall regional ability and willingness to pursue long-lasting social and economic transformation/restructuring.

From the review of the pertinent literature, no regional study has examined the simultaneous effects of logistics and trade facilitation on regional trade in Africa. In addition, no previous study considered the effects of trade credits, the ease of doing business and institutional quality on African trade. These factors are crucial, especially for the African continent, where regional economic integration largely evolves from strong trade links. It is the intention of this study to extend the literature in view of the foregoing gap, to adduce empirically oriented policy perspectives that are important for regional trade and economic integration in the African continent.

4.0   Methodology

4.1.   Model Specification

In empirical specification, the systematic between logistics, trade facilitation and trade flows performance across countries in Africa is captured in the stylized trade model:

$$TFL_{i,t} = f(LPI_{i,t}, TFA_{i,t} \, X_{i,t}) \qquad\qquad (1)$$

Where $TFL_{i,t}$ is the dependent variable, here, African trade performance, measured as the growth rate of African trade (i.e sum of exports and imports), LPI is logistics performance index, TFA is trade facilitation, i is number of countries, t, is year fixed specific effect, and X is a vector of other macroeconomic variables, in accordance with the literature on the factors that influence trade performance (see Kotan & Saygili, 2009; Ozekhome & Oaikhenan, 2019,b). These variables include:

OPN- a measure of openness of the domestic economy to trade /trade liberalization - measured as exports plus imports as percentage of GDP;
EXR = Exchange rate- measured as nominal exchange in terms of the US Dollar;
FDEV =Financial development- measured as credit to the private sector deposit money banks as percentage of GDP;
EDB= World Bank Ease of Doing Business- measured on a scale of 1-190, where a high ranking implies greater ease of doing business and trade, and;
INST= Institutional framework that encourages the coordination and harmonization of policies in line with trade treaties/protocols, including appropriate reforms.
Following this, the extended version of the model to capture the determinants of trade performance in selected African countries is specified as:

$$TFL_{i,t} = f\left(LPI_{i,t}, TFA_{i,t}, OPN_{i,t}, EXR_{i,t}, FDEV_{i,t}, EDB_{i,t}, INST_{i,t}\right) \qquad (2)$$

The empirical specification of the model estimated is captured in the form:

$$TFL_{i,t} = \alpha_0 + \alpha_1 LPI_{i,t} + \alpha_2 TFA_{i,t} + \alpha_3 OPN_{i,t} + \alpha_4 EXR_{i,t} + \alpha_5 FDEV_{i,t} + \alpha_6 EDB_{i,t} +$$
$$\alpha_7 INST_{i,t} + \varepsilon_{it} \qquad\qquad (3)$$

Where the variables are as earlier defined; i represent the selected African countries examined over the period, 2008-2019.
a_1- a_7 are the parameters to be estimated, and ε is the unobserved error term.
Apriori, the expected signs are $a_1, a_2, a_3\ a_4, a_5, a_6, a_7 > 0$.

4.2.   Justification for the included variables

A number of important variables are important to the determination of trade, in line with the extant theory. Logistics is an important trade determinant, as it provides the ground efficiency and the needed critical infrastructure (soft and hard) for trade. Following this, improved level of logistics will encourage greater trade and international competitiveness (see Devlin, & Yee, 2005; Nguye, & Tongzon, 2010; Albert, et al., 2011; Marque-Ramos, 2011). Trade facilitation through the simplification, coordination, harmonization and standardization of trade procedures promotes international trade, as it reduces trade transaction costs. Thus, improved and efficient trade facilitation will encourage greater Africa and inter-African trade and international competitiveness (see Wilson, Mann, & Otsuki, 2004, Portugal-Perez, & Wilson, 2008). Openness of the domestic economy is a core determinant of trade, in line with international trade theory, that the removal of obstructions to trade will ensure efficient and optimal allocation of resources, stimulate international competitiveness and trade. Its inclusion is thus hinged on strong economic theory and empirical evidence (see Hammouda & Jallab, 2005; Cho, & Diaz, 2011). Exchange rate is an important determinant of trade since it enables international transactions and exchanges through the conversion of currencies to a common denominator. A change in the exchange, therefore, has a direct influence on international trade. In addition, a stable and competitive exchange rate is crucial to greater trade flows, particularly in the case of devaluation/depreciation of a domestic currency relative to other currencies, such that the exports of the country that has devalued are stimulate through greater international competitiveness, given favourable demand for the exportable commodities that are demand elastic. The inclusion of exchange rate, is thus, anchored on strong theoretical and empirical footing.

Financial development is an important determinant of trade through the channel of trade credits and finance, thus encouraging trade. Vast literature and empirical studies support this position (see Manova, 2008a, b), Antras & Caballero, 2009; Bougheas & Falvey, 2010). Thus, a well-developed financial system is able to finance greater level of international trade through the provision of trade finance, product diversification and trade risk insurance, amongst others. The ease of doing business is an important determinant of the international competitiveness of the business and trade environment. As determinant of trade, the manner of policy regulations in the environment and processes of trade determine the volume and intensity of trade and business competitiveness. Hence, its inclusion in the model is justified on strong theoretical and empirical basis (see the World Bank Ease of Doing Business). Finally, institutional framework, which embed the rule of law, political stability, government effectiveness and contract enforceability are important variables that influence the

coordination and harmonization of trade processes geared towards greater regional trade. As a trade determinant, strong institutional framework ensures the adherence to trade treaty/protocols, as well as their enforcement. This has the capacity to encourage greater level of intra-African trade through trade policy reforms/restructuring, particularly, the coordination and synchronization of trade policies. Its inclusion is thus, in line with the extant literature.

The definitions of the variables in the model, unit of measurement, as well as the sources of data are provided in Table 2.

Table 2. Definition of Variables and Data Sources

Variable	Description/Measurement	Source
Trade Flows	African trade performance is measured as the growth of rate of total volume of recorded trade (i.e. average growth rate of export and import trade).	World Development Indicators (World Bank), World Trade Report, UNCTAD.
Logistics Performance Index(LPI)	A composite weighted index based on seven fundamentals; efficiency of the clearance process by customs and other border control agencies (i.e.; speed, simplicity and predictability of formalities); quality of trade and transport infrastructure (e.g., ports, railroads, roads, information communication technology); information technology infrastructure; ease and affordability of international priced shipments; competence and quality of logistics services (e.g., transport operators, customs brokers); ability to track and trace international shipments (consignments), domestic logistics costs and; timeliness of shipments in reaching the desired destination within the scheduled or expected delivery time.	World Bank World Development Indicators (World Bank).
Trade Facilitation	Trade facilitation is measured as transaction costs to trade (i.e average of export and import costs) of a unit cargo in USD Dollars.	World Bank World Development Indicators (World Bank).

Openness	Openness to trade is measured as the sum of exports and imports as ratio of GDP.	World Bank World Development Indicators (World Bank).
Financial Development	Private credit by deposit banks as a ratio of GDP.	World Economic Outlook (IMF).
Exchange Rate	Nominal exchange rate in terms of the US Dollar as a common denominator.	World Economic Outlook (IMF).
Ease of Doing Business Score (Index).	The ease of doing business measures the competitiveness of the trade and business environment in terms of regulations, and processes involved. Economies are ranked on their ease of doing business, from 1–190. An improved ease of doing business ranking, which suggests less business and trade inhibitions and documentations (with respect to regulations and the necessary reforms) implies that the environment is more conducive to business and trade. The rankings are determined by sorting the aggregate scores on 10 topics, each consisting of several indicators, giving equal weight to each topic.	World Bank Doing Business Report.
Institutional Quality	Institutional quality, as it pertains to trade is measured in line with Kaufmann et al (2010), as the average of six weighted institutional indicators that include socio-political stability, rule of law, enforceability of contracts proceeding, absence of risk of expropriation, government effectiveness and corruption)-measured on an index scale of a range of -2.5 to 2.5. Source: http://info.worldbank.org/governance/wgi/index #home	World Bank World Development Indicators (World Bank).

Source: Author's compilation.

4.3.   Estimation Technique

The estimation is done employing different panel data estimators- Panel Fixed Effect (FE) and Panel Estimated Generalized Least Squares, also known as feasible generalized least squares (both fixed and random), which addresses autocorrelation, and   the Fully Modified Ordinary Least Squares (FMOLS), which corrects for autocorrelation, potential endogeneity of regressors and reverse causality. The FE estimator is a consistent estimator, but it has the disadvantage of not allowing the estimation of the coefficients of the time invariant regressors. When there is endogeneity among the regressors, there would be substantial bias in OLS and the random effect (RE) estimators, and both yield misleading inferences. Although the fixed effect technique assumes heterogeneity across country units, the methodology does not adequately address the problem of endogeneity and reverse causality. Hence, to remedy the above challenges, the Fully Modified OLS (FMOLS) estimation technique is employed to further estimate the model.

The FMOLS builds upon the weakness of the static panel data estimators (i.e fixed and random), as it is able to account for significant heterogeneity across the individual panels to produce asymptotic unbiased estimators and free normal distributions (Pedroni, 2004). The estimates are consistent and efficient, and potentially address endogeneity and simultaneous bias due to reverse causality. As test/check for the robustness of the results, the system-Generalized Method of Moments (GMM) estimation technique is employed. The technique popularized by Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998), is widely recognized as the most appropriate dynamic panel data econometric technique, when attempting to care of the problems of endogeneity, heteroscedasticity and reverse causality. The main advantage of the dynamic panel data estimators (i.e GMM) is that it comprehensively takes cognizance of the individual characteristics of the different countries used in the study. It is generally observed that country-level characteristics, unobserved period and country specific effects (economic and structural idiosyncrasies) are strong factors in the explanation of trade flows and/or trade variation, and hence, this differentiation may bring endogeneity bias into the estimation. The dynamic panel estimators help to correct this inherent estimation problem by taking care of the joint endogeneity of the regressors with the dependent variable, thereby addressing the emanating biases due to simultaneous or reverse causation. The system GMM estimator provides more precise, less biased, consistent and asymptotically efficient estimates than the first-differenced GMM estimator. Apart from eliminating potential biases that may arise from ignoring dynamic endogeneity, the estimator provides theoretically-based and powerful instruments that accounts for

simultaneity, while eliminating any imperceptible heterogeneity (Blundell & Bond (1998).

4.4.   Data

The study utilized panel data covering the period 2008-2019 for thirty-eight (38) selected African countries based on data availability for the model.

5.0   Empirical Results and Analysis

5.1.   Descriptive Statistics

Table 3 shows the descriptive statistics of the variables used for the analysis. Average trade performance (i.e. growth rate of total trade flows) during the period is 5.52 percent. With a median value of 6.17 percent, and a maximum and minimum growth rate of 9.3 percent and 1.02 percent, respectively, trade flows performance tend to have been low and dissimilar among the African countries, due perhaps, to weak logistics base and poor trade facilitation in terms of high trade transaction costs, arising from unsynchronized trade processes and custom procedures, including other border control agencies that may have caused exorbitant international trade costs. Average logistic performance index for the African countries is 2.57, with a median value of 2.54, indicating low logistics capability, using an overall performance scale of 5. The mean value of trade facilitation (measured by trade transaction costs) is USD 1998.4 USD, with a median value of USD 2003.2. The maximum and minimum values are USD 2876.1 and USD 625.3, respectively. Openness of the domestic economy has a mean value of 58.7 percent, with a median value of 57.2 percent. The corresponding average values for exchange rate, financial development, ease of doing business and institutional quality are 115.2, 18.3, 92.2 and -0.33, respectively. Thus, on the average, African countries are characterized by low logistics performance index, prohibitive international trade costs, weak institutional quality, poor ease of doing business, poor macroeconomic policy environment, among others. These factors may have contributed to the poor level of trade performance during the period.

Table 3: Descriptive Statistics

	Mean	Median	Max.	Min.	Std. Dev.
TFL	5.52	6.17	9.43	1.02	7.33
LPI	2.48	2.52	4.52	1.74	1.23
TFA	1997.4	2002.3	2876.12	625.3	15.24
OPN	58.72	57.25	70.26	38.42	6.78
EXR	115.23	109.06	524.20	7.56	32.52
FDEV	18.26	19.75	25.62	1.22	3.72
EDB	92.22	95.23	110.20	15.30	4.26
INST	-0.33	-0.44	1.02	-1.22	5.32

Source: Author's computation

5.2.   Correlation Analysis

The result of the pairwise correlation matrix tests used to examine the nature, pattern and degree of correlation among the variables is reported in Table 4. A strong incidence of correlation among the independent variables could violate the working assumptions of the estimation technique thereby, generating unrealistic estimates. From the correlation matrix, a positive correlation is observed between trade performance and the explanatory variables, including the logistics and trade facilitation variables. An overall examination of the correlation matrix suggests that the problem of multi-collinearity in the model is not likely to be an issue, as the correlation coefficients are generally low.

Table 4: Correlation Matrix

	TLF	LPI	TFA	OPN	EXR	FDEV	EDB	INST
TFL	-							
LPI	0.17	-						
TFA	0.14	0.25	-					
OPN	0.20	0.11	0.22	-				
EXR	0.06	0.19	0.16	0.17	-			
FDEV	0.28	0.23	0.08	0.30	0.20	-		
EDB	0.14	0.18	0.15	0.05	0.12	0.17	-	
INST	0.09	0.16	0.19	0.13	-0.06	0.15	0.10	

Source: Author's computation

5.3   Multivariate Panel and Dynamic system-GMM Results

The estimated results from the model using variant estimators, Panel Least Squares (Fixed Effect), Panel Estimated Generalized Least Squares (Random Effect with cross-section weights), Panel Estimated Generalized Least Squares (Fixed Effect with cross-section weights) and FMOLS are presented in Table 5. The alternative result from the system-GMM used to test for robustness is also presented. The goodness of fit indicated by the adjusted coefficient of determination of the Panel fixed effect and Panel EGLS (Fixed Effect with cross-section weights) show that the regressors explain over 73 percent and 90 percent of the systematic variations in African trade performance. This implies that the explanatory variables are significant factors explaining trade performance in the continent over the period, making the predictive ability of the model good. The individual F-statistics are highly significant, passing the significance test at the 1% level; a confirmation of the reliability of the explanatory power of the model, and validating the hypothesis of a significant linear relationship between trade in African countries and its explanatory variables.

Table 5: Trade Performance and its Explanatory Variables

Variables	Panel LS (Fixed Effect)	Panel EGLS RE (with CSW)	Panel EGLS FE (with CSW)	FMOLS	System GMM
C	0.102 (1.243)	1.124 (1.050)	1.032 (1.160)		
TFL (-1)	-	-	-	-	0.1023* (1.791)
LPI	0.222 (0.92)	0.2884 (1.230)	0.315 (1.337)	0.2771 (1.270)	0.2812* (1.832)
TFA	-0.188 (-1.882)*	-0.223 (-2.106)**	-0.254 (-2.141)**	-0.265 (-2.18)**	-0.187 (-2.406)**
OPEN	0.412** (2.522)	0.372 (2.636)***	0.388 (2.773)***	0.386 (2.622)***	0.740 (2.622)***
EXR	0.022 (0.902)	0.030 (1.140)	0.027 (1.322)	0.143 (1.821)*	0.105 (2.102)**
FDEV	0.117 (1.350)	0.186 (1.506)	0.204 (1.872)**	0.177 (2.162)**	0.225 (2.254)**
EDB	1.016 (0.671)	1.084* (1.511)	1.082 (1.721)	1.221 (1.835)	1.094* (1.823)
INST	-0.021 (-1.741)	-0.079* (-1.743)	-0.820* (-1.821)	-0.115* (-1.844)	-0.964* (-1.872)

R²	0.15	0.46ʷ	0.941ʷ		
Adjusted R²	0.730	0.40ʷ	0.903ʷ		
F-statistic	6.22	12.23ʷ	42.23ʷ		
Long-run variance				0.046	
J-Stat					3.95 (0.28)
AR(1)					-2.84*** (0.005)
AR(2)					-0.610(0.54)

Note: ***, ** & * indicate statistical significance at 1%, 5% & 10% levels, respectively.
FE= Fixed Effect; RE= Random Effect; CSW= Cross-Section Weights, W= Weighted Statistics; t-ratios are in   parenthesis.
Source: Author's computation

The coefficient of the lagged trade variable in the system-GMM (a measure of the past realization of trade position) is positively related to current trade and significant at the 10 percent level. Thus, previous trade position positively influences current or future trade in Africa, especially in the face of policy consistency in the successes already made in trade reforms. Based on the estimates of the system –GMM, a unit percent increase in initial trade in Africa results to a further trade by 0.1 percent.

The coefficient of the logistics performance index is positively signed and significant only at the 10 percent level in the estimates of the system-GMM. This implies that although logistics capability positively influences African trade flows, the impact is still mild, due mainly to the weak trade infrastructure, poor technological development and weak political capacity to implement appropriate policies in the region. The result supports the findings of Njinkeu, Wilson, & Fosso (2008), Nguye, and Tongzon, (2010), Marque-Ramos (2011) and Ozekhome and Oaikhenan (2019,b). The estimates indicates that a unit percent increase in the logistics performance index will increase trade flows in Africa by 0.28 percent.

The coefficient of trade facilitation measured by trade transaction costs is negatively signed, based on the presumptive signs and is significant at the 5 percent level for the panel EGLS, FMOLS and system-GMM estimates. Apparently, high trades transaction cost due to poor trade coordination and harmonization has a diminishing effect on trade performance in African countries. Thus, better, efficient and result-oriented trade facilitation will lower the transaction cost of trade and consequently stimulate trade in Africa. The results supports the findings of De (2004), Hoekman and Nicita (2011) and

Portugal-Perez and Wilson (2012). The coefficient estimate from system GMM shows that a unit percent decrease in trade transaction costs arising from improved trade facilitation will lead to trade expansion in Africa by 0.19 percent.

The coefficient of domestic trade openness is appropriately signed, in line with theoretical expectation and is significant for the full panel estimation. Thus, greater degree of openness will encourage trade expansion in Africa, as it will eliminate all distortions to trade. The result supports the findings of Hammouda and Jallab (2005) and Cho and Diaz (2011) and Ozekhome (2016). The coefficient indicates that a unit percent increase in trade openness will, on the average, trigger trade expansion in the African continent/region by about 0.7 percent. The coefficient of the exchange rate variable is positively related to trade performance, and is statistically significant at the 5 percent level in the estimates of the system-GMM. Thus, currency devaluation/depreciation engenders trade growth, as commodities become cheaper in the international market, given favourable demand for the export commodities that are demand elastic. This finding supports the findings of Ozekhome and Oaikhenan (2019,b). Unfortunately, many of the countries African countries lack meaningful diversification in the composition of their output and trade due to dependence on production and exports of sometimes single or narrow range of primary commodities with low demand elasticity. The coefficient indicates that a unit percent depreciation in nominal exchange rate will induce trade growth in Africa by 0.11 percent.

The coefficient of financial development (proxied by banks credit to the private sector) is positively signed and significant at the 5 percent level for the Panel EGLS (CSW), FMOLS and GMM results. Thus, increased level of credit intermediation that helps to finance trade, tend to encourage greater level of international trade and international competition. This finding supports the findings of Manova (2008a, b), Antras and Caballero (2009) and Bougheas & Falvey (2010). The coefficient indicates that a unit percent increase in trade credits will promote trade in African region by 0.23 percent. The coefficient of the ease of doing business is positively signed and is significant at the 10 percent level only in the GMM estimate. Thus, improved ease of doing business in terms of simplified policy regulations and trade processes enhances trade flows in the African region. This is one of the element of the new structural measures espoused in the AfCFTA. The coefficient indicates that a unit percent improvement in the ease of doing business will stimulate trade and international competitiveness in African countries by 1.1 percent.

The coefficient of the variable introduced to capture institutional quality, which encompasses the rule of law, political stability, government effectiveness, and enforceability of contracts proceeding is negative and significant at the 10 percent level in all the estimations. This finding supports the findings of Ayanwu and Yameogo (2015) and is at variance with the findings of Adegboye et al (2019) on economic integration for ECOWAS countries. Thus, poor institutional environment tend to undermine trade in African region. Invariably, there is poor enforceability of trade agreements/protocols in terms of the adherence (non-violation) to trade treaties, alongside poor governance and political instability that weakens trade in the region. This may have contributed to the poor intra-African trade performance during the period under focus, as strong institutional framework is required for the ratification and enforcement of trade protocols/treaties, and in implementing the needed structural and economic reforms that facilitates trade, as in the case of the AfCFTA. In line with the estimates, a unit percent improvement in institutional quality will enhance trade in Africa countries by 0.96 percent.

The conventional post-estimation (post-diagnostic) evidence for the robustness and validity of results obtained, show a Hansen- J statistic of 3.95 that fails the significance test at the 5 percent level, portraying the non-rejection of the hypothesis of no endogeneity problem. This thus, imply that the over-identifying restrictions are equal to zero. The specification of the model can therefore not be rejected, as it is appropriate specified and the instruments suitable and valid. The evidence also provides good certification for the choice of the exogeneity of instruments, as required in a system-GMM. The post-estimation results also leads to the rejection of the null hypothesis of no serial correlation at order one in first-differenced errors, but failure to reject same at order two {with AR (1) =-2.80 0.005) and AR (2) = -0.61(0.54)}. There is accordingly, no robust evidence to invalidate the results, bearing in mind that, according to Arellano and Bond (1991), the GMM estimates are robust in the presence of first-order serial correlation, but not in the second- order serial correlation in the error terms. The model, is thus, fit for structural and policy analysis.

5.3   Policy Implications of Findings

A number of important policy implications can be deduced from the empirical findings. First, improved logistics performance index is positively related trade, and as such, has the capacity to trigger trade flows in Africa, particular, intra-African trade. Therefore, it is important for countries in Africa to develop strong capacities for logistics base in term of increased investment and policy attention to hard and soft infrastructure that will encourage trade and economic integration in Africa.

Second, improved trade facilitation espoused in the simplification, coordination, harmonization and modernization of trade processes will enhance trade in Africa, particularly, intra-African trade, and thus, economic integration. With high and exorbitant transaction cost of trade, the prospect for increased intra-African trade and international competitiveness is considerably reduced. Therefore, it is important that African countries articulate robust trade facilitation policies and strategies that will optimize trade in the region. Increase trade in the African region would be economically beneficial to the African region if a win-win for all trade policies and strategies were implemented through a significant reduction in international trade costs brought about by robust trade facilitation.

Third, greater openness to trade through the removal of all obstacles and hindrances to trade will promote trade in African region. The removal of trade barriers to trade in Africa through greater economic openness, will permit efficient and optimal allocation of resources, and thus encourage trade in the region. This is a key element in the landmark trade agreement espoused in the AfCFTA, as it commits countries to remove tariffs on 90 percent of goods, progressively liberalize trade in services, and address a host of other non-tariff barriers. Therefore, policies and strategies aimed at greater degree of domestic openness to trade should be continuously implemented in African countries to promote greater level of trade integration, as espoused in the AfCFTA.

Fourth, financial development is positively related to trade performance, as it helps to facilitate trade resources and financial credits relevant to the promotion of international trade. A sound financial system is also important to trade in terms of risk diversification and trade insurance. It is therefore important that strong regulatory policies that would deepen and develop the financial system be continuously implemented in the region in order to encourage trade and fast rack economic integration in Africa.

Fifth, improved ease of doing business through softer and friendlier policy regulations will greatly enhance trade flows in African countries, as the quest to increase intra-African trade cannot materialize in a complex and uncertain business and trade environment. Thus, policies and regulations to improve the African trade environment and make it more internationally competitive are imperative. Without doubt, improvement in the ease of doing business will enhance trade and economic cooperation in the African continent.

Sixth, a competitive and robust exchange rate is important to promoting greater trade in Africa, particularly intra-African trade. Thus, sound, stable and competitive

exchange rate policy management is required to encourage trade in the African region. Finally, robust institutional settings, particularly the rule of law, political stability, government effectiveness, accountability and transparency and contract enforceability are important to African trade expansion. Unfortunately, there is poor institutional environment in Africa. It is therefore important that governments and policy makers in Africa develop strong institutional framework to enhance trade in the region, as it will facilitate the ratification, adherence and enforcement of trade protocols. In this regard, strong institutional framework that will help in the negotiation of regional agreements during period of reforms is important. These, accordingly, will, provide effective backgrounds to overcome insurmountable obstacles that may exist between domestic expectations and overall regional ability and willingness to pursue long-lasting social and economic transformation/restructuring embedded in trade policy agreements and the needed synchronization processes for trade and economic integration.

6.0   Conclusion

The study examined the link between logistics, trade facilitation and trade flows performance, against the backdrop of the implications for greater intra-African trade, using data on thirty-eight (38) African countries, on the basis of data availability, over the period 2008-2019. Employing a number of panel data estimators that include the fixed effect, panel EGLS (Feasible Generalized Least squares), the fully modified OLS (FMOLS) and the system GMM, which was used to test for robustness, the empirical results show a positive but weak relationship between logistics and trade in the African region. Trade facilitation (measured by international trade transaction costs), openness of the domestic economy, exchange rate, financial development and previous trade position are the other variables that significantly influence trade in African countries. The ease of doing business variable is positively related to trade, but the effect is mild, due perhaps, to the poor trade policy and regulatory environment in most of the African countries. This outcome is nevertheless, receiving attention in most of the African countries, with reforms being carried to enhance the trade and business environment. The institutional quality variable made to capture the adherence to trade treaties/protocols that guarantee the coordination and harmonization of trade policies and economic and structural reforms needed to advance the course of trade is negative and moderately significant, due perhaps to weak adherence to the rule of law, non-enforceability of contract proceedings, political instability, weak government effectiveness and corruption in Africa.

Against the background of the foregoing, government and policy makers in African countries need to implement robust trade policies and strategies that will enhance

trade, particularly, intra-African trade. This is hinged on the fact that the prospect for improved trade and economic integration can only be enhanced if efficient and robust trade policies and strategies that are beneficial to African countries are articulated and implemented in a win-win situation. The policies and strategies would, of course, entail the building of sound logistics capability, implementation of good and efficient trade facilitation, openness of the domestic economies to trade, sound exchange rate management, robust financial development, greater ease of doing business in terms of improved and friendlier trade environment, and strong institutional capacity that encourages trade through compliance to trade rules (i.e. treaties/protocols), as well as its enforcement. Such policies and strategies, if implemented, will no doubt, encourage trade, particularly intra-African trade and economic integration in the African region.

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FOREIGN AID AND EDUCATIONAL DEVELOPMENT IN SUB-SAHARAN AFRICA: DOES DOMESTIC INSTITUTIONAL CAPACITY MATTER?

Abidemi C. Adegboye*[1], Ifeoluwa Alao-Owuna[2]and Anthony O. Osobase[3]

Absract

In this study, the effect of foreign aid on educational development is examined for countries in the sub-Saharan Africa region while taking into consideration the effects of policy capacity as intervening in the connection between aid and the education sector. Using data for 34 countries and for the period 1998 to 2017, the Fully Modified OLS technique is applied for the empirical analysis. The direct and indirect effects of both aid to education and educational expenditure are considered in terms of policy dimensions. It is found that aid to education directly improves educational access and efficiency but does not have a direct impact on either educational quality or share of budgets devoted to education by the countries in SSA. On the other hand, educational expenditure significantly improves both access and quality in the educational sector, but not efficiency. We also found that better policy capacity of SSA governments tends to improve the extent of aid effect on educational development (in terms of access, quality, efficiency or budgetary allocation). The major policy implication of the results is that the establishment and sustenance of quality institutions that support policy making and implementation in SSA is a veritable means of attaining effective linkages between educational resource use and outcomes in the region.

JEL Classification: F35, H52, I22, I28, O43
Keywords: Aid to education, educational expenditure, policy capacity pupil-teacher ratio, school enrolment, school life expectancy

*Corresponding author's e-mail: cornabi@gmail.com
[1] Department of Economics, University of Lagos, Akoka, Yaba, Lagos, Nigeria
[2] Department of Economics, Adeleke University, Ede, Nigeria
[3] Department of Economics, University of Lagos, Akoka, Yaba, Lagos, Nigeria

1.0   INTRODUCTION

Foreign support in the educational sector has particularly been concerned about how funding is being used, the development outcomes in the sector, as well as the institutional environment surrounding aid receipts and educational system (Hubbard, 2007; Fuchs, Dreher & Nunnenkamp, 2014; Hippe & Fouquet, 2019). In line with this consideration, recent educational development drives among SSA countries have tended to pursue policy-based realignments as a tool for reviving the educational sector, especially for international competitiveness. As noted in an IMF review, progress in the educational sector depends on effective capacity-building, policy resolution, strong country leadership, and sustained commitment by development partners (IMF/IDA, 2012). In the same vein, the AU educational development project under "AGENDER 2063" and the Continental Education Strategy for Africa (CESA) bear a major concern for triggering policy shifts in educational development and management in order to reposition the sector and ensure international competitiveness.

A significant direction of educational policy in many SSA countries has been influenced by considerations for achieving universal enrolment patterns (Daun, 2000; Nishimura & Byamugisha, 2011; Baghdady & Zaki, 2019). There are however concerns that the emphasis on access (enrolment) by many SSA countries may have been achieved by higher government spending at the expense of quality (Stasavage, 2005). Worsening quality in the educational sector, are mainly due to the mismatch between sharp increases in enrolment and complementary resources to support maintenance of quality standards. While foreign aid has been noted to improve the volume of resources available to the sector, only domestic policy dimensions have the capacity to stimulate quality and sustainability in the system. Thus, there is the need for effective synergy between aid inflows and policy capacity and effectiveness in promoting the effect of aid on educational development. Moreover, many of the studies on aid-development nexus in SSA have considered aid inflows as mostly homogenous, without taking into account either the heterogeneity of aid donors in terms of intentions and capacity or heterogeneity of recipients in terms of application. This dimension of the research involves the pattern of data used in analysis. In this study, data on educational aid rather than total aid is employed in the analysis. This is a major highlight in the study that distinguishes it from previous studies which use total aid inflows in relation to sectoral performance.

The main aim of this study is to examine the role of policy capacity in influencing foreign aid effectiveness in the development of the educational sector in Sub-Saharan African (SSA) countries. First, we examine how foreign aid to education affects

government educational spending in the region, then the direct effects of educational aid on educational quality and development is examined. The argument is that institutional quality in recipient countries has strong effects on the outcomes of such spending. Moreover, the study seeks to show that foreign aid directed at the education sector could have different effects depending on the educational outcome being considered. Thus, the study presents educational development in terms of educational access and educational quality using different measures based on the World Bank and UNESCO estimates.

2.0   The Literature

The major aim of foreign aid by development partners is to improve economic conditions and quality of life in developing countries (Addison, Mavrotas & McGillivray, 2005; Adamu, 2013; Asongu, 2014; Kargbo & Sen, 2014; Edwards, 2015; Mahembe & Odhiambo, 2019). Although argument on the actual efficacy of foreign aid has remained inconclusive, there is some evidence that institutional factors may condition the relationship between aid and the recipient economic performances. For instance, Burnside & Dollar (2000) found that foreign aid was more effective on economic growth in developing countries that exhibited better fiscal, monetary, and trade policies, noting that good policies form a veritable condition for boosting aid effects. In the same vein, Gomanee, Girma and Morrissey (2005) found evidence that foreign aid works better in countries with good investment systems, while McGillivray (2003) found that the level of development performance and resilience to macroeconomic shocks in recipient countries determine aid effectiveness in developing countries. Essentially, Wako (2018) grouped the findings on the effectiveness of aid into four arguments: the effective aid, the conditionally effective aid, the ineffective aid, and the harmful aid camps. Following the vastness of the literature, the conditionally effective aid position appears to be quite relevant for many developing countries.

In terms of the effectiveness of educational aid, empirical studies appear to have generated three strands of outcome. The first and most early results is that "foreign aid is most often used for largely wasteful public consumption" (Remmer, 2004). These studies demonstrate that rather than boosting development and social conditions, foreign aid only helps to inflate government size and attendant wasteful expenditures by developing countries. The second strand of results show that countries with good social policies tend to be more favoured by foreign aid, although the probability that a "country adopts good policies is not influenced by the amount of foreign aid received". This outcome was found by the seminal study of Burnside and Dollar (2000) where the role of policy and institutional quality on aid effectiveness was brought to light for developing countries. For Africa, Asongu (2015) employed the panel quantile

regression technique to evaluate institutional thresholds that may exists in foreign aid effectiveness. The study found that existing institutional levels in the 53 countries are beneficial for foreign-aid effects on the recipient economies and that "foreign-aid is more negatively correlated with countries of higher institutional quality than with those of lower quality". The third spectrum consider that aid donors are mostly motivated by strategic and geo-political considerations, rather than real needs of the receiving countries (Alesina & Dollar, 1998; Fuchs et al., 2014; UNESCO, 2017).

Empirical research on the relationship between aid and educational development follows a strong delimitation based on the use of specific data on aid to education or the pattern of estimating the relationships. For instance, Ziesemer (2016) emphasized that the type of dataset matters when examining the aid-educational development relationship. Indeed, the effect of aid on educational development is highly susceptible to the pattern of estimates and extent of variable applications (Riddell & Nino-Zarazua, 2016). Moreover, Glewwe and Muralidharan (2016) found that the extent to which the estimate from a well-identified evaluation of a change in educational development reflects re-optimisation depends critically on the duration of the study. Foreign aid to education has been channeled into a variety of interventions including "school feeding programmes, classroom construction, teacher education, girls' scholarships, programmes to reduce student drop-out, curriculum development, targeting different educational levels and utilizing different aid modalities" (Riddell & Nino-Zarazua, 2016, p.18).

Das et al. (2013) investigated the effects of aid on education in India using randomly assigned school grant program over a 2-year period and found significant positive effects on test scores at the end of the first year but found no effect in the second year, even though the grant was provided again in the second year and was spent on very similar items in both years. They therefore concluded that the aid effects only represented the "first year" effect on educational development, while any "second year" effect would have to result from policy collaborations with the aid provision. Sabarwal, Evans and Marshak (2014) showed that when an insignificant impact of aid on education is estimated, there are often two policy-related interpretations that may be given. The first is that the assistance has been poorly implemented, perhaps due to "corruption or administrative failures, which are often the binding constraint in many developing countries". Second, there may be absence of, or inadequate complementary reforms that may be needed for the intervention to be effective. In this direction, Ziesemer (2016) assessed the effects of different forms of aid on health and education indicators in developing countries using GMM estimates and found

that growth rates or levels of aid per capita actually led to lower rates of illiteracy in the system.

Yogo (2017) assessed the effectiveness of aid and its efficient use in achieving universal primary education using a sample of 35 Sub-Saharan Africa for the period 2000 to 2010. Using various estimation methods and instruments to account for the endogeneity of aid, results from the study revealed that more aid inflows to education had a significant positive impact on primary completion rate. The study demonstrated that aid itself can form part of policy strategies to improve social development among the SSA countries. Wako (2018) studied aid-effectiveness using a panel of 43 sub-Saharan African countries for the period 1980 to 2013 using institutional quality as an intermediary in promoting effectiveness. He found that the long-run growth effect of aggregate aid from "traditional" donors was weak and the indirect effect was negative. Disaggregating the data into Chinese aid, and traditional aid revealed heterogeneity in the donor effects, especially when institutional quality is included in the analysis. There are other aspects of education that foreign aid has been found to influence in developing countries. For instance, Asongu and Tchamyou (2019) examined the direct and incremental impacts of foreign aid on education and lifelong learning using data for 53 African countries for the period 1996-2010 and the GMM technique. They found that aid had positive effects on primary school enrolment and lifelong learning (measured as "the combined knowledge acquired during the primary, secondary and tertiary levels of education") and that such impacts tend to last incrementally over the learning cycle.

Much of the studies on aid and domestic institutions or policy capacity have mostly considered the effects of aid on the policy environment and not the other way around. For instance, Boone (1996) found that aid only tends to increase the size of government without significantly increasing investment or improving human development. For the policy dimensions, Boone (1996) found that the policy environment of recipient countries does not change the pattern of aid inflows, although more liberal and democratic policy regimes have higher human capital indicators. The result was supported by Remmer (2004). Similarly, Busse and Gröning (2009) examined how aid receipts affect corruption and overall governance quality in developing countries and found that aid tends to limit governance capacity and promote corruption among the countries. Also, Svensson (2000), using quantile regression technique for data on developing countries found that expectations of aid in the future may suffice to increase rent dissipation and reduce the expected level of public goods provision. On the other hand, Okada and Samreth (2012) demonstrated that foreign aid leads to marked reduction in the desire for public policy to be influenced by corruption.

The focus of the study is on how the quality of policy environment affects aid into the country. In this direction, Alesina and Weder (2002), considered the relationship between institutional quality and aid inflows by asking whether corrupt governments receive less foreign aid or not. The general answer they provided was that institutional quality, on the basis of government corruption, does not enhance foreign aid receipts in developing countries. Rather, according to some measures of corruption, more corrupt governments receive more aid. They also found that increases in foreign aid do not necessarily reduce corruption. Wane (2004) found that highly capable and accountable governments accept only well designed projects, whereas governments with low accountability may accept poor quality projects either because they are unable to assess the worth of the projects or they will benefit personally. This indicates that policy capacity tends to strengthen the category of aids received and the effects on the economy. Morales-Gomez (1991) emphasized that the establishment of policies and priorities is central to the effectiveness of aid and assistance in the education sector.

The role of policy (often considered in relation to institutional quality) have been found to be strong preconditions for domestic social or macroeconomic performance (Acemoglu, 2005; Chag, 2011). The policy environment is often considered from a political-economy perspective. For instance, Lane and Tornell (1998) showed that "certain political arrangements could result in institutions that tend to inhibit domestic social performances through rent seeking". This direction of relationship was expanded by Fan, Lin and Treisman (2009) by considering the characteristics of political decentralisation as a means of attaining institutional quality since decentralisation leads to less corruption. According to them, "closer contact between decision-makers and beneficiaries allows the latter more control and leads to stronger accountability on the part of the former, while at local level decisions are made in a more transparent manner than in central ministries" (p. 13). Thus, a decentralised political system may deliver better policy outcomes that improve education over time (Padovano, Fiorino & Galli, 2011; Kuncic, 2014). On the other hand, decentralisation has been shown to create room for graft, given that proximity facilitates arrangements between corrupt parties (Hallak & Poisson, 2006; Hubard, 2007).

3.0   Institutional Capacity and Educational Aid in SSA: Stylized Facts

Patterns and direction of institutional quality indicators among SSA countries are considered in Figure 1. It can be initially noted that the scores remained negative for each of the indicators for both periods, highlighting the poor institutional and policy capacities among SSA countries. The region has performed best in terms of political stability and voice & accountability for both periods. The steady better scores shown
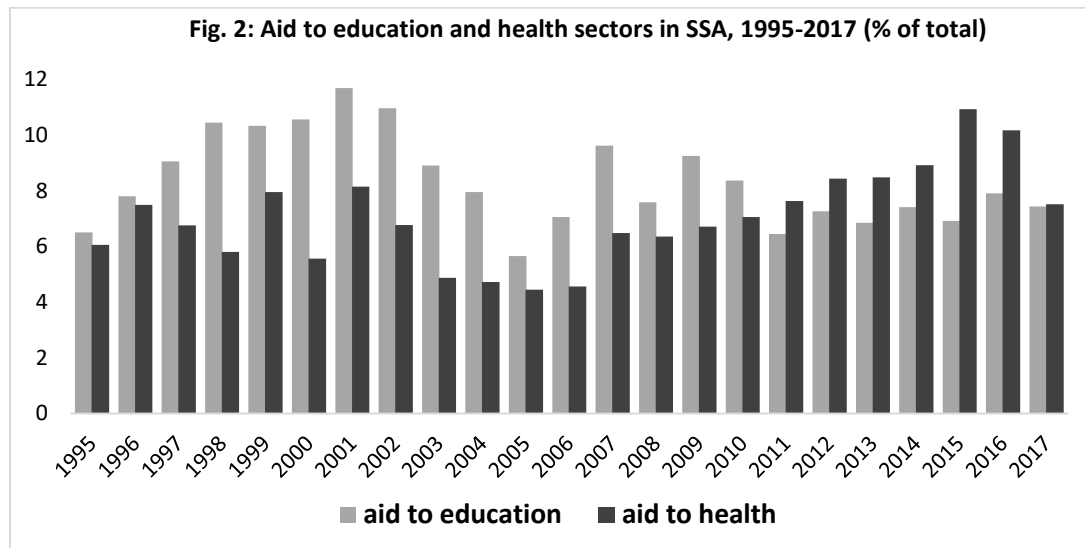
for these indicators may perhaps be due to the new wave of democratic governance and institutional framework that swept the region during the latter part of the 1990s. The biggest improvement between the 1990s and 2017 among the indicators occurred in voice & accountability. The importance of voice & accountability in both policy environment and social development is hinged on wide acknowledgement that "citizens as well as state institutions have a role to play in delivering governance that works for the poor and enhances democracy" (Sharma, 2008, p.3). Indeed, the capacity of citizens to express and exercise their views has the potential to influence government priorities, governance processes and public use of resources, including a stronger demand for transparency and accountability. When such views are attended to, governments can then be held accountable for their actions and policy statements thereby responding better to the needs and demands thus articulated by their population (O'Neil, Foresti & Hudson, 2007; Han, Khan & Zhuang, 2014). The result for average scores for quality of regulation across the region for the 1990s and 2017 indicates only a very slight improvement over time as against the worsening government effectiveness indicator. As has been noted in Mankiw (2009), and Sorensen and Whitta-Jacobsen (2010), weak regulatory institutions encourage poor educational, entrepreneurial and technical development in a country. There is also only a little improvement in the control of corruption between the 1990s and 2017.

Fig. 1: Policy capacity in SSA
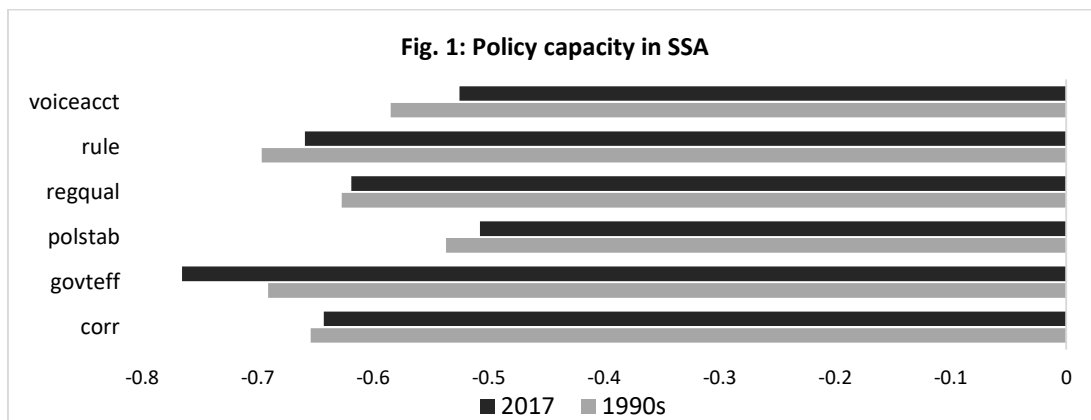
The inflow of foreign aid to education and health sectors among SSA countries is shown in Figure 2. Aid flows to both sectors appear to have experienced an unsteady pattern over the period 1995 to 2017. Between 1995 and 2010, aid to education dominated, while the period since 2010 has seen health aid rising above that of education. The fall in aid to the educational sector in SSA countries in the last decade has occurred despite the fact that "governments of low and lower middle income countries have

increased their overall spending on education since 2000" (UNESCO, 2015, p.11). There are therefore conclusions that aid to education has either dropped in priority or they are not being allocated according to need in the last few years (UNESCO, 2017). For instance, SSA, which is home to over half of the world's out-of-school children now receives less than half the aid to basic education it obtained in 2002. This amounts to 26% of total aid to basic education, barely more than the 22% allocated to Northern Africa and Western Asia, where 9% of children are out-of-school (UNESCO, 2017). Apparently, aid to the educational sector is not enough to meet the enormous educational needs of countries in the SSA region.

Aid to education is essentially important for SSA countries with perennial shortages in financial resources to develop the educational sector (Yogo, 2017; Wako, 2018). Thus, as shown in Figure 3, aid has been received for all levels of education, although aid for basic and primary education has dominated among SSA countries, while aid to secondary education is smallest among the levels. This shows that donors are certainly interested in the lowest tiers of the educational system in SSA countries since the level is critical for educational development in a country. However, there was a slight drop in aid to primary education from 2006.

Fig. 2: Aid to education and health sectors in SSA, 1995-2017 (% of total)

Fig. 3: Aid inflows by educational level (% of total educational aid)
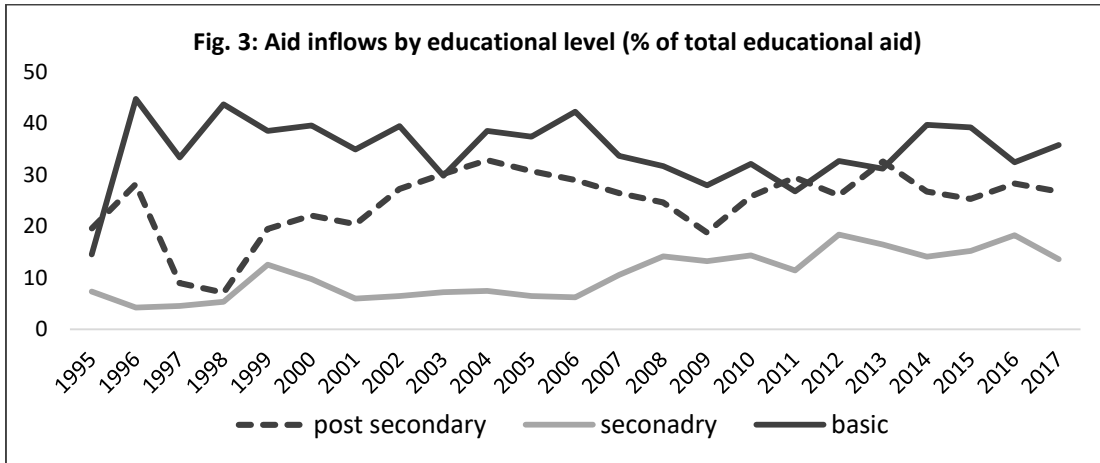
Another way to evaluate aid into education is to consider the technical dimensions of aid inflows to the sector. In Figure 4, it is seen that aid to support educational policy and administrative management is higher than all other forms of the technical support from aid, though the share of such aid support has fallen drastically in recent years. On the other hand, aid to support educational research has had a very little share of total education aid for the countries. Educational aid may be limited to aspects of the sector that do not border on research, which is basically a more policy-based segment of education.

Fig. 4: Distribution of aid for technical support in educational sector (%)

Fig. 5: Foreign Aid to Education at policy level and infrastructure

Source: Creditor Reporting System (CRS) database (OECD)

There is no clear pattern of the effects of policy capacity on aid inflows in literature. As confirmed in Figure 5, both control of corruption and government effectiveness appear to have weak relationships with aid inflows, suggesting that education aid may not actually be flowing to countries with better institutions or policy capacity. Thus, policy capacity may not be having the expected positive effects on educational aid inflows among SSA countries.

Figure 5: Policy capacity and educational aid

We also consider how policy capacity affects educational expenditure among the countries. The relationships shown in Figure 6 indicate that both government effectiveness and control of corruption have positive correlations with educational expenditure. This suggests that stronger policy capacities tend to be associated with more educational expenditure. It therefore appears that policy capacity has stronger ties with educational expenditure than with educational aid receipts. Policy will further strengthen budgetary expenditure in the sector than draw more aid into the sector.

Figure 6: Policy capacity and educational expenditure
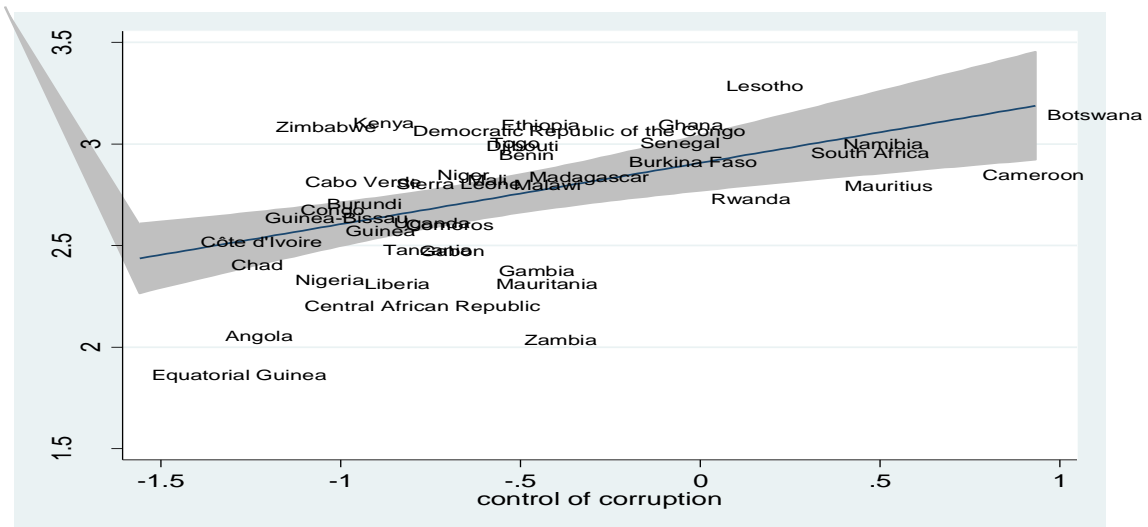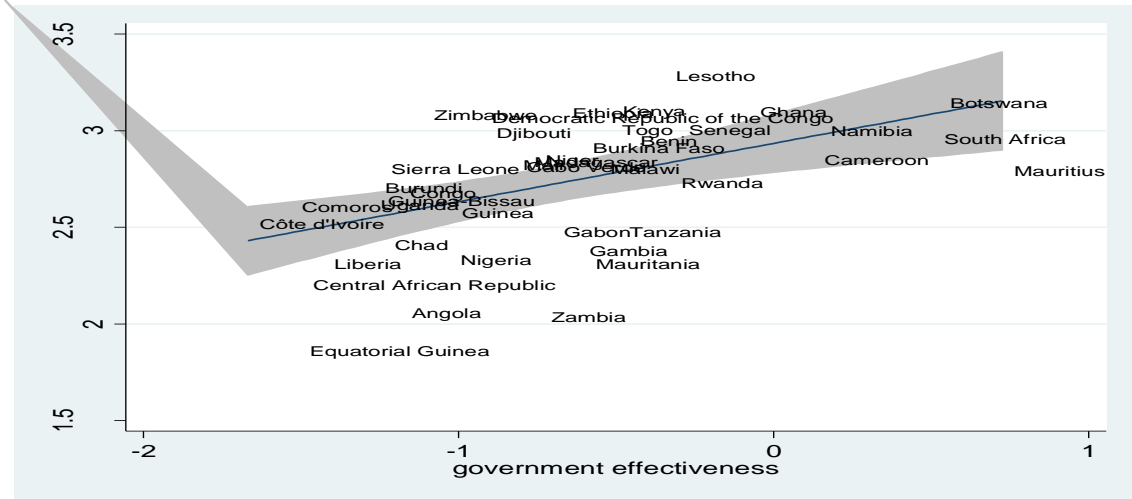
4.0   Methodology

4.1   The Model

A panel data analysis procedure is used for the empirical investigation of the study. We estimate a reduced form equation for educational development with a general form given as:

$$y_{it} = a_0 + a_1 aid_{it} + a_2 policy_{it} + X_{it}'\beta + \delta_t + \varepsilon_{it} \tag{1}$$

where y_{it} is the measure of educational development (secondary school enrolment rate, pupil to teacher ratio, life expectancy in education, and share of government

budgets to education), *aid* is educational aid inflow, *policy* is the measure of policy capacity, *X* is a vector of control regressors that influence educational sector development and also enhance robustness of the relationship in a country, δ_t and ε_{it} are the temporal, and idiosyncratic error terms respectively. The specified model shows a one-way error component for the panel equation. This is performed because, it is demonstrated that educational policies are country-specific and are thus, fixed in their impacts on educational development. We also seek to interact policy capacity with aid in the educational development equation in order to determine the role of policy capacity on aid effectiveness in the educational sector. Hence, another form of equation (1) is:

$$y_{it} = a_0 + a_1 aid_{it} + a_2 policy_{it} + a_3 aid_{it} * policy_{it} + X'\beta + \delta_t + \varepsilon_{it} \qquad (2)$$

Estimating Equation (2) with OLS leads to inconsistent estimates if foreign aid is correlated with an unobserved component that may potentially explain educational development. For instance, countries with poor educational performance could receive more aid. Moreover, policy dimensions have also been shown to be endogenously related to components of human capital development (Heckman, 2000; Adegboye & Oziegbe, 2018; Hippe & Fouquet, 2019). In these cases, the effect of aid or policy on an educational development model will be underestimated. Two major attempts have been made in literature to address the problem of endogeneity between either institutions or aid inflows and educational development. Studies like Combes et al. (2014), Bermeo and Leblang (2014) and Yogo (2017) have employed the instrumental variable method based on the 2SLS approach, while studies like Gyimah-Brempong and Asiedu (2008) and Adegboye and Oziegbe (2018) have employed the system GMM technique. For the instrumental variable methods, there are always challenges of appropriate selection of instruments whereby earlier instruments are criticized as ineffective by later studies. Hence, we will not search for instrumentation, especially given that institutional variables are used as important explanatory variables in the study.

This study proceeds to estimate the equation using the Fully Modified OLS (FMOLS) method, which is appropriate for heterogeneous cointegrated panels (Pedroni, 2000). This methodology "addresses the problem of non-stationary regressors, as well as the problem of simultaneity bias among the variables that are endogenous in a reduced-form equation" (Eregha, Irughe & Edafe, 2018 p. 66). The FMOLS is based on the assumption of a linear combination of variables which ensures that they are in proportion to one another in the long run (or panel cointegration) and it generates individual long-run estimates for the equation. The FMOLS technique yields unbiased estimates when the regressors are endogenously determined, as long as the variables

are I(1). The FMOLS is estimated based on the following co-integrated system time series (Pedroni, 2000):

$$y_{it} = \alpha_i + x_{it}\beta + e_{it} \tag{3}$$

$$x_{it} = x_{it-1} + \varepsilon_{it} \tag{4}$$

where y_{it} is the dependent variable, x_{it} is a vector of explanatory variables, and e_{it} is stationary with a constant covariance matrix represented. The FMOLS therefore solves the problem of endogenous regressors by making a semi-parametric correction to the OLS estimator. The size of the dataset, with a large time span (1995 – 2017) and a relatively small cross-section (41 countries) renders the application of the system GMM ineffective.

4.2   Variables in the Model

In measuring educational development, there can be several perspectives in terms of educational access, educational quality and educational efficiency, both in terms of government spending in the sector and life expectancy in education (Vros, 1996; UNESCO, 2004; Gyimah-Brempong & Asiedu, 2008; Wolf & Department for Education, 2011; Glewwe & Muralidharan, 2016). Both theory (such as Baker 1992) and empirical literature show that these variables effectively measure development of the educational sector in aggregate terms. For this study, educational access is measured by school enrolment at the secondary level of the system. Educational quality is captured by the pupil-to-teacher ratio which is expected to show the quality of learning in the schools. The proportion of government spending in education measures government desire and effort in ensuring educational sector development. School life expectancy is also included to capture the efficiency of the schooling system in retaining pupils within the system. This variable extends beyond mere consideration of enrolment rates to evaluate more learning-related outcomes. As Glewwe and Muralidharan (2016, p. 654) noted, "high rates of enrollment often mask low rates of actual school attendance in many low-income settings". From the literature, it is expected that educational outcome variables of access, quality and efficiency should improve with larger aid inflows into the economy. Also, government spending in education should be boosted with more aid inflows in the economy.

Another justification for the use of the dependent variables in the study involves the implication of policy capacity (or environment) on the sector. In relating educational development to policy and institutional factors, both outcome and expenditure components are included in order to show if there are underlying institutional implications that may enhance aid yields and spending towards achieving outcome targets (see Hanushek, 2013; Adegboye & Oziegbe, 2018). School enrolment is taken at the secondary school level. The secondary school level of education is often

considered as the structure for building basic cognitive skills applicable for many task related functions (Wolf & Department of Education, 2008). For the expenditure variables, we use government expenditure on education as proportion of total annual budgets (*edexp*). Educational aid is measured as the share of aid inflows that is made up of educational support (*edaid*).

In measuring policy environment, there is the need to understand the issues regarding levels of regulation (which are more policy-related) and quality of regulation (which relates more to institutional quality). The focus of the policy-related factors used in this study involves performance measures which provide assessments of the quality of governance (Knack, 2000; Rauch & Evans, 2000). The measures of institutions used in the study are based on the World Governance Indicators (WGI) estimates. The institutional quality variables include government effectiveness (*goveff*), the quality of regulations (*regulation*), control of corruption (*corruption*), and voice & accountability (*voice*). These variables are used to emphasise governance capacity, which relates to policy making and consistency, level of respect for citizens (which is related to rights to education), as well as citizens' respect for the "institutions that govern economic and social interactions among them" (Kaufmann, Kraay & Mastruzzi, 2010). For instance, societies with more powerful citizen participation have been noted to have better influences on educational development. Also, voice and accountability is a strong indicator of the policy environment and can serve as a tool for influencing policy outcomes (Eterovic & Sweet, 2014). Each of the measures takes a minimum value of -2.5 for the worst performance level and 2.5 for the best performance level. Based on the measurement and calibrations, each of the institutional factors is expected to be positively related with educational development.

Besides the standard institutional quality measures above, political systems in the process of economic activities in Africa have been a source of considerable research over many years. In this paper, and as in Barro and Lee (1994), Sala-i-Martin (1997), among others, we also hypothesize that political arrangements that proxy for decentralized political power may increase efficiency of aid use, since decentralisation tends to lead to more competition among the federating units. Federal structures are assumed to be more decentralized in terms of allocation of resources to the subordinate entities than unitary states. Hence a dummy that takes 1 for federal system and 0 otherwise is used to capture political system in a country is included in the model. Other control variables included in the model are GDP per capita (*gdppc*), labour force participation rate (*lfpr*), the share of urban population (*urbr*), the amount of natural resource rent (*rent*), and the degree of trade openness (*topen*). Each of the variables tends to influence educational performance among

the SSA countries, either directly or by influencing the main explanatory variables in the model.

4.3   The Data

Data used cover 34 sub-Sahara African countries for which data are available. Annual data for the period 1998 to 2017 are sourced for each of the countries in the sample. all the data are taken four years non-cumulative averages, which implies that five data points were generated for each of the countries in the study. The data on institutional quality were obtained from the World Governance Indicators datasets of the World Bank, while education data were also augmented from the UNESCO Ebsco data on Education. Data on aid flows was obtained from the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) through its Creditor Reporting System (CRS) database.

5.0   Empirical Analysis
5.1   Summary Statistics

The descriptive statistics for the variables used in the analysis are presented in Table 1 below. Average secondary school enrolment rate is low, averaging 39.73 for the countries over the period, although maximum value reached as much as 97.66 percent. In the same vein, the pupil-teacher ratio at the secondary school level averaged 43.15 percent for the sample, which is quite large. The ratio is actually as large as 97.42 percent, which far exceeds all spectra for quality of education for the country. Education life expectancy for the region is 6.02 with a low standard deviation value. This indicates that, on average, pupils spend 6 years in school among SSA countries which sums to completion of primary education. The average education life expectancy value corroborates the undue focus of governments in SSA countries on the universal basic education access, without solid provisions for post-primary educational development. Average share of education in total aid is 12.4 percent, while the average share of education spending in total budgetary allocations is 15.87 percent among the countries. This average budgetary allocation to education is relatively low when compared with the UNESCO recommendation of 26 percent budgetary provision in order to meet future standards in educational development. The minimum value of 4.73 percent for educational budget percent suggests that some countries have allocated very low amounts to education. Average labour force participation rate is moderate at 70.93 percent, while the urban population share of 37.87 percent is large and shows high prevalence of urbanization among the SSA countries. As mentioned in the previous section, all the institutional quality factors are negative on average, with government effectiveness recording the least performance.

Table 1: Descriptive Statistics

Variable	obs	Mean	Std. Dev.	Max.	Min.
sec. school enrolment (%)	533	39.73	20.55	97.66	6.64
school life expectancy (years)	765	6.09	1.54	9.48	1.92
pupils-teacher ratio (%)	685	43.15	13.42	97.42	18.32
share of education aid in total aid	943	12.40	9.39	53.84	0.74
education spending to gdp	769	4.20	2.17	12.54	1.17
share of education in total spending	566	15.87	5.76	30.01	4.73
gdp per capita	943	1965.9	2993.0	18626.8	198.0
labour force participation rate (%)	943	70.93	10.64	89.41	46.28
trade openness (%)	943	68.09	21.82	115.12	23.62
urban population rate	943	37.87	15.40	86.92	8.14
control of corruption	943	-0.64	0.61	0.99	-1.80
government effectiveness	943	-0.73	0.60	0.99	-1.88
regulatory quality	943	-0.63	0.59	1.06	-2.17
voice and accountability	943	-0.55	0.69	1.00	-1.98

Source: Author's computation

5.2   Panel Unit Root, Cross-Sectional Dependence and Cointegration Tests

The unit root results (not shown here) strongly indicate that the variables are non-stationary in level but become stationary at first differences. Table 2 shows the outcomes of Pedroni's and Kao panel cointegration tests on the three educational development Equation. The coefficients of the Phillips and Perron and Augmented Dickey Fuller test statistics for both the panel and group assumptions are significant at the 5 percent level. Thus, there is strong evidence of panel cointegration according to both the ADF-t and non-parametric-t statistics. These results are complemented by the Kao residual-based test which also indicates that the null hypothesis of no cointegration can be rejected for each of the equations.

Table 2: Panel Cointegration Test Result

school enrolment equation	Panel Statistics	Group Statistics	Kao (ADF)
Variance ratio	-0.654	--	
Rho	3.532	5.092	-4.73***
PP	-2.121*	-2.872*	
ADF	-2.625**	-3.033**	
pupil-teacher ratio equation	**Panel Statistics**	**Group Statistics**	**Kao (ADF)**
Variance ratio	-1.449	--	
Rho	3.249	4.961	-2.646**
PP	-4.149**	-5.206**	
ADF	-3.857**	-4.950**	
school life expectancy equation	**Panel Statistics**	**Group Statistics**	**Kao (ADF)**
Variance ratio	-0.592	--	
Rho	2.717	4.947	-2.175*
PP	-6.267**	-3.086**	
ADF	-6.885**	-4.106**	

Note: **, * indicates the rejection of the null hypothesis of no cointegration at the 0.01 and 0.05 level of significance respectively

The number of cross-sectional units (34) exceeds the time period (20 years for each of the countries). Thus, cross-sectional dependence (CD) test developed by Pesaran (2004) – which uses a pair-wise average of a sample correlation to test the existence of cross-sectional dependence – is applied. The results of the cross sectional dependence test for the datasets are presented in Table 3. The Peseran CD coefficients fail the significance test and the null hypothesis of no cross-sectional dependence among the datasets cannot be rejected. This therefore suggests the absence of cross-sectional dependence for the estimation structure.

Table 3: Cross-section Dependence Test Results

Equation	Pesaran CD	P-value	Abs corr
slxp	0.103	0.901	0.015
ser	0.276	0.899	0.019
ptr	-0.349	0.727	0.08

Source: Author's computation

5.3   Estimated Results

The results of the estimated models based on equations in the previous section are reported and explained in this section. In Table 4, the results of the three educational development variables are reported. The adjusted R-squared values for the results are generally moderate, although that of school enrolment is larger and shows that the selected independent variables explained over 65 percent of the variations in school enrolment. The long run variance for each of the equations is also low. The result shows that education aid has positive impacts on both school enrolment and school life expectancy among the countries and the effects are significant at the 5 percent level. Thus, education aid is shown to have the capacity of boosting school enrolment (which is access indicator) and school enrolment (which is efficiency indicator). A one percent rise in aid to education sector in the region leads to a 0.1 percent rise in school enrolment and 0.06 percent rise in school life expectancy. Apparently, aid receipts help to boost access to education among SSA countries and the aid inflows also helps to keep the children longer in school. These results are similar to those of Ziesemer (2016) and Yogo (2017) by indicating that aid spurs enrolments and increase likelihood of completing secondary education.

Table 4: Results for Education aid and educational development

Variable	Dependent variable		
	School enrolment	Pupil-teacher ratio	School life expectancy
edaid	0.109*	-0.001	0.056*
goveff	1.069**	-0.419**	0.370**
regulation	-0.063	-0.120	0.324**
corrupt	-0.324*	0.123	-0.305**
voice	0.316*	-0.170	0.145
urbr	-0.106	-0.360**	0.112
gdppc	0.334**	0.456**	-0.007
lfpr	0.011	0.101**	0.142**
topen	0.009**	0.005**	0.001
rent	-0.021**	0.000	0.002
edexp	0.029*	-0.019*	0.011

Adjusted R-squared	0.650	0.131	0.396
Long-run variance	0.340	0.253	0.150

Note: ***, ** indicate significance at at the 0.01 and 0.05 level of significance, respectively.

However, the result also shows that aid to education has no significant impact on pupil-to-teacher ratio. Though the coefficient is negative, it fails the significance test at the 5 percent level. Given that the pupil-teacher ratio is used to measure educational quality, this result shows that aid does not actually improve quality in the educational sector among SSA countries. Like Das et al (2013) and Glewwe and Muralidharan (2016) also found, aid may immediately stimulate participation in education but it may not however ensure quality within the system for the SSA countries.

Among the policy capacity variables, government effectiveness has significant effects on each of the three measures of educational development. The result shows that government effectiveness improves school enrolment and school life expectancy but reduces pupil to teacher ratios. Each of these effects are in line with *apriori* expectation and suggests that more effective governments would boost overall educational development in the region. It should be noted that government effectiveness is the variable most related to our policy capacity indicator and therefore implies that strong capacity for making and implementing policy will lead to better educational development among the SSA countries. Essentially, this is possible because better policy making and policy environment tend to free binding constraints from the public sector that may limit the strength of the effect of funding on the educational sector (de Grauwe & Lugaz, 2011; Hippe & Fouquet, 2019)."Voice and accountability" is significant for only the school enrolment equation and is positive. This shows that, like Eterovic and Sweet (2014) have shown, an environment with stronger citizen voice that helps to uphold governance accountability will aid educational development. On the other hand, control of corruption has a significant negative impact on both school enrolment and school life expectancy, thus suggesting that more corrupt governments tend to have better educational performance. This outcome is not expected. The coefficient of regulatory quality has a significant positive impact on school life expectancy, which indicates that better regulations can enforce more school completion rates among the SSA countries.

The coefficient of educational expenditure has significant impact on only school enrolment and pupil-teacher ratio, although the coefficients are less than those educational aid (as noted earlier in this study). These results are similar to the

observations of Banerjee and Duflo (2011) and Pritchett and Beatty (2012) who found that expensive expansions in inputs and resources may be having lesser impact on learning outcomes than "inexpensive supplemental instruction programs". The coefficient of urban population share is significant and negative in the *ptr* equation, suggesting that urban expansion decreases educational quality among the countries. Labour force participation rate is also seen to have positive impact on school life expectancy which shows that the desire to participate in the labour market tends to motivate higher school completion rates. This is an important aspect for policy direction because when governments ensure that jobs are readily available to the educated population, more individuals will be willing to go to school.

Table 5 shows the results of estimates to aid robustness by including certain control variables (including availability of natural resource, type of educational system, and the type of government system). The result can help identify the role of educational system (policy changes) on how aid affects educational development. In the school enrolment equation, controlling for resource availability and fiscal system led to insignificance of the coefficient of educational aid. This shows that countries with natural resources or operate a more decentralized system may either not be getting enough aid support for education or are less effective in applying aid resources. This is important because it confirms that educational policy actually affects aid effects on educational development.

Table 5: Results for Education aid and educational development (with controls)

Variable	Dependent variable								
	School enrolment			Pupil-teacher ratio			School life expectancy		
ledaid	0.02	0.16**	0.04	-0.13**	0.01	-0.07	0.00	0.10	0.13**
goveff	0.95**	0.31	1.05**	-0.63**	-0.07	-0.67**	0.39**	0.26*	0.47**
regulation	0.00	0.86*	0.20	-0.38*	-0.02	0.11	-0.22*	0.79**	0.14
corrupt	-0.30	-0.40*	-0.77**	0.54	-0.04	0.21	-0.24*	-0.41**	-0.56**
voice	0.50	-0.41*	-0.02	0.43	-0.05	0.18	1.01**	-0.15	0.14
urbr	0.56*	0.83**	0.26*	-0.47*	-0.95**	-0.21*	0.97**	0.45**	0.13
gdppc	0.54**	-0.15*	0.08	0.51**	0.67**	0.38**	0.03	-0.13**	-0.11**
lpr	-0.43**	0.11	0.14**	0.31**	0.11**	0.24**	-0.22**	0.14**	0.19**
open	0.11**	0.01	0.13**	0.01	0.11**	0.12**	0.01**	0.01	0.01
rent	-0.02**	0.01**	-0.03**	0.01	0.00	0.00	0.00	0.01*	0.00
edexp	0.22**	0.08**	0.05**	-0.14**	0.00	-0.02*	0.10**	-0.06*	0.02*
Resource	yes			yes			yes		
Edu system		yes			yes			yes	
Fiscal system			yes			yes			yes
Adj R-squared	0.88	0.70	0.71	0.63	0.60	0.15	0.72	0.54	0.50
L-R variance	0.11	0.18	0.27	0.07	0.07	0.27	0.02	0.09	0.13

Note: **, * indicate significance at the 0.01 and 0.05 level of significance, respectively.

The coefficient of *edaid* in the school enrolment equation is greater in Table 5 than in Table 4. Moreover, other studies like Fan, Lin and Treisman (2012) found that

decentralization may lead to better spending of common resources and thereby boost education. However, the study may have confirmed the findings by de Grauwe and Lugaz (2011) that decentralization may multiply corruption points and thereby increase the dissipation of educational funds, especially from aid receipts. The pupil-teacher ratio result however shows that controlling for resource availability leads to significant negative effect of aid on pupil-teacher ratios for the countries. Thus, it is only when revenues are high (from natural resources) that the negative impact of aid on pupil-teacher ratio can be felt.

In Table 6, the results of the estimates with interactions between aid and policy capacity are presented. In the results, the coefficients of education aid are only significant in the school enrolment and school life expectancy equations, further confirming the finding that aid does not affect quality in the educational system. However, the coefficient of the interaction between aid and government effectiveness is significant and negative in the pupil-teacher ratio equation. This suggests that when the policy environment is right, aid may actually improve educational quality for the countries. The interaction of aid with regulatory quality also improves school life expectancy, although the interaction of aid with control of corruption is seen to negatively affect both school enrolment and school life expectancy.

Table 6: Results for Education aid and educational development (interaction effects)

Variable	Dependent variable								
	School enrolment			*Pupil-teacher ratio*			*School life expectancy*		
ledaid	0.23**	0.09*	0.03	-0.04	-0.01	0.03	0.09*	0.10**	-0.01
*edaid*goveff*	0.14**	--	--	-0.05*	--	--	0.04*	--	--
*edaid*reg*	--	-0.03	--	--	-0.01	--	--	0.05**	--
*edaid*corr*	--	--	-0.08**	--	--	0.03	--	--	-0.06**
goveff	--	1.12**	1.11**	--	-0.44*	-0.44**	--	0.39**	0.38**
regulation	0.02	--	-0.09	-0.16	--	-0.11	0.36**	--	0.31**
corrupt	-0.18	-0.37*	--	0.06	0.13	--	-0.25*	-0.30**	--
voice	-0.35*	-0.25	-0.22	0.18	0.14	0.13	-0.15	-0.13	-0.09
lurbr	-0.13*	-0.11	-0.08	-0.35**	-0.35**	-0.37**	0.10	0.10	0.13*

lgdppc	0.27**	0.35**	0.37**	0.48**	0.46**	0.44**	-0.03	-0.02	0.02
lpr	0.01	0.01	0.01	0.08**	0.11**	0.13**	0.11**	0.11**	0.09**
open	0.07**	0.07**	0.11**	0.04**	0.03**	0.03**	0.01	0.01	0.01
rent	-0.22**	-0.23**	-0.22**	0.01	0.01	0.01	0.01	0.01	0.01
edexp	0.03*	0.03**	0.03**	-0.02*	-0.02*	-0.02*	0.01	0.01	0.01
Adj R-squared	0.62	0.65	0.66	0.11	0.13	0.14	0.37	0.39	0.41
L-R variance	0.38	0.34	0.33	0.26	0.25	0.25	0.16	0.15	0.15

*Note: **, * indicate significance at the 0.01 and 0.05 level of significance, respectively.*

6.0   Conclusion

In this study, the role of foreign aid in promoting educational development is examined on the basis of policy capacity and policy environment among Sub-Saharan African countries. We argued that institutions, through both direct and indirect channels, can influence the effect of educational aid on educational development. Data on thirty-four (34) countries in the sub-Saharan African region covering the period 1998 to 2017 were used in the empirical analysis and the FMOLS estimation technique was employed in estimating the relationships. The study found that aid to education directly improves educational access and efficiency but does not have direct impact on either educational quality or share of budgets devoted to education by the countries in SSA. On the other hand, educational expenditure was shown to significantly improve both access and quality in the educational sector, but not efficiency. Thus, while aid does not directly affect quality, domestic expenditure has the capacity to alter quality. This suggests the need for effective collaboration between the use of aid funds and domestic budgetary allocations in ensuring effective development of education from all facets of the system. The insignificant impact of educational expenditure on school life expectancy highlights the limitation of domestic expenditures, especially when not backed by an effective policy environment. The study also found that policy capacity, with regard to government effectiveness has a significant positive impact on educational development either on its own or by interactions with educational aid. In general, better policy capacity of SSA governments tends to improve the extent of aid effect on educational development (in terms of access, quality, efficiency or budgetary allocation). Thus, institutional capacity has both direct and indirect channels through which it impacts on educational development in SSA. Good institutions were shown to lead to better use of educational resources in the region.

From the results in the study, it is shown that establishment and sustenance of quality institutions is a veritable means of attaining effective linkage between foreign aid and enhanced performance in education among SSA countries. The age-long complaint about the poor educational conditions in the region can be largely addressed by focusing on strengthening institutional policy capacity either at structural levels, political systems or with particular relations to human capital building. If the institutional and policy environment is poor, then the process of resources accumulation and internalisation for quality delivery in education will be low. In this direction, good educational policy making is required for sustained aid inflows into the educational sector among SSA countries. To achieve quality policies in education, frameworks need to be clarified and more grassroots based policy making is required in order to explore all perspectives of needs and quality enhancement. This will provide adequate templates for donors to develop aid policy and directions. Efficient management of information is also essential in enhancing policy making in the educational sector. As domestic authorities seek to ensure better control of resources and outputs, access to information in the areas of budgets and the several layers of the educational systems in the countries expands the environment for robust policy making. This tends to aid transparency and improve management decisions.

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THE CONSEQUENCES OF CORRUPTION AND SEIGNIORAGE ON INFLATION: EVIDENCE FROM WEST AFRICA

Mounir Siaplay*[1]

Abstract

Using panel data from 15 West African countries for the period 1999-2019, this study examined the effects of corruption and seigniorage on inflation. Results from the Panel Autoregressive Distributed Lag (ARDL) model revealed that corruption has a positive and statistically significant effect on inflation both in the short and long runs. An increase in corruption generates high inflation. In addition, the study found that seigniorage has a positive and statistically significant effect on inflation but only in the long run, as there may be a lag adjustment process due to the issuance of money in the economy. Thus, the effects of corruption and seigniorage on inflation create macroeconomic imbalances in the West African sub-region, which hinder growth as well as impact the poor the most. The implications on the economy are profound, and this calls for institutional reforms, implementation of enhanced anti-corruption policies, strengthening of the independence of the central banks, and efficient use of resources to reduce corruption and promote sustainable development and inclusive economic growth.

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* Corresponding author's e-mail: mounir.siaplay@gmail.com
[1] Ben's Town, RIA Highway, Marshall, Margibi County, Liberia.

1.0   INTRODUCTION

It is well-known that governments around the world that are faced with budget deficits have conventionally financed their deficit either through raising taxes, debt financing, or issuance of new money. In a fiat standard, the issuance of new money may be a highly profitable financing option for the government to generate seigniorage revenue. Seigniorage is revenue earned from printing and issuing money resulting from the difference between the face value of the money and its cost of production (Buiter, 2007). This is made possible as the government has monopoly control over the creation of money (Aisen and Veiga, 2006). Although seigniorage is a relatively cheaper option for a government to raise funds, the empirical evidence suggests that the rate of money creation is highly correlated with inflation and can erode the purchasing power of money in circulation (Haslag,1998). Furthermore, one channel through which the relationship between seigniorage and inflation may be examined is corruption. Elkamel (2019) hypothesized that corrupt officials in government tend to waste government resources through their corrupt practices. As such, one of the easiest ways to replace the losses is through the issuance of new money which generates seigniorage. This type of financing option will result in increased spending that may lead to high inflation in the economy.

Corruption, regardless of the form it takes, has become a major problem that affects all levels of society in Africa, a continent that is endowed with abundant natural resources but remains a 'poverty home' of the world. It is significantly more critical when consideration is centered around Sub-Saharan Africa where 33 out of the 47 Least Developed Countries (LDCs) of the world are found. Albeit economic growth in West Africa has been generally noteworthy over the most recent twenty years and a couple of countries have therefore seen critical decreases in poverty levels, the advantages of this growth have accrued to a small segment of the population and imbalance has reached extreme levels (OXFAM, 2019).

These outcomes are mainly caused by high and sustained levels of corruption (Blundo and de Sardan, 2001; Abu, Karim, and Aziz 2015). Although the theoretical and empirical literature on the effect of corruption on economic growth has generated debates over the years[2], few studies have focused on the effect of corruption on inflation (Ekpo, 1985; Al-Marhubi, 2000; Abed and Davoodi, 2002; Piplica, 2011; Samimi et al., 2012; and Ösahin and Üçler, 2017). Furthermore, according to Blackburn et al.

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[2] Knack and Keefer, 1995; Mauro, 1995; Sachs and Warner,1997; Tanzi and Davoodi, 1997; Tanzi, 1998; Mauro, 1998; Hall and Jones,1999; and Nurudeen and Staniewski, 2019.

(2008), corruption has an indirect impact on growth through public finance channels. As such, corruption tends to drive public finance composition toward more seigniorage, and results in slower growth.

Hence, this study aims to further bridge that gap in understanding the effects of corruption and seigniorage on inflation in West Africa. Research questions that this study seeks to address are: 1) Are corruption and seigniorage principal factors accounting for high inflation in West Africa?   2) Is there empirical evidence demonstrating the effects of corruption and seigniorage on inflation in West Africa? and 3) Are the effects of corruption and seigniorage on inflation a short-run or long-run phenomenon?

This study is important to West Africa for the accompanying reasons: First, West Africa has more countries compared with other regions in the continent where over 30% of the populace are living on less than $1.90 per day (OXFAM, 2019). Although West Africa has been a significant beneficiary of external aid to improve its economic fortunes, there exist numerous economic and financial issues. Empirical evidence indicates that aid may have been directed into private accounts, and not utilized for the reasons for which it was received because of systemic corruption in West Africa and to a greater extent the African continent (Gyimah-Brempong, 2002; Willett, 2009). Also, notwithstanding the bounty of resources in Africa, the region has seen declining foreign direct investment compared with the different regions around the world, a result that is somewhat because of the persistence of corruption (Brunetti, Kisunko and Weder, 1998). This paper is therefore critical in investigating the effects of corruption and seigniorage on inflation in West Africa. The outcomes of this study will provide policy options in the areas of governance and institutional reforms to curb corruption practices, whilst stimulating efforts to promote price stability, which will, in turn, enhance economic growth and development in West African countries. The study employed a panel ARDL estimator to analyze the impact of corruption and seigniorage on inflation. The results confirmed that rising corruption, as well as seigniorage, leads to high inflation in West Africa. These results are robust to alternative econometric specifications of the relationship.

The rest of the paper is organized as follows: the next section provides the literature review. Section 3 presents a description of the data and the estimation method. Section 4 presents and discusses the empirical results, while Section 5 presents the conclusion of the paper.

2.0   Literature Review
2.1   Defining Corruption

As indicated by Khan (1996) and Nye (1967), corruption is the conduct that digresses from the conventional standards of governing the actions of someone in public authority on account of private-regarding intentions like wealth, force, or status. Heidenheimer, Johnston, and Le Vine (1989) and Rose (1978) expressed that corruption exists at the interface of general society and private sectors. Murphy, Shleifer, and Vishny (1993) contended that corruption, including bribery, may redirect firms and skilled people from gainful activities to rent-seeking activities, which leads to sub-optimal use of human capital thus decreasing economic development. Transparency International describes corruption as "the abuse of entrusted power for private gain". The World Bank (1997) characterized corruption as the utilization of public office for private advantage. Here, general society is extended to include: government, private businesses, global organizations, and parastatals. Andvig, Fjeldstad, Amundsen, and Søreide (2000) clarified corruption to range from misuse of public power and moral decay to strict legal definition of corruption as an art of bribery including public servants and the exchange of substantial assets, while Jain (2001) sorted corruption into three levels, to be specific: 1) Grand corruption, 2) bureaucratic corruption, and 3) legislative corruption. Grand corruption refers to the acts of the political elite by which they use their power to influence economic policies, 2) bureaucratic corruption is defined as the corrupt practices by appointed public servants either with their superiors (the political elite) or with the public, and legislative corruption refers to how legislative votes of legislators are influenced by interest groups.

Empirical studies have recognized the following factors to expand corruption: 1) low degrees of law enforcement; 2) absence of lucidity of rules and regulations; 3) absence of accountability and transparency in public dealings; 4) numerous controls that give power to public office holders; 5) critical levels of centralization and monopoly given to public officials; 6) low relative wages of public officials; and 7) the huge size of the public sector (Kaufmann and Siegelbaum, 1997; Tanzi, 1998; Ades and Di Tella, 1999; Van Rijckeghem and Weder, 2001; Rose-Ackerman and Palifka, 2016).

2.2   Linking Corruption to Inflation

The empirical literature on the effects of corruption on inflation as compared to the impact of corruption on growth is limited. Ekpo (1985) stated that corruption increases the general level of prices as an additional cost element. Oweye and Bendarfdaf (1996) examined the effect of corruption on the general level of prices and concluded that corruption increases prices. Al-Marhubi (2000) examined the influence corruption has on inflation using cross-country data. He found that corruption partly triggers a high

level of inflation after controlling for variables that may impact inflation. Abed and Davoodi (2002) found that there is a positive relationship between corruption and inflation. Pellegrini and Gerlagh (2004) revealed that a high level of corruption discourages productivity and investment. Thus, this may lead to a less productive economy in which the state becomes a net importer and as such lead to imported inflation. Blackburn et al. (2008) stated that as a result of corrupt bureaucrats embezzling tax revenue, which reduces revenue available to the government, they tend to increase their dependence on seigniorage. Thus, inflation is a possible outcome of seigniorage. Piplica (2011) examined the effect of corruption on inflation in the European Union and found that corruption is positively correlated with inflation. Blackburn and Powell (2011) stated that bureaucrats' embezzlement of public funds leads to budget deficits, thus seigniorage becomes the easiest option to generate revenue. Samimi et al. (2012) indicated that there exists a significant positive relationship between corruption and inflation. Ösahin and Üçler (2017) investigated the nexus between corruption and inflation in 20 countries from 1995-2015 and found that high corruption increases inflation rates.

Over the years, the link between corruption and inflation in terms of direction and impact has been mixed. For example, Al-Marhubi (2000), Piplica (2011), Samimi et al. (2012), and Ozsahin and Ucler (2017) found that corruption causes inflation, while Getz and Volkema (2001), Braun and Di Tella (2004), and Akca et al. (2012) reported that inflation encourages corruption. The overall conclusion from these studies is that the inflation rate increases with an increased level of corruption. Figure 1 presents the plots of inflation against corruption from 15 West African countries[3] for the period 1999-2019. The plots suggest that there may be a positive correlation between inflation and corruption; however, this relationship could be truly observed after controlling for other variables in the relationship.

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[3] Benin; Burkina Faso; Cabo Verde; Cote d' Ivoire; The Gambia; Ghana; Guinea; Guinea-Bissau; Liberia; Mali; Niger; Nigeria; Senegal; Sierra Leone; and Togo.

Figure 1. Relationship between Corruption and Inflation
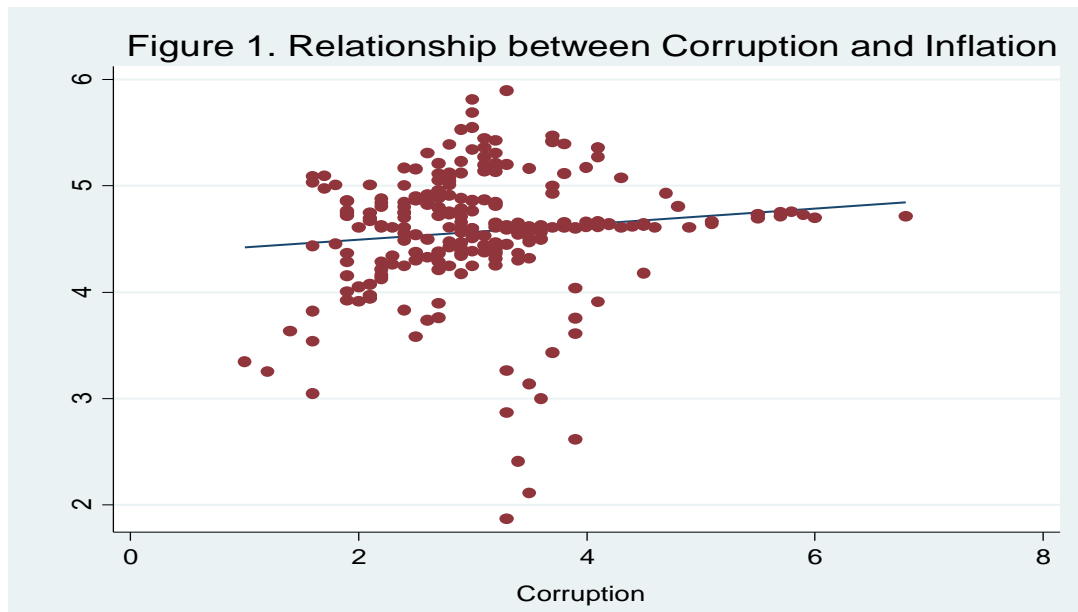
Source: Author's Construct

2.3   Linking Seigniorage to Inflation

Over the years, empirical investigations regarding the relationship between seigniorage and inflation have been well documented. For example, Kiguel and Neumeyer (1995) examined the relationship between seigniorage and inflation in Argentina and reported that increases in inflation are closely linked with government increase in seigniorage through the issuance of money. Other studies have increasingly recognized that seigniorage causes inflation (Dornbusch and Fischer 1981; Van Wijnbergen, 1989; Bruno and Fischer, 1990; Easterly and Schimdt-Hebbel, 1993; Easterly and Schmidt-Hebbel, 1994; and Buiter, 2007). Figure 2 presents the plots of inflation against seigniorage from 15 West African countries[4] for the period 1999-2019. The plots suggest that there may be a positive correlation between inflation and seigniorage; however, this relationship could be truly observed after controlling for other variables in the relationship.

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[4] Benin; Burkina Faso; Cabo Verde; Cote d' Ivoire; The Gambia; Ghana; Guinea; Guinea-Bissau; Liberia; Mali; Niger; Nigeria; Senegal; Sierra Leone; and Togo.
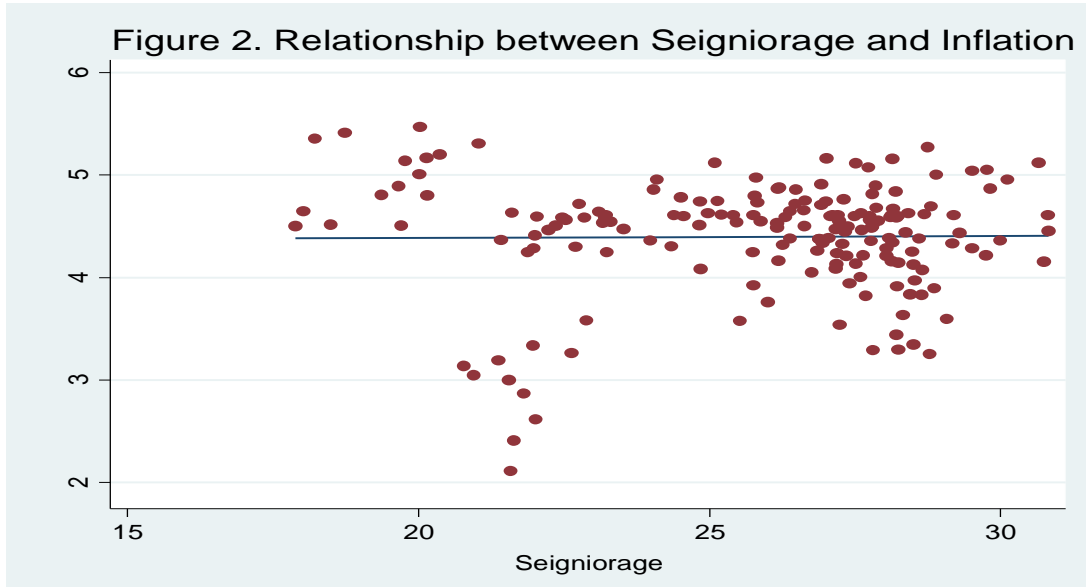
Figure 2. Relationship between Seigniorage and Inflation

Source: Author's Construct

In summary, the literature has identified the various causes of corruption to include low levels of law enforcement, lack of clarity of rules, lack of transparency and accountability in public action, and relatively low wages of public servants. In addition, the literature has unearthed the effects of corruption and seigniorage on inflation. These studies provide an important link in the context of West Africa in which few countries on average score relatively well in the corruption ranking as shown in Table 1.

Table 1: Average Corruption Perception Index (CPI) per Country: 1999-2019

Country	CPI Score (0=highly corrupt & 10=highly clean)
Benin	3.6
Burkina Faso	3.8
Cabo Verde	5.7
Cote d'Ivoire	3.0
The Gambia	3.1
Ghana	4.3
Guinea	2.4
Guinea-Bissau	1.9
Liberia	3.4

Mali	3.1
Niger	3.2
Nigeria	2.6
Senegal	3.9
Sierra Leone	2.9
Togo	2.9

Source: Transparency International

On the premise that corruption is a complex and multifaceted phenomenon and the extent of its causes and effects are linked to one's discipline, cultural background, and political dimensions, it is deemed necessary to investigate the relationship amongst corruption, seigniorage, and inflation in the West African context. This will aid in devising workable policies and strategies in curbing corruption as well as promote the understanding of seigniorage and its impact on inflation, which could lead to macroeconomic imbalances in West Africa. This therefore study employs a panel ARDL model to estimate the effects of corruption and seigniorage on inflation in West African countries from 1999-2019. This model has the advantage of ensuring that the parameter estimates are consistent in the presence of dynamics and endogenous regressors.

3.0   Data and Estimation Method
3.1   Data
The data are annual observations for 15 West African countries (i.e. Benin; Burkina Faso; Cabo Verde; Cote d' Ivoire; The Gambia; Ghana; Guinea; Guinea-Bissau; Liberia; Mali; Niger; Nigeria; Senegal; Sierra Leone; and Togo) for the period 1999-2019. The period reflects the availability of the annual data for Corruption Perception Index (CPI) which began in 1995, the post-global food and financial crisis of 2007-2009, and substantial covariate risks due to economic upheavals and political volatility in part linked to heightened corruption, changes in government administration, wave of terrorism in the Sahel region and the health crisis (e.g., the Ebola Virus Disease outbreak) among others. The variables used in this analysis included inflation (GDP deflator), Corruption Perception Index (CPI), seigniorage (change in reserve money as a share of GDP at current prices), trade as a percentage of GDP (Openness), GDP per Capita, and unemployment rate. Missing data related to CPI and reserve money per country cause the panel to be unbalanced. The data were sourced from Transparency International, the World Bank's World Development Indicators Dataset, and the International Monetary Fund (*International Financial Statistics*).

The main variables are corruption, seigniorage, and inflation. The dependent variable inflation is represented by the GDP deflator. Elkamel (2019) suggested that there is a weak magnitude of corruption's effect on inflation as a result of miscalculation of corruption practices in some goods and services, which are not captured through the consumer price index. The CPI for each country is a score from 0 (highly corrupt) to 10 (highly clean). The definition of seigniorage as the change in reserve money as a share of GDP at current prices follows Fischer (1982), Cukierman et al. (1992), Aisen and Veiga (2006), and Blackburn et al. (2008). In addition, I included control variables that may affect inflation such as openness, GDP per Capita, and unemployment rate. Elkamel (2019) indicated that openness in terms of export and import as a proportion of GDP may tend to lower inflation if the country gains a comparative advantage. With respect to GDP per Capita, countries with lower development and by extension lower GDP per Capita tend to experience lower inflation. As countries' development drive improves, they experience a higher inflation rate. The unemployment rate reflects the short-term relationship between unemployment and inflation as explained by the Phillips curve hypothesis. This variable represents the effect on the labor market, which assumes a negative relationship with inflation.

The data in Table 2 shows the summary statistics of inflation, corruption, seigniorage, openness, GDP per Capita, and unemployment rate. It indicates that there is enough variation across countries in West Africa as evident by the standard deviation. The low average Corruption Perception Index (3.094) among countries indicates that they are perceived as highly corrupt.

Table 2: Summary Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Inflation	314	4.504	0.568	1.869	5.894
Corruption	251	3.094	0.929	1.000	6.800
Seigniorage	213	1.29E+12	3.52E+12	-3.74E+12	2.42E+13
Openness	314	67.500	35.020	20.723	311.354
GDP per Capita	314	627313	986950	234	5270000
Unemployment	314	5.080	2.984	0.320	12.240

Source: Author's Computation

The correlation coefficients are presented in Table 3. The correlation coefficients show a positive (0.1202) correlation between inflation and corruption as well as a positive (0.0434) correlation between inflation and seigniorage. The correlation analysis shows

that the regressors do not have a perfect or exact linear representation of one another as evident by the benchmark of less than 0.80 to avoid multicollinearity.

Table 3: Correlation Analysis

Variables	Inflation	Corruption	Seigniorage	Openness	GDP per Capita	Unemployment
Inflation	1.0000					
Corruption	0.1202	1.0000				
Seigniorage	0.0434	-0.2198	1.0000			
Openness	0.1463	0.1910	-0.0166	1.0000		
GDP per Capita	-0.0294	-0.2241	0.6495	-0.0141	1.0000	
Unemployment	-0.0919	0.4148	-0.0616	0.0916	-0.1040	1.0000

Source: Author's Computation

3.2   Estimation Method
3.2.1   Panel ARDL Estimator

To investigate the relationship between corruption, seigniorage, and inflation, panel data from 15 West African countries for the period 1999-2019 are used. This analysis involves a combination of cross-section (N) and time-series (T) observations in which N and T represent countries and the number of years respectively. Baltagi (1995) and Baltagi and Li (1995) noted that in a panel estimation, neither the Generalized Least Squared (GLS) estimator nor Fixed Effect (FE) will produce consistent estimates in the presence of dynamics and endogenous regressors. Thus, Instrumental Variables (IV) are needed to produce consistent estimates particularly in the presence of dynamics.

To produce a consistent estimate in the presence of dynamics and endogenous regressors, Arellano and Bond (1991) proposed a dynamic panel Generalized Method of Moments (GMM) estimator. The dynamics GMM panel estimator is an IV estimator, which considers both current and past values of endogenous regressors and use them as instruments. However, Roodman (2009) stated that in the case of large T and N, the GMM estimator would produce spurious results because as T becomes larger, the instruments increase as well thereby affecting the validity of the Sargan test of over-identifying restriction. Also, small N may lead to unreliable autocorrelation test results. Thus, to overcome the problems associated with the GMM estimator, panel ARDL estimators including Mean Group (MG), Pooled Mean Group (PMG), and Dynamic Fixed Effect (DFE) can be employed.

3.2.2 *Mean Group (MG), Pooled Mean Group (PMG) and Dynamic Fixed Effect (DFE) Estimators*

The Mean Group (MG) estimator proposed by Pesaran and Smith (1995) produces consistent estimates of the average parameter for large N and T. However, this estimator may not account for the similarity of parameters across the same groups. On the other hand, the Pooled Mean Group (PMG) estimator takes into account both pooling and averaging. This estimator allows the intercepts, short-run coefficients, and error variances to differ without restriction across groups, while keeping the long-run coefficients to be homogeneous across groups (Pesaran, Shin, and Smith, 1999). Finally, the Dynamic Fixed Effect (DFE) estimator keeps the coefficients of the co-integrating vector to be the same across all panels with an equal speed of adjustment coefficient and short-run coefficients (Blackburne and Frank, 2007). However, if the sample size is small, there is an inherent bias to the simultaneous equation due to the endogeneity existing between the lagged dependent variable and error term (Baltagi et al. 2000). Therefore, there is a need to conduct a Hausman test to select the best estimator for the model.

3.2.3 **The Model**

Following Pesaran, Shin, and Smith (1999), suppose that given data on time is, t=1, 2,..., T, and groups, i=1, 2,..., N, then the generalized ARDL (p, q$_1$, q$_2$,...q$_k$) model is specified as:

$$y_{it} = \sum_{j=1}^{p} \delta_i y_{i,t-j} + \sum_{j=0}^{q} \beta'_{ij} X_{i,t-j} + \varphi_i + \varepsilon_{it} \tag{1}$$

where y_{it} is the dependent variable, $X_{i,t-j}$ is a k x 1 vector that is allowed to be purely I(0) or I(1) or co-integrated, δ_i is the coefficient of the lagged dependent variable called scalars, β_{ij} are the k x 1 coefficient vectors, φ_i is the unit-specific fixed effects, p and q are the optimal lag orders, and ε_{it} is the error term. Thus the re-parameterized ARDL (p, q$_1$, q$_2$,...q$_k$) error correction model is specified as:

$$\Delta y_{it} = \theta_i[y_{i,t-1} - \lambda'_i X_{i,t}] + \sum_{j=1}^{p-1} \xi_{ij}\, \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \beta'_{ij}\, \Delta X_{i,t-j} + \varphi_i + \varepsilon_{it} \tag{2}$$

where θ_i is the group-specific speed of adjustment coefficient and expected to be less than zero, λ'_i is a vector of long-run relationships, $[y_{i,t-1} - \lambda'_i X_{i,t}]$ is the Error Correction Term (ECT), ξ_{ij} and β'_{ij} are the short-run dynamic coefficients, and ε_{it} is the error term. Therefore, this general specification can be adapted to estimate the empirical model as follows:

$$\Delta Inf_{it} = \theta_i[Inf_{i,t-1} - \lambda'_i X_{i,t}] + \sum_{j=1}^{p-1} \xi_{ij}\, \Delta Inf_{i,t-j} + \sum_{j=0}^{q-1} \beta'_{ij}\, \Delta X_{i,t-j} + \varphi_i + \varepsilon_{it} \tag{3}$$

where Inf_{it} denotes inflation represented by GDP deflator in i country at time t, X_{it} indicates the set of control variables in i country at time t (corruption, seigniorage, openness, GDP per Capita, and unemployment rate), θ_i is the group-specific speed of adjustment coefficient, λ'_i is a vector of long-run relationships, $[Inf_{i,t-1} - \lambda'_i X_{i,t}]$ is the

Error Correction Term (ECT), ξ_{ij} and β'_{ij} are the short-run dynamic coefficients, and ε_{it} is the error term.

3.2.4   Panel Unit Root Test

Before selecting the type of estimator (MG, PMG, or DFE) to analyze the relationship amongst corruption, seigniorage, and inflation, it is important to conduct a unit root test to ascertain the order of integration of the variables. The Im, Pesaran, and Shin (2003) panel unit root test commonly referred to as IPS test is employed due to the assumption of heterogeneous slopes and deals well with the gap in the data series as compared with the Levin and Lin (1992, 1993) test, which assumes that the panel data is composed of homogeneous cross-section, hence conduct a test on the pooled data series.

Im, Pesaran, and Shin (2003) stated that to conduct the IPS test in panel data, the average of the Augmented Dickey-Fuller (ADF) tests assume that the μ_{it} is serially correlated and the correlation properties vary across sections. Thus, when the iid assumption is relaxed for μ_{it}, $\mu_{it} = \sum_{j=1}^{p_i} \varphi_{ij} \mu_{it-j} + \varepsilon_{it}$, the following model is considered for the panel unit root test:

$$y_{it} = \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \varphi_{ij} \Delta y_{it-j} + z_{it}\gamma + \varepsilon_{it} \qquad (4)$$

the null hypothesis is $H_0 = \rho_i = 1$ for all *i* and the alternative hypothesis is $H_a = |\rho_i| < 1$, for at least one *i*. This test depends on the autoregressive properties of each cross-section taking into account the IPS test based on the average of the individual ADF statistics. Finally, the Bayesian Information Criterion (BIC) or the Akaike Information Criterion (AIC) are used to select the order of augmentation for the ADF test in each cross-section.

3.2.5   Optimal Lags Selection and Hausman Test

After performing the unit root test to ensure that no variable is integrated of order 2, the next step is to determine the optimal lags by using the unrestricted model and an information criterion, either BIC or AIC to decide the choice of lags for each unit or group per variable. This is done by choosing the most common lag for each variable to represent the lags for the model. It is important to note that due to the assumption of long-run homogeneity, the cointegration is determined from the statistical significance of the long-run coefficients. Thus, the cointegration is presented as the joint significance of the level's equation. Furthermore, to determine the best estimator (MG, PMG, or DFE) for the model, there is a need to conduct a Hausman test. The null hypothesis of homogeneity is tested based on a Hausman-type test by comparing MG, PMG, and DFE. The null and alternative hypotheses along with the decision criterion

are stated as follows: under the null hypothesis, PMG is efficient than MG and DFE. Thus, the null hypothesis is accepted, if PMG (p>0.05), while the alternative hypothesis is selected if MG and DFE (p<0.05).

4.0   Results and Discussion

The estimation procedure begins with the initial test to check the normality of the series as well as to confirm that there is no multicollinearity among the explanatory variables. These outcomes are accounted for in Tables 2 and 3 respectively. Next, given the time span of the dataset (20 years), the macroeconomic variables are likely to be characterized by the unit root process (Nelson and Plosser, 1982). Therefore, the IPS test is employed to determine the order of integration. Thereafter, the optimal lags using the unrestricted model and the BIC information criterion are employed to determine the choice of lags for each unit or group per variable. This is done by choosing the most common lag for each variable to represent the lags for the model. Following the choice of the optimal lags, the Hausman test is conducted to determine the best estimator (MG, PMG, or DFE) for the model. Finally, equation (3) is estimated to ascertain the short and long-run relationships amongst corruption, seigniorage, and inflation.

4.1   Results of the Unit Root Test

The unit root test results are introduced in Table 4. The results indicate that one variable (seigniorage) is stationary at a level, while the other variables (inflation, corruption, openness, GDP per Capita, and unemployment) are stationary after the first difference. Therefore, this mixture of I(0) and I(1) requires the use of a panel ARDL model, which produces accurate results.

Table 4: Im-Pesaran-Shin Unit Root Test

Variables	Levels	First Difference	Integration Order
Inflation	0.3730	-4.5055***	I(1)
Corruption	0.7838	-7.4236***	I(1)
Seigniorage	-3.3112***		I(0)
Openness	-0.7994	-6.9107***	I(1)
GDP per Capita	5.3227	-4.4039***	I(1)
Unemployment	-0.1145	-3.3506***	I(1)

Notes: Parameter estimates are statistically different from zero at *** 1% significance level.

4.2   Results of Optimal Lags and Hausman Test

The optimal lags for the panel ARDL models concerning the effect of corruption on inflation as well as the effect of seigniorage on inflation are ARDL (1 1 0 0 0) and ARDL (1 1 0), respectively. The Hausman test results are presented in Table 5. The Hausman tests indicate that the PMG is the efficient estimator than MG and DFE under the alternative hypothesis because the results are statistically insignificant at the 5% level. Thus, these results support the panel short-run heterogenous and the long-run homogeneity as presented in the PMG estimator. Therefore, the empirical model in equation (3) is estimated using the PMG estimator.

Table 5: Hausman Test

Estimator	Chi-square Statistic	Prob>chi2
H_0: PMG vs. H_1: MG	1.87	0.760
H_0: PMG vs. H_1: DFE	0.00	0.999
	Chi-square Statistic	Prob>chi2
H_0: PMG vs. H_1: MG	0.07	0.789
H_0: PMG vs. H_1: DFE	0.00	0.954

Notes: H_0: Select PMG if (p>0.05) vs. H_1: Select MG if (p<0.05);

H_0: Select PMG if (p>0.05) vs. H_1: Select DFE if (p<0.05).

4.3   Results from Error Correction-based ARDL Model

Table 6 presents the PMG estimator results on the effects of corruption and seigniorage on inflation. Columns (1) to (3) illustrate the effect of corruption on inflation, whilst columns (4) to (5) present the effect of seigniorage on inflation. In a panel ARDL model, the existence of a long-run relationship is a premise for a valid, consistent, and efficient relationship among the variables of interest. Therefore, for this condition to hold, the Error Correction Term has to be negative and not lower than -2 (Sohag, Nabilah, Begum, 2015). The results of the Error Correction Term in Table 6 indicate that the term is negative and not lower than -2 at the 5% and 10% significant levels in columns (1, 2, 4, 5), while it is negative and not lower than -2 but not statistically significant in column 3.

Columns (1) to (3) provide the effect of corruption on inflation. The results indicate that corruption has a positive relationship with inflation and it is statistically significant at the 1% and 5% levels both in the short-run and long run. For example, in the short-run (columns 1 to 3), a 1% change in corruption will increase inflation by 0.025 and 0.026 and they are statistically significant at 1% and 5%, respectively. Also, in the long run, a

1% change in corruption would result in a 0.618 increase in inflation and it is statistically significant at the 1%. These results are robust after controlling for other macroeconomic variables. Also, the coefficient for openness has a positive relationship with inflation and it is statistically significant at the 1% and 5% levels only in the long run. GDP per Capita coefficient suggests that countries in West Africa that have lower development tend to have lower prices as shown in column 2 and it is statistically significant at the 1% level only in the long run. However, column 3 further suggests that as countries in West Africa catch up with other countries, there is a positive relationship between GDP per Capita and inflation, and this is statistically significant at the 10% level only in the long run. These signs indicate that some countries are lag as compared with others in terms of development and hence the effects are mixed. Finally, the effect of unemployment on inflation in the short run is negative and not statistically significant reflecting the effect of the labor market which assumes a negative relationship between unemployment and inflation as described by the Phillips curve. But there exists a positive long-run relationship that is statistically significant at the 1% level which illustrates that there may not be a permanent trade-off between unemployment and inflation because regardless of the price level, unemployment is expected to return to its natural level.

Columns (4) to (5) provide the effect of seigniorage on inflation. In the short run, the seigniorage has a positive effect on inflation but it is not statistically significant. This may be a result of the lag adjustment process due to the issuance of money in the economy. However, the results show that seigniorage has a long-run positive relationship with inflation and it is statistically significant at the 1% level as evident in columns (4) and (5). In addition, controlling for openness in columns (4) and (5) indicates that openness has a negative relationship with inflation in the short run and it is statistically significant at the 5% level and a positive relationship with inflation, in the long run, and statistically significant at the 5% level.

The main focus of this study is to examine the relationship amongst corruption, seigniorage, and inflation. It is found by the study that there is a positive significant relationship between corruption and inflation in the short and long run as well as a positive significant relationship between seigniorage and inflation in the long run. The existence of a long-run and positive relationship between seigniorage and inflation indicates that there is an adjustment process regarding the issuance of money and its lag effect on inflation in the economy.

The results obtained from the PMG estimator regarding the effect of corruption on inflation support previous studies (Ekpo, 1985; Oweye and Bendarfdaf,1996; Al-

Marhubi, 2000; Piplica, 2011; Samimi et al., 2012 and Ozsahin and Ucler, 2017), which established a positive effect of corruption on inflation. In addition, the results further support the positive effect of seigniorage on inflation as previously found by Dornbusch and Fischer (1981), Van Wijnbergen (1989), Bruno and Fischer (1990), Easterly and Schimdt-Hebbel (1993), Easterly and Schmidt-Hebbel (1994), Kiguel and Neumeyer (1995), and Buiter (2007).

Table 6: Estimation Results of the Pooled Mean Group

Dependent variable: Inflation

Variable	(1)		(2)		(3)		(4)		(5)	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Long-run coefficients										
Corruption	0.008	0.131	0.618***	0.173	-0.099	0.113				
Seigniorage							5.00E-13***	8.75E-14	2.01E-12***	7.29E-13
Openness	1.119***	0.181	1.028***	0.192	0.622***	0.136			0.020**	0.009
GDP per Capita			-1.017***	0.389	0.484*	0.271				
Unemployment					0.076***	0.027				
Error-correction coeff.	-0.074**	0.038	-0.066*	0.039	-0.089	0.056	-0.097**	0.045	-0.039**	0.018
Short-run coefficients										
Δ Corruption	0.025***	0.011	0.018	0.012	0.026**	0.013				
Δ Seigniorage							1.85E-12	3.68E-12	3.05E-12	3.00E-12
Δ Openness	-0.001	0.001	-0.001	0.001	-0.001	0.001			-0.002**	0.001
Δ GDP per Capita			0.001	0.001	0.002	0.001				

Δ Unemployment					-0.041	0.036				
Constant	0.056***	0.015	0.681*	0.406	-0.187	0.202	0.466**	0.194	0.163***	0.059
Country	15		15		15		15		15	
Observation	234		234		234		197		197	

Notes: Parameter estimates are statistically different from zero at *10%, **5%, and ***1% significance levels, respectively.

Δ is the first difference operator. The first panel of the table presents the long-run estimation and speed of adjustment, while the second panel reports the short-run
estimated coefficients. The lag structure for (1)-(3) and (4)-(5) are ARDL (1 1 0 0 0), and ARDL (1 1 0),
respectively.

5.0   Conclusion

This paper uses panel data from 15 West African countries (i.e. Benin; Burkina Faso; Cabo Verde; Cote d' Ivoire; The Gambia; Ghana; Guinea; Guinea-Bissau; Liberia; Mali; Niger; Nigeria; Senegal; Sierra Leone; and Togo) from 1999-2019 with a panel ARDL estimator (PMG) technique to investigate the effects of corruption and seigniorage on inflation. The result shows that corruption has a positive and statistically significant effect on inflation both in the short and long runs. In addition, seigniorage also has a positive and statistically significant effect on inflation only in the long run as there may be a lag adjustment process in the issuance of money in the economy. These results suggest that corrupt officials have an alternative source of financing their corrupt activities through the issuance of money and as such, there is no guarantee that the independence of the central bank may eradicate the effect of corruption on inflation. Thus, corruption and seigniorage result in high inflation thereby creating macroeconomic imbalances in the West African sub-region, which hinder growth and development as well as impact the poor the most.

Hence, the demand for institutional reforms to fight corruption and the need to strengthen the independence of the central bank is imperative to improve the well-being of West African citizens particularly the poor to promote sustainable and inclusive economic growth. This can be achieved by maximizing the use of domestic resources while limiting recourse to seek external aids, which are partly responsible for widespread corruption due to its misuse.

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DETERMINANTS OF INCLUSIVE GROWTH IN NIGERIA: THE ROLE OF MONETARY POLICY

Iyoha*[1], M. A. and O. S. Aigheyisi[2]

Abstract

This study examined the determinants of inclusive growth in Nigeria with particular focus on the role of monetary policy. The study adopted the ARDL approach to co-integration and error correction modeling for analysis of annual data for the period 1981-2015. It employed an integrated measure of inclusive growth, which adjusts growth rate of real per capita income for changes in Gini index of income inequality. The Monetary Policy Rate (MPR) was employed as the instrument of monetary policy. The empirical evidence indicated significant negative effect of the MPR on inclusive growth in the short-run and significant positive effect in the long-run. These implied that easy monetary policy could be used to enhance inclusive growth in the short-run, but in the long-run, reliance should be on (cautious) monetary tightening. Other determinants of inclusive growth identified are inflation, investment and non-oil export growth. While inflation adversely affects inclusive growth, investment and non-oil export growth promote inclusive growth. Based on the evidence, it is recommended that the monetary authority should deploy the MPR as a counter-cyclical monetary policy instrument to achieve inclusive growth, while bringing inflation under control. Policies to enhance investment and non-oil export growth are also recommended.

Keywords: Inclusive Growth, Income Inequality, Monetary Policy.
JEL Codes: O47, D63, E52

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* Corresponding author'S email: iyohama@gmail.com
[1] Department of Economics, Banking and Finance, Benson Idahosa University, Benin City, Nigeria
[2] Institute of Health Technology, UBTH, Benin City, Nigeria

1.0   INTRODUCTION

For many years, Economists placed primary emphasis on the need for countries to strive to achieve economic growth. This was the focus of various growth theories including the Neoclassical and Endogenous Growth Theories (Solow, 1956 & Swan, 1956; Romer, 1986; Barro & Sala-i-Martins, 2004). Consequently, governments across the globe at various times and under differing economic conditions, designed and implemented policies and programs aimed at accelerating the rate of economic growth or attaining sustainable growth and development. Economic growth was envisaged to engender improvement in living standards and equitable distribution of income and consumption. However, it was observed that though some level of growth and development were attained in some countries, especially the developing countries, there was no corresponding improvement in employment, living standard and (equality of) access to basic necessities of life. This was because some of the key determinants of economic growth such as education, openness and financial depth were associated with higher inequality (Barro, 2000, cited in Anand *et al.*, 2013).

Recently, there has been a shift from economic growth discourse to that of "inclusive" economic growth. Emphasis is now on the concept of inclusive economic growth and how it can be achieved. Goal number 8 of the UN's Sustainable Development Goals (SDGs) has to do with "promotion of sustained, *inclusive*, and sustainable *economic growth*, full and productive employment and decent work for all". Member countries of the UN are to strive to achieve this goal (and other goals) by year 2030. Anand (2013, abstr.) succinctly noted that "The call for inclusive growth has been unanimously broadcasted by policy makers across the world. The Arab Spring, the growing divide between Main Street and Wall Street in advanced economies, and the "three-speed" world economy have placed inclusive growth at the forefront of policy debates". Taking income and its distribution into consideration, and in view of the UN's SDGs, it can be reasonably asserted that a major objective of macroeconomic policy in the new economic order is the attainment of inclusive growth.

No generally accepted definition and measure of the concept of inclusive growth exists. According to the OECD (2020, para. 1), inclusive economic growth refers to "economic growth that is distributed fairly across society and creates opportunities for all". This presupposes that the dividends of growth are shared fairly among individuals and social groups (OECD, 2014). The World Bank (2009) viewed inclusive growth as growth that is poverty-reducing. According to Duran (2015), the bases of inclusive growth are "the 'equality of opportunity' and 'participation in growth by all with a special focus on the working poor and the unemployed'". Thus inclusive growth is growth that is pro-poor; growth that improves the living standards of the poor; growth

characterized by job creation and suppression of inordinate income and consumption inequality. Achieving this is therefore desirable, considering the potential positive spillover effects it could have on various variables (including security, health, life expectancy, labor productivity, output, etc.) in the economy.

Some countries including China and Poland have however recorded some successes. China is one of the largest and fastest growing economies of the world. According to the OECD (2015) and Ouyang et al. (2017), the country's growth has been accompanied with rapid employment-generation, poverty-reduction and improvement in living standards. The growth has been attributed largely to economic reforms characterized by expansion of the role of the market in the economy, which engendered a boost in private-sector investment in the country, improvement in management of state-owned enterprises (SOEs) beginning from 1992, the country's decision to join the World Trade Organization in 2001, increased investment in infrastructural development, improvement in business climate, e-commerce which accounted for 15.5% of the country's national retail sales in 2016, etc. On the other hand, Poland's economic progress was accompanied by significant social achievements, reduction in income gaps (the country was able to close per capita income gap by 25 percentage points between 1990 and 2015) and improvements in living standards, since she joined the OECD in 1990. The country was able to achieve these through privatization of SOEs, and liberalization of trade, capital flows and prices (OECD, 2016).

However, this has not been the case of Nigeria. Prior to 2015, particularly during the period 2000-2014, following the return of the country to democratic rule, Nigeria's growth (in terms of per capita income) was quite impressive, as reported by the World Bank (2019). The country was ranked the third fastest growing economy in the world by CNNMONEY in 2014 and early 2015 (Africa-On-The-Rise, 2015). However, despite the impressive growth, unemployment rate, especially youth unemployment was quite high (Akande, 2014) and it was higher in the urban areas. NISER (2013) reported that rural youth unemployment in 2010 was 47.59% and the figure rose to 53.25% in 2012 owing to low level of investment, inadequate infrastructure, etc. Recent statistics from the NBS (2018) revealed that, in the third quarter of 2018, 40.8% of youth aged 15-24 years were unemployed, while 30.7% of youth aged 25-34 years were unemployed. Poverty rate was also high especially in the rural areas (World Bank, 2014). The World Bank (2016) reported that, in 2004 rural poverty rate in Nigeria was 51.61%, while urban poverty rate was 34.16%. In 2011, rural poverty rate stood at 46.35%, while urban poverty rate stood at 16.69%. In 2013, rural poverty rate was 48.49%, while urban poverty rate was 15.92%. There was large disparity in income (Oxfam, 2017). These

imply that though the country experienced growth during the period, the growth did not translate into improved welfare for the people. The growth experienced was not job-creating; it was not pro-poor. It was therefore not inclusive. Kware (2015, p.1239) succinctly noted that "Unemployment, income inequality and poverty in Nigeria, remain remarkably high despite impressive economic growth. High unemployment rates make personal incomes extraordinarily divergent. Income inequality in the country has been worsening due to differential access to infrastructure and amenities. Oil wealth has always been unequally distributed in the country favoring urban areas at the expense of rural areas. Consequent upon these, poverty has been on the increase. As at 2014 the poverty level in Nigeria stood at 63 percent of the population living below $1 a day".

The situation became worse from 2015, as the economy stumbled into slow growth and eventually went into a recession. Data from the World Bank's World Development Indicators (2020) show that, for the first time since year 2000 (about a year after the country returned to democratic rule), the country recorded a negative GDP per capita growth rate of -0.03% in 2015. The figure stood at -4.17% in 2016 and remained negative till 2019. Poverty, unemployment and inequality escalated so much that the country was regarded by the Brookings Institution as the global capital or headquarters of poverty in 2018-2020, with about half of its population living in severe poverty (or less than $1.90 per day). Key reasons adduced for poverty in Nigeria include corruption, unemployment and inequality (Adebayo, 2018; Panchal, 2020). Successive governments in the country have made efforts to achieve inclusive growth over the years. Though some degree of success have been achieved, the problems of unemployment, underemployment, inequality in the distribution of income and high poverty rates still persist. It can therefore be argued that growth in the country has been largely non-inclusive.

Monetary policy is one of the macroeconomic policies used by government through its various institutions to achieve desired macroeconomic objectives. It refers to the control of money supply and other related variables such as reserve money and interest rate by the monetary authority to achieve desired macroeconomic objectives. It could be deployed to boost aggregate demand, which leads to greater employment and poverty alleviation. It could also be deployed to control inflation. Expansionary monetary policy is aimed at increasing money supply, while contractionary (or tight) monetary policy is used to contract money supply. Both could be used to achieve desired objectives. Expansionary monetary policy could be used to boost liquidity, aggregate demand and employment in the short-run. However, in the medium to long-run, expansion in money supply could engender inflation, which

is injurious to output and employment. Tight monetary policy is required to achieve price and financial system stability (CBN, n,d). Hence, monetary policy could be viewed as a counter-cyclical policy instrument. This is the position of Economic Theory and it is subject to empirical test. There is the possibility for a country to simultaneously experience economic growth, poverty, high unemployment and inequality as recently experienced by Nigeria (Oxfam, 2017).

Instruments of monetary policy include Monetary Policy Rate (MPR), Open Market Operations (OMO), Cash Reserve Ratio (CRR), Liquidity Reserves Ratio (LR), etc. These are some of the quantitative instruments. They are used by the central bank to influence money supply, prices etc. through the commercial or deposit money banks. The MPR is the base interest rate set by the central bank to control the lending rate of the deposit money banks, thereby influencing money supply, price level, employment, output level and other macroeconomic variables. Being the base rate, no commercial bank can set its lending rate below it. It is also the rate at which the central bank lends to the commercial banks. Upward (downward) adjustment of the MPR is contractionary (expansionary) and it implies increase (decrease) in the lending interest rate. OMO on the other hand refers to the sales of government financial instrument or securities such as treasury bills, bonds and development stock to the public through the financial institution to the public in a bid to control money supply and influence inflation thereby attaining price stability. The financial instruments are re-purchased by the government in a bid to increase money supply. The CRR refers to the proportion of public and private deposits (or total deposits) that the deposit money banks are required to keep in reserves. The cash reserves are not to be lent or invested by the deposit money banks. They are either kept in the cash vaults of the banks or with the central banks. Raising the CRR is contractionary, while lowering it is expansionary. The LR is the proportion of deposits that commercial banks are to maintain in liquid form such as cash, gold, liquid financial assets or securities. Unlike the CRR, the commercial banks make some earnings on the LR. This proportion is maintained by the bank (not kept with the central bank) to ensure availability of funds to meet their deposit liabilities (when depositors make withdrawals). The Central Bank of Nigeria (CBN) uses this instrument to stabilize financial system liquidity. Upward adjustment of the LR is contractionary, while downward adjustment is expansionary.

The ultimate targets of monetary policy in Nigeria are inflation and output (CBN, 2020a). According to the CBN (2020b), the conduct of monetary policy in the country is aimed at influencing money supply by making it consistent with required economic growth rate, achieving positive real interest rates, ensuring stability of the financial system as well as achieving stable and competitive exchange rate for the domestic

currency (the Naira). The monetary policy instruments used by the Central Bank of Nigeria (CBN) to achieve its objectives include MPR, OMO, CRR, the LR, the Discount Window Operations (DWO), etc. The CBN has at various times deployed these instruments to achieve desired macroeconomic objectives. In 2014, the focus of monetary policy was on achieving price and financial stability. To achieve this, the CBN had to embark on tight monetary policy to curtail the inflation effects of electioneering campaigns and other associated activities in the run down to the 2015 elections. The MPR, OMO, CRR, etc. were deployed for these purposes. The MPR was raised from 12.0% to 13.0%; CRR on private sector deposit was raised from 15.0% to 20.0%, CRR on public sector deposit was raised from 50.0% to 75%; LR was kept at 30.0% to control excess liquidity in the financial system. In 2015 when the growth rate of real per capita turned negative the first time since year 2000, the policy action was largely expansionary as the CBN deployed a range of policy instruments including the MPR, the CRR and the OMO and DWO to address the situation. During the period, the MPR was reduced from 13.0% to 11%. The CRR on public and private deposits was initially harmonized at 31.0% to avoid overheating of the economy, but later reduced to 20.0% of total deposits with the caveat that the resulting liquidity should be channeled to employment-generating activities in agriculture, industry, infrastructural development and solid minerals. The LR was held constant at 30.0% to address excess liquidity in the banking system. In 2016, the focus of CBN's monetary policy was on "restarting the economy, curtailing inflation, reducing unemployment, boosting external reserves to stabilize the exchange rate and moderating liquidity levels in the banking system" (CBN, n. d. (c)). To achieve these, the CBN adopted a cautious monetary tightening course by adjusting the MPR upwards from 11.0% to 12% in March 2016, and further raising it from 12.0% to 14% in July 2016. The Cash Reserve Ratio (CRR) and the Liquidity Reserve Ratio (LR) were unaltered at 22.5% and 30.0% respectively during the period.

The mechanism through which monetary policy such as adjustment of the MPR affects macroeconomic variables including inclusive growth is as follows: expansionary monetary policy, which entails downwards adjustment of the MPR could be used to revive the economy through expansion of credit, especially banking sector credit to investors as a result of reduction in the lending interest rate. This raises the level of investment and employment in the country in the short-run. However, the expansion in credit could lead to uncontrolled increase in money supply which engenders inflation. To curtail this, cautious upwards adjustment in the MPR can be used to achieve price stabilization in the medium- to long-run (this is the core mandate of the CBN (CBN, n.d. (c)).   The decrease in inflation is favorable to long-run economic growth and employment generation thereby reducing income inequality and enhancing growth inclusiveness. Cautiously adjusting the MPR upwards can also influence the level of

external reserves positively (Calvo, *et al.*, 1993) as it engenders increase in the real interest rate (where the financial market is liberalized or in the absence of financial repression) and this could result in increased inflows of foreign capital as predicted by the McKinnon-Shaw hypothesis attributed to McKinnon (1973) and Shaw (1973). All things being equal, increased foreign capital inflows increase the stock of capital in the economy, thereby raising the level of output and employment and causing an appreciation of the real exchange rate. The central bank then frequently intervenes in the foreign exchange market to absorb the excess inflows of foreign exchange thereby increasing the level of foreign reserves, and curtailing inflation, which may result from possible expansion in money supply (Calvo *et al.*, 1993; Jongwanich, 2010).

The main objective of this study is to investigate the factors affecting inclusive growth in Nigeria. In particular, the role of monetary policy in achieving inclusive economic growth in Nigeria is examined. Several studies (Tella & Arimi, 2016; Guobadia, *et al.*, 2016; Ibukun & Aremo, 2017) have attempted to investigate the determinants of inclusive growth in Nigeria. The dearth of those studies is that none of them employed a unified measure of inclusive growth as done in Anand et al. (2013), Khan et al. (2016), Munir and Ullah (2018), Jalles and Mello (2019). Rather, the studies used unemployment, GDP per person employed (which is actually a measure of labor productivity) or poverty rates to capture inclusive growth. This study differs from previous related Nigeria-studies by computing and using a unified measure of inclusive growth.

The study is organized into five sections. The study has been introduced in the current section (Section 1). Section 2 reviews the literature on the determinants of inclusive growth-- the gap in the literature is identified, and the contribution of this study to the literature is highlighted. The methodology of the study is presented in Section 3. Results of the analysis are presented and discussed in Section 4. Section 5 concludes the paper with recommendations for policy consideration.

2.0   Literature Review
2.1.   Theoretical Literature
The Monetarists postulate that monetary policy could be used to influence output and employment, especially in the short-run. Expansion in money supply decreases interest rate, so long as the economy is not in a liquidity trap – a situation where interest rate is non-responsive to changes in money supply. This implies reduction in cost of investment finance or loanable funds or capital. The relationship is also explained by the IS-LM framework developed by Sir John Hicks in 1937 and popularized by Alvin Hansen in 1949. The decrease in interest rate engenders increase in investment which is the heart

of growth models (Baldwin & Forslid, 2000). Thus, increase in investment is predicted to enhance production, and given adequate effective demand, this in turns engenders increase in demand for labour to sustain production. This is in line with the postulation of the Keynesian Theory of Income and Employment, which also links output growth to increase in employment in the short-run. The rise in employment possibly engenders decrease in poverty rate and thus, enhances growth inclusiveness. This implies that money is non-neutral in the short-run. However, they also predict that in the long-run, money is neutral, as the output (growth) effect of monetary expansion may not be significant considering that the economy may have reached its full employment level. Thus, any expansion in money supply will only serve to engender increase in the general price level, which could be detrimental to consumption, investment and employment.

The Classical Quantity Theory of Money developed by Irvin Fisher and further refined by Milton Friedman relates money supply to price and output. Increase in money supply engenders increase in prices and output. The short-run Phillips Curve expresses an inverse relationship between inflation and unemployment. This relationship has been heavily criticized as deceptive, and as an empirical evidence seeking theory (Tobin, 1972; Dorn, 2020). However, it may be explained by the relationship among monetary expansion, prices (inflation) and employment. Increase in money supply positively affects output and employment in the short-run, while simultaneously causing inflation. This suggests that the relationship between inflation and unemployment may not be a causal relationship, but that the variables (output, inflation and employment) may be simultaneous outcomes of expansionary monetary and fiscal policies, at least in the short-run.

Tobin (1965) introduced money into the Solow's Growth Model to demonstrate that changes in money balances affect economic growth. This model is identified as the first Monetary Growth Model (Tutulmaz, 2014). However, Levhari and Patinkin (1968) criticized Tobin's Monetary Growth Model for considering money as a store of value. In their contribution to the Monetary Growth Theory, (outside) money is considered as either a consumption good or a capital good, each having varying growth effects depending on the use the government makes of the money which it prints.

Monetary policy instruments can be used to achieve inclusive growth. A major policy instrument is the MPR, which is used by the monetary authority to influence the lending rate of the commercial banks. It is the base interest rate at which the central bank lends to the commercial banks. Being the base interest rate, the lending rates of the commercial banks are expected to be greater than or at least equal to it. By adjusting

the MPR, the central bank is able to influence the interest rate, money supply and exchange rate all of which have linkages with investment, employment generation, income distribution, poverty reduction and output growth. Downward adjustment of the MPR is a loose (or expansionary) monetary policy and implies that commercial banks are able to lend at a relatively lower interest rate. This translates into increase in demand for loans, greater investment, creation of more jobs (or employment generation), poverty reduction, reduction in aggregate income gap, resulting in achievement of some level of growth inclusiveness in the short-run.

However, expansion in money supply resulting from the downward adjustment of the MPR also has some implications for prices, output exchange rate and capital inflow over the medium to long term. Uncontrolled increase in money supply could increase inflation, which in turn adversely affects economic growth, and employment as a result of its adverse effect on investment and cost of production (Tobin, 1972), and worsens the income gap in the long run (Bulif,1998; Siami-Namini, 2019; Law & Soon, 2020). It could also adversely affect the exchange rate of the domestic currency causing the domestic currency to depreciate as a result of increase in imports of final consumer goods with the attendant adverse effect on domestic (infant) industry and their demand for labour (Froyen, 2013). The depreciation of the domestic currency, inflation and the fall in interest rate resulting from monetary expansion serve to discourage inflows of foreign capital, or trigger outflows of same from an economy under a flexible exchange rate regime and where capital accounts are liberalized (Froyen, 2013). These have adverse consequences for investment, employment, output and inclusive growth in the long-run. To curtail these, tight monetary policy may be implemented by adjusting the MPR upwards. This is used by the monetary authority to achieve price and financial stability over the medium to long term (Partachi & Mija, 2015). An increase in the MPR reduces the ability of the commercial banks to lend, as a result of the rise in the lending interest rate. This could cause a reduction in private sector demand for loans, curtail money supply, lower demand for import and lower inflation in the economy. A decrease in inflation, reduction in import demand (partly attributable to lower domestic inflation rates) and appreciation of the domestic currency (resulting from the decrease in money supply) are favorable to investment which in turn promotes employment-generation (for skilled and unskilled labor) and poverty-reduction, and decreases income gap, thereby enhancing growth inclusiveness.

2.2.   Empirical Literature
The empirical literature on the determinants of inclusive growth is reviewed in this section. The literature has been inconclusive. Several reasons can be adduced to the

inconclusiveness of the literature. These include use of various measures for inclusive growth, the methodologies applied and country-specific conditions (for country studies).

As regards issues of measurement of inclusive growth, several studies used human development index which incorporates per capita income, education (knowledge) and life expectancy (longevity) to proxy inclusive growth (Ogbeide & Igbinedion, 2016). This measure of inclusive growth lacks rigour because it does not take into account the distribution of income (as income may be concentrated in a small segment of the population), employment and poverty. Some studies (Adamu & Iyoha, 2015; Ibrahim, 2017; Olakanmi & Olagunji, 2020) used per capita income to proxy inclusive growth, also ignoring the distribution (equality and inequality) of income. Inclusive growth was measured in Tella and Arimi (2016), Ibukun and Aremo (2017) and Olusola and Oluwatobi (2017) as GDP per person employed. This measure (GDP per person employed) hardly passes as a reliable measure of inclusive growth but it is often employed in empirical studies (Aigheyisi, 2019; Alekhin & Ganeli, 2020) as a measure of labour productivity, which cannot be synonymous to inclusive growth as it does not reflect equality or inequality of consumption or income.

Several studies have used a unified measure of inclusive growth, most of them integrating economic growth and income equality or inequality (Anand, *et al.*, 2013; Alekhina & Ganeli, 2020). Khan et al. (2016) following the Asian Development Bank extended the integrated measure of inclusive growth to incorporate other variables such as accessibility and governance. Studies also exist which do not use any unified measure of inclusive growth (Guobadia, *et al.*, 2016; Oluwasogo, *et al.*, 2017; Adeoye, *et al.*, 2018). The studies only investigated the interactions among economic growth, (un)employment and some other variables within Vector Error Correction (VEC) or Vector Autoregressive (VAR) framework.

The determinants of inclusive growth have not attracted as much attention of researchers as the determinants of economic growth. Using GDP per person employed as a proxy for inclusive growth, Tella and Arimi (2016) found that inclusive growth in Africa is affected by health and demographic changes. Specifically, the study found that inclusive growth in the continent was affected by real GDP per capita, real health expenditure per capita, age dependency ratio, real net official development assistance, but adversely (negatively and significantly) affected by population growth. Using the same measure of inclusive growth, Ibukun and Aremo (2017) found that FDI positively affects inclusive growth, while inflation, population growth, education expenditure and government final consumption expenditure negatively affect

inclusive growth in Nigeria. Adeosun et al. (2020) also found that inclusive growth (measured by GDP per-person employed) in Africa is stimulated by public investment through employment generation effects. The use of GDP per person employed as a proxy for or a measure of inclusive growth in these studies constitutes a drawback on the reliability of their results since the variable easily passes for a measure of labor productivity but not inclusive growth.

Anand et al. (2013), Khan et al. (2016), Munir and Ullah (2018), Jalles and Mello (2019) and Alekhina and Ganeli (2020) used integrated measures of inclusive growth in their studies of the determinants of inclusive growth. In the study by Anand et al. (2013), which investigated the determinants of inclusive growth in emerging markets, inclusive growth was measured by integrating growth in per capita income with an index of income equality. The study found that inclusive growth in emerging markets is driven by education, trade openness, quality of infrastructure and investment. Factors found to adversely affect inclusive growth include output (GDP) volatility and inflation. The study by Khan et al. (2016) which focused on Pakistan, measured inclusive growth by integrating per capita income growth with income equality, accessibility and governance. The study found that FDI and trade openness positively and significantly affect inclusive growth. It also found that inflation adversely affect inclusive growth, suggesting that macroeconomic instability inhibits achievement of inclusive economic growth. Munir and Ullah (2018) also focused on Pakistan and used similar integrated measure of inclusive growth (except that the variable was measured by integrating per capita income growth with the Gini index of income inequality). The empirical evidence indicated that inclusive growth in Pakistan is negatively and significantly affected by (high) inflation (macroeconomic instability), terms of trade, and broad money supply to GDP ratio. Money supply growth and domestic credit to the private sector were found to have contributed positively and significantly to achievement of inclusive growth in the country. Key shortcomings of the study are inclusion of several financial development variables as explanatory variables in the specified model. These could introduce some bias into the estimated model rendering the estimates unreliable. Jalles and Mello (2019) examined the determinants of inclusive growth in a sample of 46-78 countries during the period 1980-2013, using the logit and multinomial probit estimation methods. Inclusive growth was measured as a combination of growth in per capita income and changes in income inequality in the study. The empirical evidence indicated that inclusive growth had been driven by human capital (per capita education expenditure), redistribution, remittances, trade openness, factor productivity, and labor force participation. Unemployment, inflation, output volatility, systemic and total financial crisis and currency crisis were found to have adversely affected inclusive growth. Political and institutional factors such as the

durability of the political regime, legislative election and proportional representation were also found to have contributed favorably to growth inclusiveness, while margin of majority constitutes a significant drawback to it.

The study by Alekhina and Ganeli (2020) focused on six Asian countries namely Indonesia, Lao PDR, Malaysia, Philippines, Thailand and Vietnam. The study used an integrated measure of inclusive growth, which incorporates real GDP per capita growth and income equality index. The study found that inclusive growth in Asian countries is driven by productivity growth (captured as GDP per person employed), FDI inflows, higher savings ratio, digitalization (using growth rate of mobile cellular subscribers per one hundred people as proxy), female labor force participation and fiscal redistribution. The positive effect of labor productivity on inclusive growth was attributed to its effect on real output. The effects of inflation and financial development (credit-to-GDP ratio) on inclusive growth were not statistically significant. In a study to examine the effect of monetary policy on inclusive growth in Nigeria during the 1981-2014 period, Adeoye et al. (2018) estimated a four-variable VAR model which incorporates money supply, per capita income, unemployment and exchange rate. The VAR analysis focused on unemployment rate as the dependent variable, that is, unemployment rate is used as proxy for inclusive growth. The result showed that the contemporaneous effect of exchange rate on unemployment rate is positive and significant, suggesting that currency depreciation worsens the unemployment problem in the country. However, the lagged effect was negative and also significant, implying that depreciation of the domestic currency (the Naira) could help reduce unemployment with a lag. This may be attributed to the theoretically predicted lagged positive effect of exchange trade on export and negative effect on imports. Increase in money supply (as a percentage) of GDP was also found to exacerbate the unemployment problem contemporaneously. The lagged and contemporaneous effects of per capita income growth on unemployment were however found to be statistically insignificant, implying that growth in the country has not cushioned the unemployment problem. The result of variance decomposition of unemployment rate revealed that exchange rate and money supply contributed more to inter-temporal changes in unemployment rate than per capita income growth. The Impulse Response Function (IRF) showed that exchange rate shocks engender increase in the exchange rate and this continued steadily. Unemployment responded positively to money supply shock initially, but decreased overtime. A limitation of the study is that it failed to measure inclusive growth, but rather used unemployment to proxy inclusive growth, which is hardly accurate considering that (un)employment and economic growth are different targets of monetary policy.

From our review of the literature, and to our knowledge, no prior study has examined the determinants of inclusive growth in Nigeria, using a unified measure of inclusive growth. This leaves a gap in the empirical literature, which the current study seeks to fill. In the study by Tella and Arimi (2016) which focused on Africa, and the study by Ibukun and Aremo (2017) which focused specifically on Nigeria, inclusive growth was measured as GDP per person employed. This variable hardly suffices as a good measure of inclusive growth but a good measure of labour productivity. To our knowledge, based on an extensive review of the literature, this study is the first to investigate the determinants of inclusive growth in Nigeria, using several unified measures of inclusive growth which incorporate per capita income growth and changes in income inequality. Furthermore, only a few studies have examined the role of monetary policy in achieving inclusive growth. Most of the previous studies focused on the effect of monetary policy on economic growth. This study therefore contributes to the extant literature by examining the effects of monetary policy on inclusive growth in Nigeria.

3.0   Methodology
This section presents measurement of the proxy for inclusive growth used for the analysis. The theoretical framework of the study is presented and the estimation models are specified. The methods for robustness checks are also discussed. The section ends with a brief discussion of the data used for the study and their sources.

3.1   Measurement of Inclusive Growth
Following Anand et al. (2013), this study utilizes an integrated measure of inclusive growth which adjusts economic growth (measured as real GDP per capita growth) for changes in income inequality. The measure is based on a Utilitarian Social Welfare Function, with its foundation on the consumer choice literature where inclusive growth depends on income growth and its distribution. The implication of this measure of inclusive growth is that increase (positive change) in income inequality reduces the inclusive growth measure, while improvement in equitable income distribution increases the measure of inclusive growth. According to Anand et al. (2013), this approach is in line with the absolute definition of pro-poor growth. Thus attainment of inclusive growth strictly requires growth in per capita income and the equality of its distribution. Stated alternatively, inclusive growth requires growth in per capita income and decrease in income inequality. Considering that data on income inequality is readily available from various authoritative sources, this study utilizes income inequality index in the computation of the proxy for inclusive growth. Thus, the measure or proxy for inclusive growth used in this study is measured or derived as:

$$GRYGI = PCYGR - YGINIGR \qquad\qquad [1]$$

Where GRYGI[3] represents inclusive growth; PCYGR is Real GDP per capita growth (or per capita income growth); YGINIGR represents percentage change in GINI index of income inequality.

3.2   Theoretical Framework and Model

Solow's 1956 Growth Model, widely presumed to provide the framework for understanding the determinants of economic wellbeing (Mankiw, 1992), the Fisher's and Friedman's Quantity Theory of Money, the Levhari and Patinkin's Monetary Growth Model and the Tobin's Monetary Growth Model which modified the Solow's model to incorporate money balances, provide the theoretical framework for this study. One of the tools used by the monetary authority to influence money balances in an economy and to achieve price and financial stability is the Monetary Policy Rate (CBN, 2020). In empirical application, the Solow Growth Model is augmented to incorporate various policies presumed to affect economic growth (Mankiw, 1992; Ploeg and Alogoskoufis, 1994). In this study, in addition to the MPR, and investment which is considered the heart of growth models (Baldwin & Forslid, 2000), other variables are hypothesized as potential determinants of inclusive growth. The variables include inflation, and non-oil export growth. Thus, the functional form of the model used in this study is specified as:

$$GRYGI = f(MPR, INF, INV, NOEXPG) \hspace{3cm} [2]$$

Where GRYGI is the measure of inclusive growth derived in equation 1; MPR is the Monetary Policy Rate (which is a quantitative monetary policy instrument); INF represent inflation measured as annual percentage change in the Consumer Price Index (CPI); INV represents investment measured as annual percentage change in gross capital formation; NOEXPG represents growth rate of non-oil exports measured as annual percentage change in non-oil exports.

This study adopted the methodology of Autoregressive Distributed Lag (ARDL) modeling approach to co-integration and error correction analysis developed by Pesaran et al. (2001). The choice of this method was informed by its flexibility in application as it can be applied when the variables are I(0), or I(1) or mixed, when some are I(0) and others are I(1), or cases of fractionally integrated series. Moreover, the methodology is applicable in cases of small and finite data sizes and it yields

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[3]GRYGI represents inclusive growth measured as annual per capita income growth (PCYGR) minus annual percentage change in the Gini index of income inequality (YGINIGR). Positive change in income inequality which implies deterioration of income inequality reduces growth inclusiveness, while negative change in inequality which implies improvement in equitability in income distribution would increase growth inclusiveness.

consistent and efficient long-run estimates of regression model with valid t-statistics even in the presence of regressor endogeneity (Harris & Sollis, 2003).

Implementation of the ARDL approach to co-integration and error correction modeling (ECM) begins with the unit root test to ascertain that none of the variables is I(2) as the method breaks down in the presence of I(2) variables. For this purpose, we used the KPSS test for unit root. Following this is the Bounds (co-integration) test which involves OLS estimation of an unrestricted error correction version of an ARDL model specified as:

$$\Delta GRYGI_t = \beta_0 + \sum_{j=1}^{p}\left(\delta_{1j}\Delta GRYGI_{t-j}\right) + \sum_{j=0}^{p}\left(\delta_{2j}\Delta MPR_{t-j}\right) + \sum_{j=0}^{p}\left(\delta_{3j}\Delta INF_{t-j}\right) +$$

$$\sum_{j=0}^{P}\left(\delta_{4j}\Delta INV_{t-j}\right) + \sum_{j=0}^{P}\left(\delta_{5j}\Delta NOEXPG_{t-j}\right) + \beta_1 MPR_{t-1} + \beta_2 INF_{t-1} + \beta_3 INV_{t-1} +$$

$$\beta_4 NOEXPG_{t-1} + \varepsilon_t \qquad\qquad [3]$$

The variables are as defined previously. Ln is the natural logarithm operator. Parameters β_1 to β_4 correspond to the long-run relationship, while the parameters δ_{2j} …δ_{5j} correspond to the short-run relationships. Δ is the first difference operator, ε is the error term, j is the optimal lag order of the ARDL and it is to be empirically determined. The co-integration test involves testing the joint significance of the regressors of equation 2 using Wald's F-test. The null hypothesis of "no co-integration" ($\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$) is tested against the alternative hypothesis of co-integration ($\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4$). Pesaran et al. (2001) computed two sets of asymptotic critical values for the F-statistic at different levels of statistical significance (1%-10%), they are the lower bound critical values which assume the variables are I(0), and the upper bound critical value which assumes the variables are I(1). The null hypothesis of no co-integration is rejected, if the computed F-statistic is greater than the upper bound critical value at the chosen level of significance. The null hypothesis is accepted, if the F-statistic is less than the lower bound critical value, implying the variables are not co-integrated. The test is inconclusive, if the computed F-statistic is between the lower and upper bound critical values. If co-integration is indicated, then the short-run (error correction) and the long-run models can be estimated.

The error-correction model is derived from the underlying ARDL model as:

$$\Delta GRYGI_t = \lambda_0 + \sum_{j=1}^{p}\left(\lambda_{1j}\Delta GRYGI_{t-j}\right) + \sum_{j=0}^{p}\left(\lambda_{2j}\Delta MPR_{t-j}\right) + \sum_{j=0}^{p}\left(\lambda_{3j}\Delta INF_{t-j}\right) +$$

$$\sum_{j=0}^{P}\left(\lambda_{4j}\Delta INV_{t-j}\right) + \sum_{j=0}^{P}\left(\lambda_{5j}\Delta NOEXPG_{t-j}\right) + \varphi ECT_{t-1} + \xi_t \qquad\qquad [4]$$

The βs are estimates of the respective short-run effects of the explanatory variables on the dependent variable. ECT is the error correction term which, *inter alia,* measures the speed of adjustment to equilibrium in the event of short-run deviation from the long-run (equilibrium) relationship. To play the role of error correction, its coefficient (φ) is expected to be negatively signed and statistically significant. The negative and significant coefficient is a further indication of co-integration of the variables. ξ is the error term.

The long-run equation is derived from the ARDL model as:

$$\text{GRYGI}_t = a_0 + a_1\text{MPR}_t + a_2\text{INF}_t + a_3\text{INV}_t + a_4\text{NOEXPG}_t + \mu_t \tag{5}$$

μ represents the error term. The *a priori* expectations are: $a_1 > 0$, $a_2 < 0$, $a_3 > 0$, $a_4 > 0$.

3.3   Theoretical Justification for Included Variables and their *a priori* Expectations

The MPR is the one of the quantitative instruments of monetary policy used by the Central Bank to achieve desired macroeconomic goals such as price stability, employment and economic growth, by influencing the level of money balances in the economy. By varying the MPR, the central bank is able to influence the level of money supply in the economy through the lending financial institutions. Reduction in the MPR engenders decrease in bank lending rate. This policy action is expansionary and it leads to increase in demand for loans from the lending financial institutions. This enhances investment and employment generation, thereby reducing poverty rate and income gap in the economy (depending on the sectors benefiting from the expansion in bank credits) and ultimately enhancing inclusive growth in the short-run. However, the expansion in bank credit could result in increase in money supply, and if this is not controlled, it would lead to high inflation in the long-run. Inflation adversely affects growth and employment and exacerbates the income inequality problem (Bulif, 1998). To control inflation, there will be the need to contract the lending capacity of the lending financial institutions. This calls partly for increase in the MPR so as to raise the banks' lending rate. Increase in the MPR is required to achieve this. Thus, in the long-run, MPR is expected to be positively related to inclusive growth, while inflation is expected to adversely affect inclusive growth.

Various growth theories (Neoclassical and Endogenous Growth Theories) identify investment as a key determinant of economic growth. It is the heart of growth models (Baldwin & Forslid, 2000).The Okun's Law and the Keynesian Theory of Income and Employment predict positive employment effect of economic growth. Increase in employment expectedly engenders reduction in poverty and income inequality. Thus, increase in investment in key sectors of the economy will enhance growth inclusiveness.

The export-led growth hypothesis attributed to Findley (1984) and Krueger (1985) predict positive growth effect of exports on economic growth. Export expansion resulting in economic growth is expected to engender improvement in employment which contributes to poverty-reduction and reduction in income inequality, *ceteris paribus*. Thus non-oil export growth is expected to positively affect inclusive growth.

3.4   Data

The study uses annual times series data spanning the period from 1981 to 2015. The choice of this scope (which could be taken as a limitation or constraint of the study) is informed by the fact that the last observation for data on income inequality from the data source - the Global Consumption and Income Project (2018) - is for 2015. Data on real GDP per capita growth, inflation and investment were obtained from the World Bank's World Development Indicators (WDI) database 2019, while data on non-oil exports used for computation of non-oil export growth were obtained from the CBN Statistical Bulletin (2019).

4.0   Results and Discussion

The estimation results are presented and discussed in this section. The section begins with presentation and discussion of the unit root test results, followed by the co-integration test results. Thereafter, the results of estimation of the various models are presented, discussed and tested for robustness.

4.1   Correlation Analysis

The empirical analysis begins with the pairwise correlation analysis. This is done to be certain that no pairs of the explanatory variables are strongly correlated as strong correlation could throw up the problem of multicolinearity which would adversely affect the reliability of the model estimates. Multicolinearity inflates the variance(s) of the affected coefficients, leading to underestimation of the t-ratios. With multicolinearity, an otherwise significant variable would erroneously be reported as non-significant. The matrix of pairwise correlation coefficient is presented in Table 1. It can be observed that the pairwise correlation coefficients are quite low (less than 0.4). This implies that weak correlations exist between pairs of the explanatory and it is expected that model(s) estimated with the variables will not be plagued with the problem of multicolinearity.

With respect to the correlations between the measure of inclusive growth (that is the dependent variable) and the explanatory variables, it is observed that apart from inflation which is negatively correlated with inclusive growth, the other explanatory variables are positively correlated with inclusive growth.

Table 1: Pairwise Correlation Coefficients

	GRYGI	MPR	INF	GCFG	NOEXPG
GRYGI	1.00				
MPR	0.07	1.00			
INF	-0.27	0.35	1.00		
GCFG	0.37	0.02	-0.19	1.00	
NOEXPG	0.13	-0.08	0.21	-0.20	1.00

Source: Authors' computation using EVIEWS 9.

4.2   Unit Root and Co-integration Tests

The results of unit root test involving the KPSS tests are presented in Table 2. The test result indicates that all the variables are stationary at level as the test statistics are less than respective critical values at the 5% significance level.

Table 2: KPSS Stationarity Test

Variables	Level		
	KPSS test stat.	Critical Value (5%)	Inference
GRYGI	0.33	0.46	S
MPR	0.16	0.46	S
INF	0.12	0.15	S
GCFG	0.45	0.46	S
GCFY	0.30	0.46	S

NS stands for non-stationary; S stands for stationary
Source: Authors' Estimations using EVIEWS 9

The observation that the variables are stationary at levels implies that long-run relationships possibly exist among them. This calls for ARDL modeling. The long-run model can also be estimated using the OLS estimator (Roy, 2020). However, to be quite certain that long-run relationships truly exist, the variables were tested for co-integration. The result of the test is presented in Table 3.

Table 3: ARDL Bounds Test

Test stat.	Value	Critical Value Bounds (1% sig. level)	
		LB	UB
F-stat.	7.26	3.74	5.06

k represents number of explanatory variables
Source: Authors' Estimations using EVIEWS 9

The cointegration test results presented in Table 3 indicates the null hypothesis of no long-run relationship is rejected at the 1% significance level since the computed F-statistic is greater than the upper bound critical value at the chosen significance level. It can therefore be inferred that the variables are cointegrated.

4.3   Model Estimation Results

The results of estimation of the ECM and Long-run models are presented and discussed in this sub-section. The estimated error correction model is presented in Table 4. It shows a lagged negative effect of MPR on inclusive growth in the short-run. The effect is significant at the 10% level. A unit rise increase in the MPR is associated with 0.44 unit decrease in the measure of inclusive growth. This implies that contractionary monetary policy could adversely affect inclusive growth in the short-run. It therefore suggests that decrease in the MPR which is a loose or expansionary monetary policy is required to achieve inclusive growth in the short-run as it eases access to loanable funds required for investment and other economic enhancement purposes from the financial system, especially the commercial or deposit money banks whose capacity to lend would have been enhanced by the loose policy as a result of the lowering of their interest rates resulting thereby. The observed negative effect corroborates evidence from Chang and Jaffar (2014) and Olakanmi and Olagunju (2020) which also found that contractionary or tight monetary policy negatively affects inclusive growth.

Inflation adversely affects inclusive growth as indicated by the negative sign on the coefficient of inflation variable which is significant at the 10% level. A unit increase in inflation will engender 0.11 unit decrease in inclusive growth. To our knowledge, previous known studies on Nigeria focused on the effect of inflation on economic growth, not inclusive growth. Though the results have been mixed, some of the studies suggested the relationship between the variables to be inverted U-shaped and estimated thresholds below which inflation positively affect growth, and above which it adversely affects growth (Bawa, 2012; Doguwa, 2012; Umaru & Zubairu, 2012; Osuala, et al., 2013; Enejohh & Tsauni, 2017; Adaramola & Dada, 2020). The observed negative effect of inflation on inclusive growth in this study may be attributed to the likely inequality expansion effect of inflation, as observed by Bulif (1998) and Siami-Namini and Hudson (2019). It underscores the need for the country to control inflation in her bid to achieve inclusive growth.

The short-run effect of investment on inclusive growth is positive as expected and significant at the 10% level. This could be attributed to the growth-enhancing and inequality-reducing effects of investment. The observation conforms to the theoretical prediction of various growth theories including the Neoclassical and Endogenous

Growth Theories (Solow, 1956, Swan, 1976, Barro & Sala-i-Martins, 2004) and is in synchrony with evidence from previous studies including Adeosun et al. (2020) which found that public investment stimulates inclusive growth in Africa through job-creation effects.

The short-run effect of non-oil export growth on inclusive growth in Nigeria is positive and significant at the 5% level. This validates the export-led (inclusive) growth hypothesis and highlights the need for the non-oil sectors of the economy to be developed so as to enhance the volume and quality of exports products arising therefrom. A unit rise in non-oil export growth is associated with 0.02 unit rise in inclusive growth. Thus, improvement in non-oil exports will enhance the growth of the nation's economy (as predicted by the export-led growth hypothesis and this in turn will engender reduction in unemployment (or improvement in employment) as predicted by the Okun's Law. Improvement in employment reduces income inequality to some extent. This evidence buttresses the evidence from Ibrahim (2017), which found significant positive effect of agricultural exports on inclusive growth in Nigeria.

The error correction coefficient is negatively signed and statistically significant at the 1% level, thus it will rightly play the role of restoring equilibrium relationship in the event of short-run (temporary) deviation from the long run equilibrium relationship. The coefficient of the error correction term which lies outside the range of 0 to -1 suggests that the convergence towards equilibrium in the event of short-run deviation therefrom is oscillatory (Narayan & Smith, 2005). The model has a good fit as indicated by the coefficient of determination, which shows that 65% of variation in inclusive growth is explained by the model. The F-statistic indicates that the included explanatory variables are jointly significant at the 1% level in explaining inclusive growth in the country. The Durbin-Watson statistic of 2.10 points to absence of problem of autocorrelation.

Table 4: Error Correction Model based on ARDL(1, 2, 1, 0, 1)

Dependent Variable: ∆GRYGI

Sample:1981-2015

Variable	Coeff.	t-Stat.	Prob.
∆(MPR)	-0.17	-0.68	0.50
∆(MPR(-1))	-0.44	-1.75	0.09
∆(INF)	-0.11	-1.70	0.10
∆(GCFG)	0.08	1.83	0.08
∆(NOEXPG)	0.02	2.10	0.05
CointEq(-1)	-1.29	-6.13	0.00

R^2 = 0.65; Adj. R^2 = 0.51; F-stat = 4.52 (p-val. = 0.00); DW- stat = 2.10
Source: Authors' Estimations using EVIEWS 9

The long-run estimates are shown in Table 5. The results show positive relationship between MPR and inclusive growth. The relationship is significant at the 5% level. A unit rise in the MPR is associated with 0.52 unit rise in inclusive growth. This implies that increase in the MPR (which is a tight monetary policy) will enhance inclusive growth in the long-run in the country. Thus, while expansionary monetary policy (reduction in the MPR) may enhance inclusive growth in the short-run as found in the short-run estimates, tight monetary policy is required for long-run inclusive growth. This may be connected to the price stabilization objective of monetary policy in the medium to long term in the country (that is the need to control inflation that likely results from uncontrolled increases in demand for money and money supply caused by the reduction in the MPR which engenders decrease in deposit money banks' lending rates) (Partachi & Mija, 2015; CBN, n.d). The observed positive effect of MPR on inclusive growth in the long-run corroborates evidence from Mesagan and Yusuf (2019) which also found positive long-run growth effect of the MPR.

The signs on the long-run coefficients are same as those of the short-run (error correction) coefficients; however, the effects are more significant in the long-run than in the short-run. This is indicated by the t-ratios and the respective p-values of

associated variables. Thus, as in the short-run, inflation also negatively affects inclusive growth and the effect is significant at the 1% level. A unit rise in inflation will engender 0.16 unit decline in inclusive growth. The predictions of the Neoclassical and Endogenous Growth Models are also validated by the observed positive effect of investment on inclusive growth. The export-led growth hypothesis is also validated in the long-run by the observed positive and highly significant effect of non-oil export growth on inclusive growth in the country. Reasons adduced to the short-run effects could also be adduced to the long-run effects.

Table 5: Long-Run Coefficients based on ARDL(1, 2, 1, 0, 1)

Dependent Variable: GRYGI

Variable	Coeff.	t-Stat	Prob.
MPR	0.52	2.61	0.02
INF	-0.16	-3.67	0.00
GCFG	0.06	2.10	0.05
NOEXPG	0.03	2.82	0.01
C	-4.24	-1.64	0.12

Source: Authors' Estimations using EVIEWS 9

4.4   Diagnostics

The diagnostic tests of the model are presented in Table 6. The results show that the model passes the test of residual normality. This is indicated by the Jarque-Bera test which fails to reject the null hypothesis of normality of residuals as the p-value is greater than 0.05. There is also an indication of absence of problem of serial correlation as seen in the Breusch-Godfrey LM test statistic which fails to reject the null hypothesis of absence of serial correlation in the model as the associated p-value is greater than 5% (or 0.05). Result of the Breusch-Pagan-Godfrey test for heteroskedasticity indicates homoscedasticity, that is the variances of errors of the model are constant, at the test statistic with p-value greater than 0.05 fails to reject the null hypothesis of constancy of the variance of the residuals. The Ramsey RESET test result shows that the regression equation specification is error-free. This is indicated by the p-value of the test statistic which fails to reject the null hypothesis of no errors in the regression equation specification.

Table 6:Diagnostics Test Results

Tests	Test stat.	p-value
Residual Normality Test	0.74	0.69
Serial Correlation (Breusch-Godfrey LM Test)	0.27	0.77
Heteroskedasticity (Breusch-Pagan-Godfrey)	0.78	0.64
Ramsey RESET Test	0.91	0.35

Source: Authors' Estimations using EVIEWS 9

4.5   Stability Test

The study relied on the approach to testing long-run stability of regression model proposed by Brown, Durbin and Evan (1975). The method involves plots of the cumulative sum of residuals (CUSUM) and the cumulative sum of squared residuals (CUSUMSQ). The results of the test are presented in Figure 1a and 1b respectively (in the appendix). Both plots lie between the 5% critical bounds (See Figures 1a and 1b in the appendix). On the strength of these, it can be inferred that the long-run model is structurally stable. Long-run stability of a model enhances it reliability for policy pursuit.

5.0   Conclusion and Recommendations

The determinants of inclusive growth in Nigeria have been investigated in this study, with key focus on the role of monetary policy. A conclusion that can be drawn from the empirical evidence is that, with respect to inclusive growth, monetary policy is counter-cyclical. It can be deployed to achieve inclusive growth in the short-run by reducing the monetary policy rate. This policy action (which is expansionary) implies reduction in lending rates of the central bank (which lends to or discount bills for the deposit money banks) and by extension, the lending rate of the deposit money banks, thereby leading to increase in investment and employment. However, in the long-run, the effect of MPR on inclusive growth is positive, suggesting that contractionary monetary policy (increase in the MPR which engender increase in the lending rates of the deposit money bank) is favourable to inclusive growth as it helps to achieve price stability in the medium to long term. Other conclusions that can be drawn from the study are that inflation is inimical to inclusive growth, while investment and growth of non-oil exports are favorable to inclusive growth.

Based on the empirical evidence, the following are recommended for policy considerations:

i.   The MPR should be deployed as a countercyclical monetary policy instrument. It should be lowered to achieve inclusive growth in the short-run as this policy

action is expansionary and could boost economic activities, economic growth and employment generation through improvement in investment. However, for long-run growth, it should be raised and deployed as a price stabilization tool.

ii.   The observed negative effect of inflation on inclusive growth calls for the need for the government to deploy various policy instruments (including monetary and fiscal policy) to control inflation so as to achieve inclusive growth.

iii. The positive and significant effect of investment on inclusive growth calls for the design and implementation of programmes and policies to encourage greater investment in the country.

iv.   The non-oil export sectors of the economy (including manufacturing, agriculture, financial, etc.) should be developed so as to enhance the volume and quality of the nation's non-oil exports and diversify same. Improved credit to the non-oil sectors could play crucial role in achieving this. There is also need to design export promotion strategies and develop viable export processing zones as well as improve export trade facilitation and logistics.

As a recommendation for further studies, future research or studies may replicate or take this study further by using other measures of inclusive growth, extending the study period and employing other appropriate methodologies.

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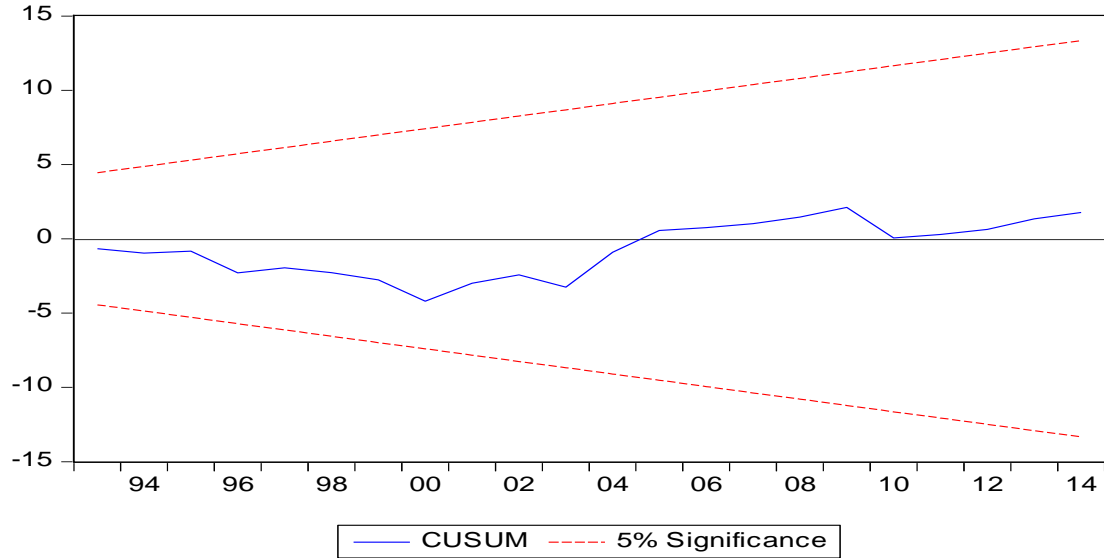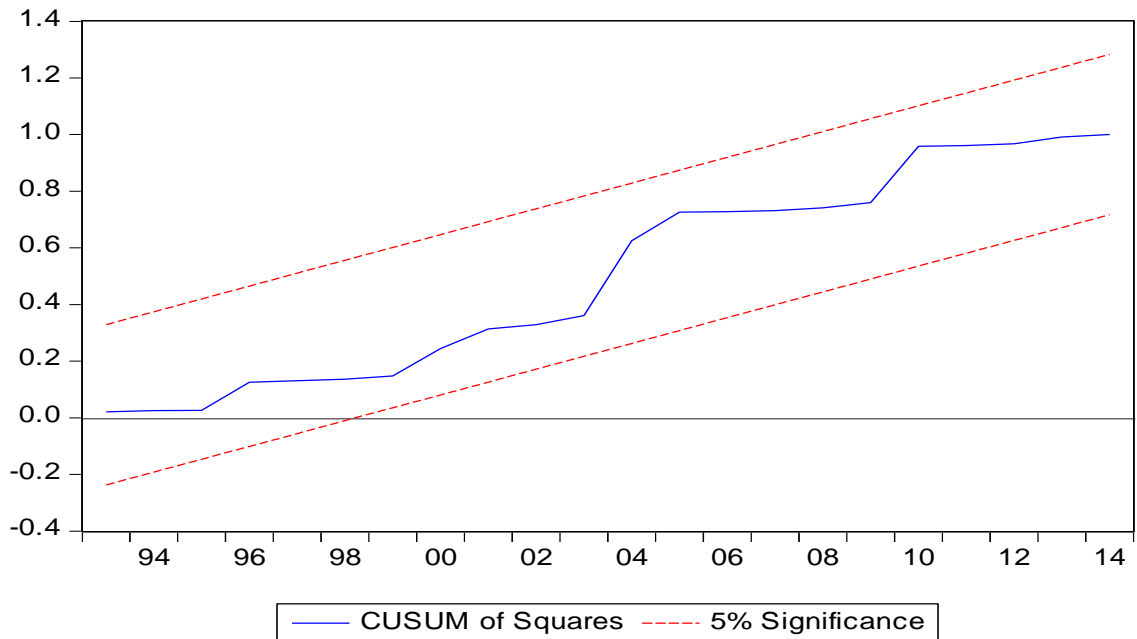
APPENDIX

Figure 1a. *CUSUM*

Figure 1b *CUSUMSQ*

TECHNOLOGICAL INNOVATIONS AND AFRICAN EXPORT PERFORMANCE

Lukman O. Oyelami *[1] and Ogbuagu Matthew Ikechukwu[2]

Abstract

This study seeks to investigate the contributory effect of technological innovation on total export performance and specifically manufacturing exports of African countries. This is with a view to exploring manufacturing exports as a viable option for diversification. To achieve the objective of this empirical investigation, this study employs the static technique of panel estimation of the Fixed Effects (FE) based on the econometric realities inherent in the data utilized. The conclusion from this study is that innovation generally impacts positively on export performance of African countries however, manufacturing export shows more response in terms of magnitude to innovation than total export. The finding provides a clear pathway for export diversification for many African countries that run resource-based economies.
Keywords: Innovation, Export, GMM, Africa
GEL Classification: O31, F29, C13, N17

* Corresponding author's e-mail: loyelami@unilag.edu.ng

[1] Economics Unit, Distance Learning Institute &Associate Economist, Institute of Nigeria-China Development Studies University of Lagos, Akoka, Lagos.

[2] Department of Economics and Development Studies, Faculty of Humanities and Social Sciences, Federal University Oye-Ekiti, Ekiti State, Nigeria

1.0   INTRODUCTION

Following previous years of low investment in research and innovation in Africa, the Global Innovation Index (GII) report in 2015 shows that encouraging signs are gradually emerging from Sub-Saharan Africa. In addition to South Africa, some African countries have begun to make substantial progress in GII ranking particular Burkina Faso, Kenya, Malawi, Rwanda, and Senegal. GII entails Innovation Input Sub-Index consisting of measures on the institution, human capital, and research, infrastructure, and market and business sophistication. Innovation Output Sub-Index comprises measures of knowledge and technology output and creative output. However, based on the GII ranking in 2019, only seven African countries (South Africa, Tunisia, Morocco, Kenya, Egypt, Botswana, and Rwanda) were included among the first hundred countries in the world compared to eighteen countries from developing Asia and fourteen from Latin America.

Coincidentally, according to data from the World Bank (World Development Indicators, 2018), African countries with a high GII ranking have a higher percentage of manufactures exports (% of merchandise exports) than other African countries with lower GII ranking. This observation might suggest the capacity to generate increasing value addition based on technological innovation. Thus, it is imperative to investigate the nexus between technological innovation and the export performance of African countries. Apart from this causal observation, there is a general hypothesis that countries with very low performance in GII also perform poorly in Competitive Industrial Performance (CIP) index. This hypothesis was confirmed by a study undertaken by INSEAD and WIPO (2014). The study confirmed that 10 African countries with weak performance in GII dominated the bottom of the CIP index scores. This suggests a close connection between innovative capacities and the competitiveness of an economy. Thus, innovation might be a key enabler for the African countries to diversify and transform what they produce and trade with the global community.

Compared to other developing regions of the world specifically Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan), African countries still largely trade in primary products such as cocoa, crude oil, and coffees without any serious value addition (Iyoboyi & Na-Allah (2014)). Export diversification especially in manufacturing export has played a leading role in the economic transformation of developing countries outside Africa. Thus, export diversification through intensive and extensive margins can as well propel African countries into the path of economic transformation. In achieving this goal, innovation might just be one of the critical requirements to achieve the desired export transformation.

The general objective of the study is designed to investigate the role of technological innovation in export performance in Africa. However, this will be achieved by examining the long-run relationship between technological innovation and export growth in Africa and subsequently, analyze the effect of technological innovation on manufacturing export performance. Further from the introductory section, section two presents literature review that includes stylized facts of technological innovation and export activities in Africa and the review of the extant empirical literature. Section three focuses on methods where data and empirical expositions of the study are discussed. Section four gives the results of the study and section five presents policy implications and recommendations emanating from the study.

1.2   Stylized Facts

Export of primary commodity products and import of manufactured goods and services define the engagement of a typical African country in international trade. In Figure 1, primary commodities such as cocoa, coffee, and fuels account for more than 75% of the total export from the continent between 1995 and 2000. In another period, between 2010 and 2015, the contribution of these categories of export moved up by 8 percent to reach 83% of total exports. A little bit of trend reversal was observed in 2019, as the primary commodity products and fuels contributed 75% of total exports. However, the fluctuation in the prices of commodities may play a role in all of these movements. Despite the dominance of primary commodity products of the export from the continent, it is also observable that high and medium skill manufacturing is gradually replacing labor-intensive manufacturing.

Figure 1.
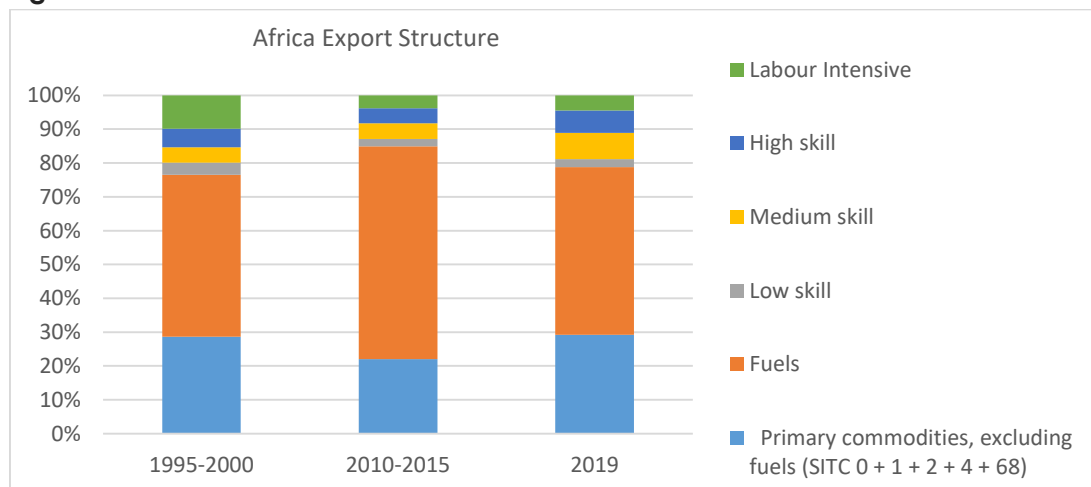
Source: Author's Computation

Table 1 presents the percentage contribution of the top five primary commodity products that dominate African export during the period 1995-2000, 2010-2015, and 2019. These commodities do not only maintain their relevance over the years, but they also contribute almost half of the export from the region. This over-dependence on the export of primary commodity products may partially explain the vulnerability of the continent to commodity price shocks resulting in an unstable macroeconomic environment.

**Table 1. Africa's top 5 merchandise exports, 1995-2019**

Products	Share in Total %
Petroleum oils	32.14667956
Pearls, precious & semi-precious stones	5.339237214
Petroleum or bituminous	5.087929229
Natural gas	3.697419626
Cocoa	0.137268818
2010-2015	
Products	Share in Total %
Petroleum oils	44.95062078
Natural gas	6.602289394
Petroleum or bituminous	4.428741158
Cocoa	1.942709459
Pearls, precious & semi-precious stones	1.77633836
2019	
Products	Share in Total %
Petroleum oils	33.83623445
Natural gas	4.938132511
Petroleum or bituminous	3.14371426
Cocoa	2.340061352
Pearls, precious & semi-precious stones	1.853812464

Source: Author's Computation

Figure 2, shows the innovation ranking and manufacturing export as a percentage of the total export of African countries. From the figure, only two out of the top ten ranked African countries in GII has their manufacturing exports of less than 30% (Ghana and Rwanda) and only one out of the next ten has manufacturing exports greater than 30%(Madagascar). During the period considered, South Africa is the highest-ranked country in the continent in terms of innovation while Botswana is the highest-ranked

country in terms of manufacturing export. Despite the economic size of countries like Nigeria, Algeria, and Ghana, account for a small percentage of African manufacturing exports. A close observation of the geo-political zones in the continent shows that North African countries are more represented in GII's top ten ranked African countries. Similarly, they contribute more in terms of manufacturing export compared to West African countries and other sub-regions.

Figure 2:
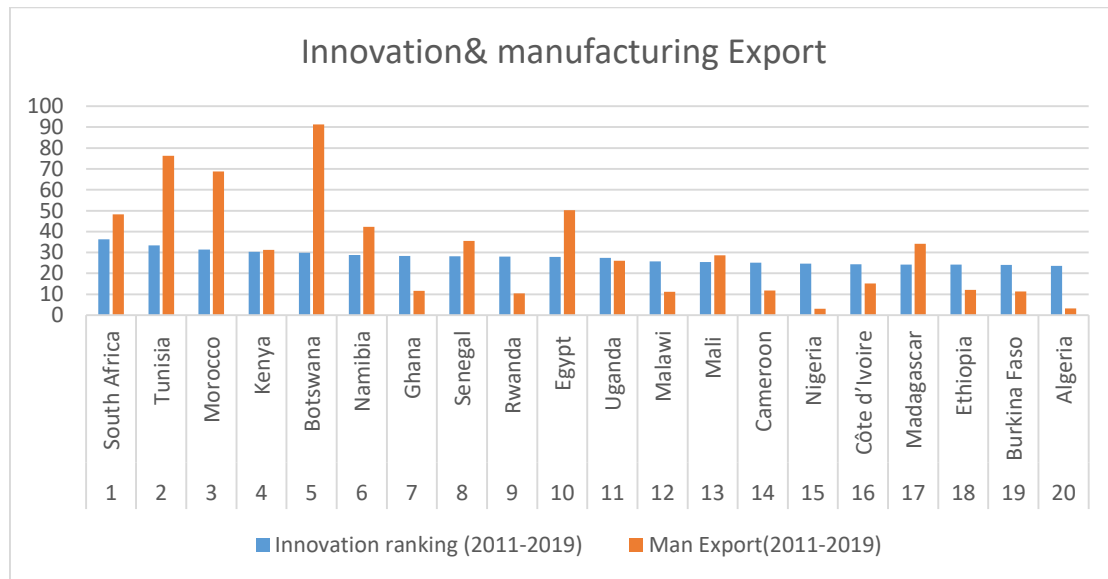
Source: Author's Computation

2.0.   Literature Review

2.1   Conceptual and Empirical Literature

Innovation is a system that creates new production processes, new products, enhances the efficiency of resource allocation, and develops new solutions to economic challenges (York & Venkataraman, 2010). Arguably, any system which generates new processes tends to spur production and accelerate gains accruing from resource mobilization. It is, therefore, feasible to achieve greater efficiency and returns via technological innovation which is an essential pathway to progress. Furthermore, Edeh et al. (2020) argued that innovation is a key driver of competition and dynamic market efficiency. In today's changing global market, firms possessing a strong source of competitive advantages are more likely to survive and achieve superior performance. On this basis, one would expect innovative SMEs to grow faster and become more efficient than non-innovators in the export markets (Ratten, 2015).

Innovation can be measured using expenditure on research and development (R&D) or GII (Tekin & Hancioğlu, 2017). On the other hand, export performance measures the productivity and economic prosperity of export-oriented firms usually categorized in three dimensions including financial performance, strategic performance, and satisfaction performance (Haddoud et al., 2018).

Empirical research on this subject matter has been overwhelming and cut across various regions globally. For instance, Kongmanila & Takahashi (2009) examined the innovation-export performance relation, as well as firm profitability of Lao garment industry adopting resource-based theory. Analyzing data from field surveys on industrial clusters, using path analysis, the paper suggests that innovations are vital tools in determining export performance and form profitability. They recommended that garment firms and public agencies should partner on innovation in order to promote investment and export. Later, Palangkaraya (2012) used the propensity score matching approach to ascertain the direction of causality between innovation and export performance among Australian firms. The paper found a positive correlation between export and innovation within the study period. Also, there is a bi-causal relationship between innovation and export performance. Based on these findings, the study concluded that product innovation may result in a higher probability of becoming a new exporter.

Iyoboyi & Na-Allah (2014) examine the effect of technological innovation on economic performance in Nigeria between the 1970 and 2011 period. Employing the Dynamic Ordinary Least Square (DOLS) technique, the authors found evidence in support of the positive impact of technological innovation on performance. The paper concluded that to ensure sustainable growth, efforts should be channeled at the application of knowledge factors and capital equipment into economic activities in Nigeria. Hao et al. (2016) explained that besides the U-shaped relationship between innovation and export growth, the nonlinearity can be verified through the threshold effect test. In addition, the authors found that innovation contributes more to export performance, and the corresponding threshold is higher in terms of technology. The major contribution to knowledge is the introduction of a comprehensive framework to dissect the dynamic effect of innovation on export performance.

Subsequently, Erol and Yasemin (2017) argued that the pathway to value-addition in developing countries is innovation and technology aimed at improving foreign competitiveness. These have been the projectile of some emerging countries (China, Brazil, Malaysia, Mexico and Thailand) to economic growth and development. To verify the above claim, the study employed panel data analysis to examine export

performance-innovation relations among 27 developing countries in Global Innovation Index (GII) of 2016 between the period 2011 to 2015. The result revealed that innovation exerted a positive effect on export performance. More so, Haddoud et al. (2018) relied on the resource-based and network-based trajectories, to explain the effects of internal and external resource innovation on a firm's export performance in Algeria. The study revealed that the former is superior in enhancing export performance and regularity. Thus, SMEs managers and policymakers should concentrate on those important factors driving the internationalization process within the study area.

Bicakcioglu-Peynirci et al. (2019) utilized meta-analysis to investigate the association between innovation and export performance by sampling 554,227 manufacturing export companies. The paper shows that to achieve superior export performance, innovation is a strategic driver. Furthermore, the results support that a significant positive relationship exists between a firm's innovative capacity and export performance in Europe. Emphasizing the role of institutions, Jorge et al. (2019) relied on survey data from 201 firms sampled in four countries dissecting the effect of innovation on export performance. Employing qualitative comparative analysis, the result reveals that the degree of technological capacity is determined by the export market, institutional factors, and marketing capacity.

Small and Medium Enterprises (SMEs) are key drivers of export especially among emerging and developing countries, and their prosperity depends on its innovative capacity. Building on this argument, Edeh et al. (2020) empirically explored the performance of exporting SMEs and innovation strategy in Lower-middle income countries (Nigeria). The study further investigated the individual and joint effects of technological and non-technological innovation on export performance of SMEs using the Dynamic Ordinary Least Square (DOLS). The study found that innovation-export performance relation is sensitive to the external environment hence, an efficient public policy aimed at promoting firm innovation should be embraced. Similarly, Mallinguh et al. (2020) examined the effect of capital spending for new technology on SMEs export performance between 2017 to 2019 using 101 sampled Kenyan SMEs. The result from the OLS methods shows that the capital budget for the acquisition of new technology positively influences SMEs' export performance. Building on this established premise, the paper concluded that innovation programs play a critical role in promoting export longevity and firm sales performance.

2.3   Theoretical Framework

The role of technological innovation in driving economic performance became popular with classical economics especially Solow (1956). Despite the subtle agreement with the classical on the fact that application of new knowledge is essential to realizing long-run growth in GDP per capita, some pockets of disagreement exist on how applicable this proposition is in reality. The first major criticism is the assumption that knowledge is freely available and as are public goods (Iyoboyi & Na-Allah, 2014). Further, subsequent empirical inquiries were largely tailored by this argument and later overtaken by technology catch-up or convergence debate. This is the major explanation for weak performance and divergence among developing countries which rest on their inability to translate innovation into productivity and growth. Here, technological innovation is exogenously determined. Their critics fell within the endogenous growth or new growth theory which emphasized that convergence is impossible since developed economies were more technologically innovative than small underdeveloped countries; however, the latter can still experience economic prosperity through technological imitation (Romer, 1990). Drawing from the above, the empirical modeling rests on the theoretical foundation of the endogenous or new growth model, hence, the study modifies the equation of Iyoboyi and Na-Allah (2014). The endogenous model is adopted because this current study does not focus on convergence arising from technological spillover effects.

3.0   Methodology

3.1   Data and measurements

To unravel the nexus that characterizes innovation and export performance of Africa countries, data on country's innovation, export value, and capital intensity were sourced and employed for the empirical investigation. Specifically, the country's innovation variable was proxied by Global Innovation Index (GII). The index provides detailed metrics about the innovation performance of countries based on performances. Considering our dependent variable, which is export performance, we employed total value export of goods and service and manufacturing as a percentage of total merchandise. While total value export of goods and services is a gross export performance and manufacturing as a percentage of total merchandise shows export performance in manufacturing goods. These two variables were employed to investigate the relative contributions of innovation to gross exports and manufacturing exports. In addition, two control variables were introduced as independent variables. They are inflation rate and per capita income. These two control variables are important since aggregate data are being utilized for different African countries with different levels of income and inflationary pressure. The data were harvested for twenty-three African countries selected based on data availability

and sourced from World Bank Development Indicators (WDI) and UN Comtrade Database. The data covers the period of nine years for twenty-three selected countries. The countries are South Africa, Tunisia, Morocco, Kenya, Egypt, Botswana, Rwanda, Senegal, Namibia, Uganda, Côte d'Ivoire, Mali, Algeria, Nigeria, Cameroon, Burkina Faso, Malawi, Madagascar, Niger, Ghana, Ethiopia, Zimbabwe, and Benin. The composition of the countries represents five major regional dimensions in the continent.

Measurements

Following the guidance drawn from similar studies such as Tekin & Hancioğlu (2017) and Edeh et al.(2020), the key variables in the study are Export of goods and good service, Manufacturing Exports (Man), Innovation, Capital intensity, Inflation rate and Per capita income. The relevance of these variables to export performance of any country has been extensively discussed in trade literature (Dosi, Pavitt & Soete,1990; Tekin, & Hancioğlu, 2017).

Export of Goods and Service: The variable as employed in this study is measured by the sum of exports of goods, services and primary income receipts by country. To prevent unintended errors that might occur in conversion, data were expressed and used in current U.S. dollars. Other studies have used variant measurements to capture export, however, this measurement is the most popular in the literature.

Manufacturing Exports. The variable is measured by manufactured exports (% of merchandise exports). Manufactures in this context comprise of commodities in SITC sections chemicals basic manufactures, machinery and transport equipment and miscellaneous manufactured goods excluding division non-ferrous metals.

Innovation: It entails Innovation Input Sub-Index consisting of measures on the institution, human capital, and research, infrastructure, and market and business sophistication. Innovation Output Sub-Index comprises measures of knowledge and technology output and creative output. The variable can be properly appreciated using the diagram in figure 3. By expectation, the innovation coefficient on the export of goods and services and manufacturing exports should be positive. However, a higher coefficient is expected for manufacturing exports due to the extensive use of technology.

Capital intensity: As obtained in similar studies, capital intensity is measured by investment as a fraction of domestic value-added. Also, domestic value added is measured by the sum of the value-added in the agriculture, industry, and services sectors. While investment is measured by Gross fixed capital formation includes land

improvements (fences, ditches, drains, and so on) plant, machinery, and equipment purchase; and the construction of roads, railways, and the like. including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. The a priori expectation is that the coefficient on the capital intensity variable should be positive which suggests that the new technologies can easily be absorbed to improve exports.

Inflation rate: Inflation as measured by the consumer price index reflects the 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. The level of uncertainty in the economy is gauged by inflation (INF) in the mode **Per capita income:** GNI per capita is the gross national income converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad.

3.2   Model Specification

Trade and growth theory such as new growth theory predicts mutual causation of innovation and exports. However, several models of export equations have been estimated, providing justification for export as the dependent variable. To empirically investigate the effect of innovation on export performance of African countries, we largely replicate the functional specification of Magnier & Toujas-Bernate (1994) and Amable & Verspagen (1995). The major departure lies in the static nature of our specification and the inclusion of new variables. To achieve the objective of the study which is to investigate the effect of innovation on overall export including goods and services and to examine the contributory effect of innovation on manufacturing exports, the following basic export baseline equations are specified.

$$lnExp_{it} = \alpha_0 + \alpha_1 lncapint_{it} + \alpha_2 lninnv_{it} + \alpha_3 inf_{it} + \alpha_4 lnincom_{it} + \gamma_i + \omega_t + \varepsilon_{it} ....(1)$$

In equation 1, $lnExp$ depicts the natural logarithm of export measured by total value export of goods and service and manufacturing as percentage of total export. Also, $lncapint$ represents the natural logarithm of capital intensity and $lninnv$ captures the natural logarithm of Innovation. The control variable Income ($lnincom$) is represented in its natural logarithm form while inflation (Inf) is represented in its rate form. Similarly, $\alpha_0...\alpha_4$ represent the constant and coefficients of all independent variables. In addition, γ_i captures the country effect and ω_t indicates time effect. In addition, ε_{it} is the general error term and i = 1, . . . , N and t = 1, . . . , T are cross-sectional and time representations.

In line with the objectives of the study, the following estimation procedures are considered to be econometrically expedient. Due to the nature of the panel employed in this study, (panel of 23 countries (N) across 9 years (T)), the estimation technique heavily relied on the static technique of the panel estimation model based on fixed or random effect. Appropriate specification between fixed or random effects will be determined based on the Hausman specification test.

3.3   Summary Statistics and Correlation Analysis

The summary statistics of variables used for estimations are presented in Table 1 for both full samples and across the African sub-region. The average innovation index for a full sample is 26.9. South Africa ranks highest at sub-regional level with an innovation index of 29.7 and West Africa ranks the lowest with an innovation index of 24.9. This makes South Africa the most innovative sub-region and West Africa the least innovative sub-region in the continent. The average value of export in the full sample is 10.28 in logarithmic form with the equivalent value of $**19,900,000,000.** North Africa has the highest value of export which is 10.58 in logarithmic form with the equivalent value of $**38,800,000,000 among the sub-regions, while East Africa has the lowest value of export $4,710,000,000. In the case of manufacturing, on a full sample, there is an average of 29% manufacturing export as a percentage of total export. At the sub-regional level, North Africa and South Africa have the two highest percentages of manufacturing export as a percentage of total export with 50% and 49% respectively. The results of correlation analysis, as shown in Table 2 indicate that export has a significant positive relationship with innovation and income with a correlation value of 0.62 and 0.31 respectively. In contrast, exports have a negative relationship with both capital intensity and inflation with values of -0.06 and -0.25. While that of capital intensity is insignificant, that of inflation is significant suggesting that countries with high inflation will lose their competitiveness in international trade. The results for manufacturing export also show that there is a significant positive relationship between the variable and innovation ditto for income. The co-efficient values of 0.44 and 0.41 are reported as the strength of the relationship respectively. The variable also demonstrates a significant positive relationship with inflation and an insignificant negative relationship with capital intensity. The correlation analysis as reported is based on a full sample. Other significant relationships worthy of note are that of innovation and income as well as innovation and inflation.**

Table 1: Summary Statistics

Variables	Full Sample Mean	SD	C. Africa Mean	SD	E. Africa Mean	SD	N. Africa Mean	SD	S. Africa Mean	SD	W. Africa Mean	SD
Innov	26.98	4.03	25.12	1.98	26.74	2.69	29.11	4.07	29.79	4.85	24.91	3.23
Export	10.28	10.46	9.86	8.93	9.67	9.51	10.58	10.19	10.50	10.66	10.19	10.45
ManExp.	29.08	24.75	10.13	5.16	20.33	10.29	50.18	29.03	49.288	28.17	15.77	10.58
Intensity	4.54	1.64	4.02	.09	4.56	1.70	4.29	1.75	4.96	2.36	4.50	1.12
Income	2207.03	2177.03	1399.79	74.12	733.45	244.02	3519.52	818.01	5461.34	2493.49	1034.98	654.95
Inflation	92.65	12.72	97.29	2.12	87.35	13.18	95.53	6.09	81.47	8.68	95.49	17.08

Innov; Innovation: Export; Total Export value of Goods and Services: ManExp; Manufacturing Export; Intensity; Capital Intensity: Income; Per capita Income: Inflation; Annual Inflation Rate.

Source. Authors' computation

Table 2. Correlation Matrix (with natural logarithm)

Variables	ManExp	Export	Innov.	Income	Intensity	Inflation
ManExp	1.0000					
Export	0.0805	1.0000				
Innov.	0.4119***	0.6357***	1.0000			
Income	0.4426***	0.3164***	0.3105***	1.0000		
Intensity	-0.0066	-0.0699	-0.0128	-0.2068***	1.0000	
Inflation	0.2426*	-0.2589***	0.4303***	0.4302***	0.2039	1.0000

Innov; Innovation: Export; Total Export value of Goods and Services: ManExp; Manufacturing Export; Intensity; Capital Intensity: Income; Per capita Income: Inflation; Annual Inflation Rate.
Source. Authors' computation

4.0   Estimation and Discussion of Results

The main model estimation technique employed for this study is a static technique of panel estimation model based on fixed or random effect. The results of Fixed Effect (FE) and Random Effect model estimation are presented in table 3. The results show estimation performed on a full sample for the two models designed for this study. The first model has total export as the dependent variable and the second model has manufacturing export as the dependent variable. This was designed to deepen our knowledge of the nexus between innovation and export performance. The results in the first column show the contributory effect of the independent variables on total exports based on fixed effect specification. Similarly, results in the second column indicate the contributory effect of the independent variables on manufacturing export based on fixed effect specification. Columns three and four are repeated in this same set of estimations based on random effect specifications. Subsequently, Hausman specification tests were carried out and reported under fixed effect estimations to determine the appropriate specification for our models. Generally, the results are presented in the form of elasticity due to the introduction of variables in logarithm values.

In the first column, the export elasticity of innovation, income, capital intensity, and inflation is 0.38, 0.91, 0.07 and 0.18 respectively. Similarly, in the second column, the manufacturing exports elasticity to innovation, income, capital intensity, and inflation are 1.12, 0.59, -0.24, and 0.29. The following key findings are discernable from the results. The positive coefficients of innovation, income, capital intensity, and inflation conform with the a priori expectation. It implies that all of these variables have a positive impact on total export. More explicitly, an increase in innovation, income,

capital intensity, and inflation will increase total export. In the case of manufacturing exports, except capital intensity, all other predictors show a positive impact on manufacturing export. This demonstrates that these predictors have inherent characteristics to bring about an increase in manufacturing export. Despite the positive impact of all the predictors on the total export in the first model, only innovation and income have statistically significant effects on total export at 10% and 5% significant levels. In the case of manufacturing exports, only innovation is statistically significant at 1% significance level. The results as interpreted focus exclusively on fixed-effect specifications because Hausman specification rejects the null hypotheses of difference in coefficients not systematic in the two estimations. Thus, making fixed-effect specifications a preferred specification in the two estimations.

It is also observable from the results that income has more impact on total exports than innovation. More importantly, the findings reveal that innovation is a more critical factor for manufacturing export than it is for total export going by the magnitude of the elasticity. This suggests that countries that want to diversify manufacturing export or improve on the manufacturing content of their export may need to invest more in innovation. This implies that investment in innovation components such as regulatory institutions, human capital and research, infrastructure, market sophistication, and business sophistication contributes greatly to export performance especially the export of manufacturing goods. This finding is very important for African countries desirous of diversification of their export away from agriculture and resource-based commodities.

To properly situate this study, an attempt is made to delve into the literature to position findings emanating from the study. Findings essentially align with studies by Ekin & Hancioğlu (2017) that investigate similar problems in 27 selected developing countries. Similarly, a country-specific study by Edeh, Obodoechi & Ramos-Hidalgo (2020) produced similar findings using firm-level data from the lower-middle income country of Nigeria. Based on this, it is appropriate to assert that this study is properly placed in the literature. The major value addition from this study is the attention given to manufacturing export and focusing on African countries.

Table 3: Estimation with Fixed Effect and Random Effect

	Fixed Effect		**Random Effect**	
	Export	Man	Export	Man
Variables	[1]	[2]	**[3]**	**[4]**
Constant	14.88(0.00)	-4.67(0.24)	16.99(0.00)	-2.56(0.083
Innovation log	0.38(0.07)	1.12(0.00)	0.33(0.09)	1.29(0.00)
Income log	0.91(0.00)	0.59(0.19)	0.65(0.00)	0.23(0.058)
Intensity log	0.07(0.50)	-0.24(0.24)	0.05(0.60)	-0.26(0.14)
inflation	0.18(0.32)	0.29(0.52)	0.15(0.35)	0.23(0.67)
Time variables	**Yes**	**Yes**	Yes	Yes
No of Observation	179	171	179	171
F.Stat/Prob	287.4/0.00	39/0.00	17(0.00)	21.6/0.001
Hausman test(Chi/Prob)	696/0.00)	8.64(0.03)		

5.0   Conclusion and Policy Recommendations

The objective of this study was to investigate the nexus between innovation and export performance of African countries. In fulfillment of this objective, the study employed data on innovation, total export, manufacturing export, and factor intensity. The results from the descriptive analysis show that North Africa is the most innovative sub-region based on data from Global Innovation Index (GII). The sub-region also has the highest manufacturing exports in the African continent. In addition, the results from correlation analysis revealed the existence of an important relationship between total export, manufacturing export, and innovation.

The major conclusion from this study is that innovation generally impacts positively on export performance of African countries; however, manufacturing exports show more sensitivity to innovation than total export based on the coefficient magnitude and significance level. And, this provides a clear pathway for export diversification for many African countries that run a resource-based economy. The casual observation from the descriptive analysis reflects those African countries that rank high on the innovation index perform better in manufacturing exports. The observation also reveals that countries in West African countries are not performing well on the innovation index and countries from South and North African countries are doing a lot better than other African countries. The outcome of this study has revealed substantially the imperativeness of the need for heavy investment by African countries in technological innovation to make trade work better for their development. However, the major limitation of this study is inadequate data on Global Innovation Index across sub-regional levels in Africa for effective comparison. Further study can break the analysis to sub-regional levels to obtain more detailed information.

Recommendations emanating from this study among others are; Investment in regulatory institutions; research and development; knowledge absorption and tertiary education are essential to promote technological innovation required to promote diversified trade and a prosperous economy.

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FISCAL POLICY AND BUSINESS CYCLE SMOOTHING IN NIGERIA: AN EMPIRICAL ASSESSMENT

Akpan H. Ekpo[1], Paul A. Orebiyi[2] and Godwin Essang Esu[3*]

Abstract

The study investigates the smoothing effect of fiscal policy on business cycle fluctuations in Nigeria. To this end, we employ relevant time series data on fiscal policy variables and other macroeconomic and institutional factors as control variables. The study applies the Statistics Netherlands Business Cycle Tracer (SNBCT) technique, which maps real-time business cycle developments by tracking the cyclical development of a selected set of lagging, coincident, and leading economic indicators. The findings showed that ceteris paribus, fiscal policy would have smoothing effects on business cycle fluctuations, but the speed of adjustment is as transmitted by government effectiveness as a proxy of strong institutions and the stability of the macroeconomic environment. Therefore, the study concludes that fiscal policy instruments – government expenditures, taxes, transfers could be countercyclical in the face of other interactive control variables. Comparatively, the results imply that fiscal instruments in Nigeria are less potent, and policy objectives could be more prominent than output stability. The study further supports the assertion that sound fiscal institutions are germane; thus, it is proper to put together well-designed fiscal rules and frameworks to promote good expenditure control over the cycle.

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* Corresponding author's email: **esugodwin1@gmail.com**; **essangabasi@yahoo.com**
[1] Department of Economics, University of Uyo, Nigeria.
[2] Department of Economics, University of Uyo, Nigeria.
[3] Department of Economics, University of Uyo, Nigeria.

1.0   Introduction

In recent years, there has been renewed interest by several researchers who have found that fiscal policies are predominantly procyclical among emerging market economies. Among this strand of researchers are Riaz and Munir (2016); Halland and Beaney (2011); Kaminsky, Reinhart, and Végh (2004); Lane (2003); Gavin and Hausmann (1998); and Talvi and Végh (2005). Procyclical fiscal policies are usually the result of governments in emerging market economies (EMEs) like Nigeria cutting taxes and raising expenditures during booms and forced to adopt contractionary policies during busts when domestic and external credit constraints become binding and stringent (Calderón and Schmidt-Hebbel, 2008). In the course of the enormous research on this discourse, recent evidence shows that corruption and democracy could be responsible for procyclicality (Halland and Beaney, 2011; Alesina et al., 2008). Macroeconomic policies have also been found to play a crucial role in stabilizing business cycle fluctuations in EMEs where institutions are stronger and economic fundamentals are better (Calderón and Schmidt-Hebbel, 2008). The effects of overwhelming shocks have also been discussed in the empirical literature (Thornton, 2008; Manasse, 2006; Acemoglu et al., 2003; Easterly, 2004; Talvi and Vegh, 2005). Generally, the business cycle is characterized by co-movement among many economic indicators (Floris van Ruth, Schouten, and Wekker, 2005).

In Japan, for instance, the government has repeatedly used expansionary fiscal policy to boost the economy, and there is no consensus on whether it had any significant effects on the economy (Fatas and Mihov, 2001). As Riaz and Munir (2016) put it, fiscal policy is an essential mechanism available to the government to smoothen business cycle fluctuations. However, the debate of whether fiscal policy can be substituted for monetary policy is a different matter of empirical discourse.

The main challenge facing the empirical literature in this area is the difficulty of isolating exogenous and unanticipated changes in fiscal policy and understanding the extent to which budgetary policy helps stabilize business cycle fluctuations. For instance, a fraction of government revenue varies automatically with income to some extent, and this may be predictable. By another strand, changes in fiscal policy either by way of public spending or taxes may reflect countercyclical policy actions to stabilize the economy. A government policy option may be to maintain the budget deficit or public debt at a given level. These options (with or without institutions) and their effects in stabilizing business cycle fluctuations are empirical issues (Bouakez, Chihi, and Normandin, 2014; Fatas and Mihov, 2001). Furthermore, empirically assessing fiscal policy viability in addressing business cycles smoothing in Nigeria's contemporary times is mute.

The purpose of this paper is to provide new evidence on this subject using alternative empirical methodology that avoids the potential shortcomings of existing approaches. The rest of the paper is organized as follows: following the introduction in section one, section two profiles the fiscal policy structure in Nigeria, whereas section three reviews the relevant literature. Section four presents the study methods employed, while the results of the estimations and the related findings are discussed in section five. Section six concludes the paper drawing on some policy suggestions.

## 2.0   Fiscal Policy Structure in Nigeria

Nigeria operates a federal system with some degree of fiscal federalism. The fiscal power of Nigeria sits on a three-tiered tax structure divided among the federal, state, and local governments, with each operating in different tax jurisdictions (Fasoye, 2019). The most lucrative tax handles are under federal government control, while the lower tiers of government collect the less money-spinning residuals. In the past three decades, oil has accounted for at least 70 percent of the revenue in Nigeria, thus implying that the country is a monocultural economy with a weak traditional tax revenue base and fiscal policy management (Odusola, 2006). Nigeria being a monocultural exporting country, the economy is prone to vagaries of the international market forces, and this requires attention which eventually culminated in several *tax policy* reforms (Fasoye, 2019). In this context, fiscal policy becomes a primary economic stabilization weapon that involves measures taken to regulate and control the volume, cost, availability, and direction of money to achieve specific macroeconomic policy objectives.

Generally, state governments in a federal system play a substantial role in the fiscal policy landscape. In recent decades, many states in Nigeria have become technically insolvent, especially when the international price of crude oil collapses. Some state governments owe workers several months' salaries due to this. Non-payment of salaries has consequential multiplier effects on economic activities. When states go into recessions, their tax bases contract and safety-net expenditures expand (Clemens and Miran, 2012).

Glut in foreign earnings equally impacts the financing of government expenditure and this may result to the government borrowing to finance its budget and eventually crowding out the private sector. In recent years, net foreign capital inflows have slowed down, including remittances that were a major source of foreign capital inflow into Nigeria. For instance, foreign direct investment, net inflows (% of GDP) declined from 5.79 percent in 1994 to 2.93 percent in 2009 and a further dipped to 0.51 percent in 2019. During this period, oil rents (% of GDP) declined to 9.17 percent in 2009 from

16.63 percent in 1994, and after that dropped to 7.4 percent in 2019. Precisely, the correlation between foreign direct investment, net inflows (% of GDP), and oil rents (% of GDP) from 1989 to 2019 computed from Figure 1 was over 57 percent.

On the other hand, if shifts in government expenditures displace contemporaneous private activity, state governments' actions would lead to volatility relatively albeit small. This is very problematic to the economic growth trajectory of Nigeria, especially when compounded with inherent political governance problems. In 2005 and 2009, the Sovereign Wealth Fund (SWF) and the Excess Crude Account (ECA) were created respectively as avenues to save oil revenue during booms to serve as stabilization funds and boosters during busts periods (NBS, 2010). These are issues of fiscal policy procyclicality geared towards promoting greater budgetary discipline.

Figure 1 FDI and Oil Rents (1989-2019), Nigeria
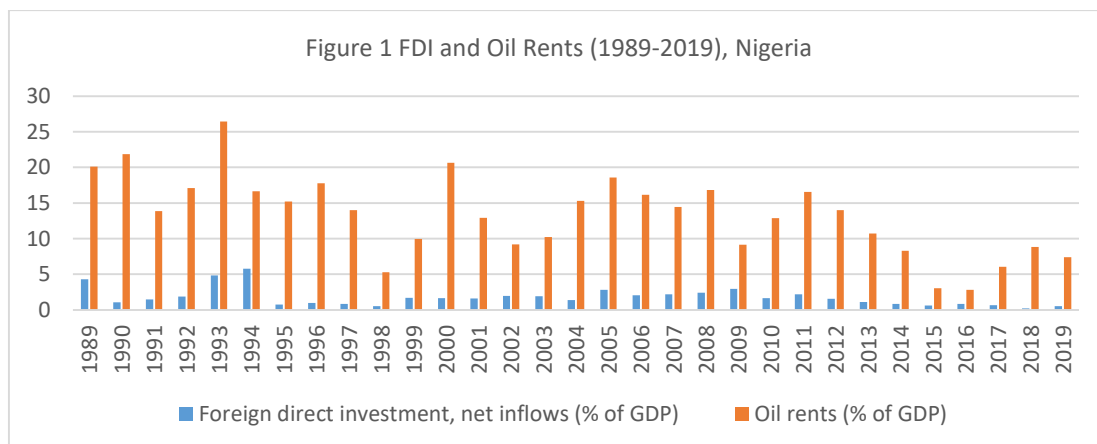
Source: World Bank (2021)

During the 2016 slump in oil prices, according to the National Bureau of Statistics (2017), it was reported that the Nigerian government was unable to smoothen its expenditure due to depletion of the reserves and revenue shortfalls, leaving the economy without buffers. This culminated in the recession experienced from the second quarter of 2016 to the first quarter of 2017, partly necessitated by fluctuations in the global oil market. Nigeria experienced its first recession in over two decades in 2016 when the economy contracted by 1.6 percent due to hostile oil prices and oil production shocks, which spilled over to the non-oil sectors. Oil GDP shrank by 14.4 percent, and non-oil GDP contracted by 0.2 percent (Malingha, 2017).

Nigeria's ranking on the competitiveness index is very low; comparatively, the doing business index, economic freedom index, governance index, and other major global

ranking indices are also very poor. According to Frankel et al. (2013), as of 2012, only about a third of the developing world could 'graduate' from procyclical fiscal stance since the 1960s. These authors emphasize the role of institutions, depth of financial integration, and political checks and balances in reducing the procyclicality of fiscal policies in developing countries. The full effect of procyclical spending by emerging and developing countries depends on the fiscal policy multiplier associated with the expenditures. More specifically, it depends on the multiplier associated with smoothing the timing of these expenditures (Fasoye, 2019). The implications for aggregate volatility could be substantial if the relevant multiplier is slightly larger (Shoag, 2010).

The paper is further motivated by the recent fiscal crisis that erupted in recent years. The Nigerian economy entered another round of recession in 2020, thus, reversing three years of recovery after the 2016 downturn due to a fall in crude oil prices because of falling global demand and containment measures to fight the spread of COVID–19 (Nigeria Economic Outlook, 2021). The fiscal state of the economy generally has been alarming. Therefore, the study investigates the role of institutional quality on the reactions of state governments to change in fiscal policy.

3.0   Review of Relevant Literature

Theoretically, the standard argument drawn from Keynes' postulations is that fiscal policies should play the role of a stabilizer and should exhibit the feature of counter-cyclicality (Calderon and Schmidt-Hebbel, 2008). This would mean that instinctive variations in government revenues in response to output fluctuations help smooth business cycles through the traditional demand multipliers. The key stabilization effect here would therefore be the smoothing effect of taxes on disposable income. Considered from a simple perspective and assuming a proportional tax, which means that average and marginal tax rates are the same, the size of total taxes is a good proxy for the degree of automatic stabilizers.

On the contrary, outcomes so far in the developing economies have shown a procyclical trend. Scholars have made several attempts to explain the procyclical fiscal policy trend in developing economies. For example, Gavin et al. (1996) and Gavin and Perotti (1997) believed that for several reasons, the government might not have the ability to stabilize the business cycle using fiscal policy. Such include stringent credit constraints that may hamper borrowing during troughs, the need to run procyclical policies due to debt repayment pressure, etc. Tornell and Lane (1999); Talvi and Vegh (2005); Alesina and Tabellini (2005); Ilzetzki (2007) believe that political

distortions may be chiefly responsible for explaining this different cyclical behavour of fiscal policy.

Furthermore, scholars have explained the fact that the focus of the fiscal policy is economy-sensitive. While Riaz and Munir (2016) argued that the objective of fiscal policy in the developed economies is to boost the rate of capital formation through adjustments in consumption and marginal propensity to save, Popa and Codreanu (2010) opined that for developing economies, ensuring equitable distribution of income, including withdrawing resources from unproductive activities to productive ones, is the main objective of fiscal policy. The argument is that fiscal policy appears a readier tool for these adjustments, especially in the face of monetary policy failures and ineffectiveness (Spilimbergo, et al., 2008; Riaz and Munir, 2016). Thus, it is expected that tying the knots at the ends of the cycles should smoothen out the cycles and stabilize growth in the economy. Business cycle smoothing or macroeconomic stability in general stems from three main fiscal channels viz; automatic stabilizers, discretionary fiscal policy, and cyclical fiscal policy (Riaz and Munir, 2016).

Automatic stabilizers here have to do with how taxes (especially income taxes) and transfers (i.e., welfare spending) smooth business cycles without the interference of the government and policymakers, though with the possibility of ignoring the possible effects on GDP. The lingering question, therefore, is whether automatic stabilizers help in smoothing business cycles. And if the answer is in the affirmative, then it may be safe to ask if countries prone to frequent business cycle fluctuations make more use of these tools.

This pondering is an offshoot of the difficulties associated with justifying the effects of automatic stabilizers, especially in policy-assessment models like the dynamic general equilibrium model; a typical case is that of Gali (1994) and Veld et al. (2010). On the other hand, the discretionary fiscal policy – the second channel – is how conscious government policy responses adjust taxes or spending to changing economic activities. The third channel which is cyclical fiscal policy – is which variation is not a direct consequence of government control (Debrun and Kapoor, 2010[a&b]; Riaz and Munir, 2016).

The first from the three channels discussed seems to be at the center of our consideration because of its role in business cycle smoothing and macroeconomic stability, even at the crude stages, as enshrined in the literature. Scholars have shown the existence of counter-cyclicality as a result of the negative interaction between the size of automatic stabilizer (government size) and macroeconomic stability indicators,

thereby exhibiting smoothing effects (e.g., Li, 2010; Mohanty and Zampolli, 2009; Viren, 2005; Andresa et al., 2004; Fatas and Mihov, 1999; Gali, 1994). In the same vein, Koskela and Viren (2004) found a nonlinear interaction between size of government and macroeconomic stability indicators, while Debrun et al. (2010) and Silgoner et al. (2003) identified the fact that automatic stabilizers (in terms of government expenditure) are weak in the developing economies and shrinks the business cycle fluctuations. They described the channels (as aforementioned) through which fiscal policy effectively contributes to macroeconomic stability. On the other hand, Furceri (2010); Fatas and Mihov (2012) have further argued that automatic stabilizers (in terms of welfare or social spending) play a pivotal role in smoothing output fluctuation and macroeconomic stability. They held that the smoothing effect is more significant where the social spending is higher, *ceteris paribus*.

Other empirical evidence exists in the literature. Sharp and Khan (1980) found a smoothing effect of fiscal policy on business cycles in the USA. Engaging automatic stabilizers, using annual data from 1966 to 1975, and employing the Ordinary Least Squares (OLS) method of analysis, Sharp and Khan further concluded that the automatic fiscal stabilizers, generally, were responsible for a substantial contribution to price and output stability. However, variations exist in the stabilizing impact of the individual fiscal stabilizer within the cycle. Gali (1994) found destabilizing and stabilizing effects of the size of government (discretionary fiscal policy) on output variability for OECD in real business cycle model. Adopting OLS for annual data spanning from 1960 to 1999, Gali (1994) showed that income taxes and government purchases stabilize and destabilize the economy. The conclusion is that the effect of the interaction between government size and output volatility for business cycle smoothing might be positive or negative, depending on the relative stability of the general macroeconomic environment. Fatas and Mihov (1999) also arrived at similar conclusions for OECD countries using the same analytical method.

On the other hand, Noord (2000) examined the effect of government budget components in smoothing the business cycle in individual OECD countries in the 1990s, using a production function approach, and saw a smoothing of the cyclical volatility in those years. Silgoner et al. (2003) corroborated the previous conclusion for countries in the European Union (EU). Employing annual data from 1970 to 1999 and using simple regression analysis with the instrumental variable least squares method, Silgoner et al. established that fiscal stabilizers reduced the fluctuation of the business cycle. Also, Koskela and Viren (2004) and Andresa et al. (2004) arrived at a similar outcome for OECD countries, using annual data between 1960 and 1999.

In a related development, Khalid et al. (2007) assessed the fiscal policy transmission mechanism and fiscal policy reaction function. Khalid et al. used annual data of Pakistan from 1965 to 2006 and employed VAR and GMM estimation methods. The findings show that fiscal policy is endogenous and procyclical during booms and of no consequence in troughs within the business cycles, and by extension, the economy. The implication is that government purchases (expenditures) are anti-cyclical during a recession but have a weak response in booms. On the other hand, tax policy is procyclical both in peaks and troughs. Consequently, Khalid et al. (2007) concluded that effervescent effects of shocks are vital in budgetary components to macroeconomic variables for improving discretionary and cyclical responses for enhanced smoothing impact. This position was corroborated by Vladimirov and Neicheva (2008) in addressing the stabilizing role of the government budget for Bulgaria. Others are Mohanty and Zampolli (2009); Baunsgaard and Symansky (2009) and Li (2010). They also argued for the negative response of the size of government in its smoothing effect on business cycles fluctuations.

Also, Furceri (2010), Debrun and Kapoor (2010a), Ali and Ahmed (2010) evaluated the role of social spending in smoothing output shocks and the role of fiscal policy in macroeconomic stability respectively and concluded for and against a smoothing effect. Thornton (2010); Debrun and Kapoor (2010b); Khan (2011); Ismail and Hussain (2012); Fatas and Mihov (2012) arrived at similar findings in related empirical studies, except for Audu (2012), who differed in terms of focus in the case of Nigeria and concentrated on investigating the impact of fiscal policy on the growth of the economy. Many other findings using different approaches exist in the literature on fiscal policy's smoothing effect or otherwise.

The review so far has confirmed that the empirical literature is replete with studies on fiscal policy and the business cycle. Still, few studies with specifics for Africa and Nigeria, in particular, have been recorded. Therefore, this paper is an attempt to close the gap and contribute to the existing literature in this regard.

4.0   Method of Study
4.1.   The Theory
To Keynes (1936), taxes and government spending are channels for the adjustment of the aggregate demand (output) gap. The argument is that attaining a potential output and full employment level requires government intervention, especially when the economy is running at a level below its potentials. Keynes, therefore, believed that government spending should be increased during a recession, while taxes should be decreased to stimulate aggregate demand and boost economic growth potentials.

The rationale behind this argument is that, with increased government spending and reduced taxes, the households' disposable income will increase and fuel aggregate demand expansion and economic growth, *ceteris paribus*. In line with this argument, Riaz and Munir (2016) opined that structural budget deficit is one veritable tool for measuring fiscal policy effectiveness, while discretionary policy effectiveness can be deduced through a balanced budget.

Studies have, however, concentrated on the analysis of how taxes and transfers smooth disposable income without recourse to the possible effects on GDP. Thus, this study shall leverage this background to examine for Nigeria the smoothening impacts of fiscal policy, using the transmission-channel approach.

4.2   Econometric Models

First, we need to test the cyclicality of fiscal variables; thus, we state the following equation:

$$y_t = \delta_i + \beta \Delta z_t + \mu_t \tag{1}$$

Where β_t is the parameters of the fiscal variables (government expenditure, taxes, and transfers) vectors of n observations, y_t is the real GDP[4]. This analysis will help assess fiscal policy components that are cyclical and the ones that are acyclical. However, most of the stochastic real business cycle (RBC) models that analyze the part that fiscal policy plays have not specifically assessed the role of automatic stabilizers; rather, they measure the impact of government policies on the fluctuation of the business cycle. In an attempt to establish the strength of the automatic stabilizers, we employ the most straightforward measure, which is the size of the government.

According to Fatas and Mihov (2012), this approach is advantageous for the fact that it is easy to measure and can link theoretical valuation with the empirical outcome, that is, linking the theoretical viewpoint that what matters is the response of taxes and transfers to economic shocks, and to the size of government. The size of government, a priori therefore, is expected to relate inversely with real output growth; thus, the equation is stated as follows:

$$\Delta y_t = \delta_i + \sigma_1 Govt\_Size_t + \alpha_t \tag{2}$$

where government size is proxied by the three alternative measures viz; expenditures, taxes, and transfers. The next probable question could be whether the imports of other variables could boost the viability of the automatic stabilizers in smoothing the business cycle. There is a possibility that other variables that transmit the effects of government size on smoothening the business cycle may exist. Thus, we introduce controls in the baseline model and the resulting equation:

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[4] Deflated using the GDP deflator

$$\Delta y_t = \delta_i + \sigma_1 Govt.Size_t + \sigma_2 X_t + \omega_t \tag{3}$$

Where X_t is the vector of control variables – such as Openness, GDP[5], GDP Per Capita, and average GDP growth (Growth). The control variables are expected to play a significant role as transmitters of the smoothing effects of government size. For instance, richer economies are assumed to accommodate larger governments due to the elasticity of government services vis-à-vis income per capita (a case of Wagner's law). Also, it is assumed safe to argue that richer economies are not as volatile due to the existence of more developed financial systems. However, the size of the economy, as reflected by GDP, may be related to government size and volatility. The justification in controlling for economic growth is that government size and tax distortions can affect growth, *ceteris paribus*.

To further address the possibility of variations on our benchmark specification, we introduce another vector of controls as indicated in the following equation:

$$\Delta y_t = \delta_i + \sigma_1 Govt.Size_t + \sigma_2 X_t + \sigma_3 \psi_t + \gamma_t \tag{4}$$

where ψ is the vector of macroeconomic reflexes - inflation, exchange rate, and capital flows as reflected in equation (5):

$$\Delta y_t = \delta_i + \sigma_1 Govt.Size_t + \sigma_2 X_t + \sigma_3 \psi_t + \phi_t \tag{5}$$

Finally, to address the volatility of the business cycle in a volatile state due to endogenous institutional factors, we included institutional controls vector as reflected in equation (6):

$$\Delta y_t = \delta_i + \sigma_1 Govt.Size_t + \sigma_2 X_t + \sigma_3 \psi_t + \sigma_4 V_t + \eta_t \tag{6}$$

where V_t is the vector of institutional variables, which include corruption, the rule of law, and political instability/violence. η is the stochastic error term to control for white noise in the model.

The description of the data, their sources, and the construction framework for the models above are presented in the appendix of this paper.

4.3   Estimation Technique

As the literature relates, fiscal policy is one tool often used to smooth fluctuations in economic activity, particularly in advanced economies. The reason is that it reduces macroeconomic volatility and thus, can boost real GDP growth. For instance, an increase in fiscal stabilization—measured as the sensitivity of the overall budget balance to the output gap—could raise annual growth rates (IMF, 2015). Therefore, the need for smoothing is justifiable to find a beneficial common ground, hence the investigation. One way to filter out the cyclical component from the GDP series is to

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[5] 'GDP' represents the GDP deflated over the period under analysis.

use standard methods like the Hodrick-Prescott Filtering technique. Other techniques are the Baxter-King Filter, Butterworth Filter, and the Christiano-Fitzgerald Filter.

As earlier noted, the business cycle is characterized by comovement among many economic indicators. This study, however, applies the Statistics Netherlands Business Cycle Tracer (SNBCT) method. The SNBCT tool is a system that acts as a coincident indicator of the business cycle. It maps real-time business cycle developments by tracking the cyclical development of a selected set of lagging, coincident, and leading economic indicators. This form of the cyclical component is easier to interpret than normal mutations and focuses on medium-term developments.

5.0   Results and Analysis

The assumptions listed in the previous paragraph provide a simple way of estimating our baseline models of the cyclicality of fiscal variables and business cycle smoothing. By building on the previous paragraph framework, the fiscal policy effects in smoothing the cycle were empirically assessed. The ready question is how do fiscal variables behave over the business cycle? To address this question, equation 1 is estimated by running regressions of basic components of fiscal policy on GDP growth rate, and the results are presented in Table 1. A quick look at the results indicates that revenues, expenditure, and taxes (net of transfers) are procyclical. Their coefficients underline this fact. A 1% increase in output improves revenues by 0.09% and increases expenditures and taxes by 1.50% and 2.88%, respectively. Though the outcome, in terms of taxes (net of transfers) corroborates the findings of Bayoumi and Masson (1996) and Fatas and Mihov (2012) for OECD countries, procyclicality of government revenue, expenditure and taxes, seems to agree with what is common in the literature (example; Alesina et al., 2008; Easterly, 2004; Acemoglu et al., 2003, amongst others). They argue that fiscal policy is procyclical in developing countries as opposed to industrialized countries. The outstanding reason for this difference in the literature is that access to domestic and/or international credit markets (Caballero and Khrisnamurthy, 2004; Gavin and Perotti, 1997; Calderon and Schmidt-Hebbel, 2008) is limited in the former. Institutions and/or political structures were found to be the second reason (Halland and Beaney, 2011; Lane, 2003; Talvi and Végh, 2005; Alesina et al. 2008), while the third reason was identified as the case of the polarization of preferences associated with social inequality (Halland and Beaney, 2011; Woo, 2009). However, the primary deficit (measured as a ratio of GDP) was found to be acyclical. It fell by 7.73%. Specifically, fiscal instruments in developing economies are less potent, and policy objectives are more prominent than output stability.

Tables 1. Cyclicality of Fiscal Variables $y_t = \delta_i + \beta \Delta z_t + \mu_t$

Dependent Variable (y_t)	β	Adj. R²
Expenditures	1.50	0.66
	(0.19)	
Revenues	0.09	0.80
	(0.07)	
Tax net of Transfers	2.88	0.24
	(8.48)	
Primary Deficits/GDP (*)	-7.73	0.32
	(1.83)	

Note: All variables in growth rates except for primary deficit.
Standard errors in parentheses.

Among different measures or approaches to fiscal-policy-business-cycle analysis is the automatic stabilizers. The ready question is, do automatic stabilizers facilitate the smoothing of the business cycle? Should the answer to this question be in the affirmative, the next question could be whether countries that are akin to more volatile business cycles make more use of the tools of automatic stabilizers. In an attempt to answer these questions, we employed - amongst other measures that can capture the strength of automatic stabilizers - the size of government. Table 2 shows the regression of the volatility of real GDP growth on the selected measures of the size of government: expenditures, taxes, and transfer.

The goodness of fit is in all the regressions, as reflected in the adjusted R² being well above 60%. Also, the coefficients of the estimates are significant and robust. It shows, for an instant, that a 1% increase in expenditures will smooth-out business cycle by about 17.81%, *ceteris paribus*. The amazing fact here is that the three measures of the size of government perform well and significantly too; thus, we cannot link the stabilization effects of fiscal policy to just one of the three components: government expenditure, taxes (revenues), or transfers, rather, their role in stabilising the economy can be captured in terms of policy fine-tuning. However, the critical fact to note from the results in Table 2 is that, though a check on fiscal policy variables has shown tendencies for procyclicality, their interaction within the business cycle threw up results that agree with theoretical expectation. This outcome agrees with Fatas and Mihov (2012) argument that adjustments in these fiscal variables are through market activities and not necessarily deliberate policy fine-tuning may smoothen the business cycle.

Table 2. size of government and volatility $\Delta y_t = \delta_i + \sigma_1 Govt\_Size_t + \alpha_t$

Dependent Variable: GDP Volatility Growth

Variable	σ_1		Adj. R^2
Expenditures	-17.81*	(0.00)	0.66
Taxes(Revenue)	-8.76*	(0.00)	0.80
Transfers	-24.51**	(0.01)	0.78

Note: Probability values in parentheses. * and ** represent
significance at 1%, and 10% levels

Though the results presented in Table 2 indicating a strong and negative relationship between government size (automatic stabilizers) and the volatility of output may be suggestive, it may not be entirely sufficient. This is because other additional variables may affect both volatility and government size (Fatas and Mihov, 2009; Woo, 2009; Kaminsky et al., 2004).

Thus, there is a need to determine if other variables corroborate government size (automatic stabilizers) in explaining the relationship between fiscal policy and business cycle volatility. To achieve this, macro-growth indicators were carefully selected as controls (as suggested by Woo, 2009 and Alesina et al., 2008), and the results of the estimated equations are presented in Table 3. From the Table, columns 1 to 4 reflect, in some measure, the same situation as in Table 1. It reflects procyclicality for government expenditures and mixed outcomes in terms of revenues. For instance, in column 1, a 1% increase in government expenditures will sustain the cyclicality in the business cycle by 4.80%, while the same for revenues may smoothen the process by 0.88%. However, GDP Deflator reflects a strong and positive relationship, just as openness, GDP Per Capita, and GDP Per Capita Average Growth Rate is not significant. The implication of this is that these controls can interact with both government size and volatility. Like Halland and Beaney (2011) and Fatas and Mihov (2012) observed, having larger governments may result in richer economies because of the elasticity of government services, a case for income per capita (Wagner's Law). Also, it could be argued that there is the possibility that richer economies are less volatile because of more developed financial systems. Also, the size of the economy, as underlined by GDP, can also be identified as interacting with both government size and volatility. As long as there is a fixed cost of setting up a government, smaller countries might carry a higher cost of governance. Thus, the fact that size could also be related to volatility justifies the need to control for it. In summary, therefore, the introduction of these controls affirms the earlier outcomes and argument.

Table 3. Baseline Model with Controls $\Delta y_t = \delta_i + \sigma_1 Govt. Size_t + \sigma_2 X_t + \omega_t$

Dependent Variable: GDP Volatility Growth				
	(1)	(2)	(3)	(4)
Govt. Expenditures	4.80*	12.44*	2.64*	2.89
	(0.00)	(0.00)	(0.00)	(0.46)
Govt. Revenue	-0.88	1.58	-0.56**	8.11*
	(0.10)	(0.50)	(0.01)	(0.00)
GDP Deflator	6.09*	-	-	-
	(0.00)			
Openness	-	6.35*	-	-
		(0.00)		
GDP Per Capita	-	-	1.69*	-
			(0.00)	
GDP Per Capita Av. Growth Rate	-	-	-	1.90
				(0.96)
Adjusted R^2	0.98	0.84	0.99	0.79

Note: Probability values in Parentheses. * and ** represent significance at 1%, and 10% levels

To further establish the robustness of our investigation, we extend our variations of the benchmark specification further by introducing additional macro-controls, and the results of the estimations are presented in Table 4.

Table 4. Govt. Size and Additional Controls $\Delta y_t = \delta_i + \sigma_1 Govt. Size_t + \sigma_2 X_t + \sigma_3 \psi_t + \gamma_t$

Dependent Variable: Volatility of GDP Growth			
	(1)	(2)	(3)
Govt. Expenditures	2.98	3.14	3.58
	(0.04)	(0.04)	(0.06)
Revenues	8.06*	7.90*	4.27**
	(0.00)	(0.00)	(0.01)
Capital Flows	-	-	4.26*
			(0.00)
Interest Rate	-2.92	-	-
	(0.89)		
Inflation	-	-7.14	-
		(0.62)	
Adjusted R^2	0.79	0.80	0.83

Note: P-values in parentheses. All estimations are with intercept.

* and ** represent significance at 1%, and 10% levels

From the Table, the elasticities of the coefficients of the fiscal policy variables (government expenditures and revenues) show a procyclical interaction with the business cycle. While these results have reflected no significant difference from the previous outcomes, they show that fundamentally, the inherent distortions in the evolving fiscal policy structures in the developing economies like Nigeria hamper its potentials of smoothing the business cycle. Also, capital flows as a control reflected a boost to the procyclicality. It showed a very strong positive and significant relationship with the volatility growth. However, interest rate and inflation were deviances. They reflect countercyclicality. The elasticity coefficients are negative and not statistically significant in explaining the model. This outcome is in line with Fatas and Mihov (2012), that introduced similar controls in their fiscal-policy-business-cycle models and found the same to be non-responsive.

A further scenerio for assessment is the possibility of institutional factors playing a role in facilitating the effects of fiscal policy in smoothing the business cycle. Aside the size of government, whose coefficients have not really differed, basic institutional variables were introduced into the benchmark model, and the estimates are presented in Table 5. The coefficients of the institutional variables are positive, however, only government effectiveness is significant. The adjusted R^2 for all four columns show that the regressions had a good fit and relatively stable. The indication is that institutional weakness may have played a major rule in the procyclicality of fiscal policy, hence its inability to smoothen business cycle volatility.

Theoretically, strong institutions catalyze economic stability and steady progress. For instance, 1% improvement in government effectiveness increases volatility of growth over the business cycle by about 4.24%. Avoiding procyclical actions would allow the country to take better advantage of automatic stabilizers— which should be allowed to operate as freely in bad times (when they are most needed) as in good times (when rebuilding fiscal buffers is essential).

This conclusion corroborates the debate on the causes of fiscal policy procyclicality in the literature. As Alesina et al. (2008 Easterly), Acemoglu et al. (2003), (2004) argued, the debate on the causes of fiscal procyclicality is based on the more general discussion on policies versus institutions as the main causes of macroeconomic volatility and crises. Therefore, this study has provided some support for the assertion that macroeconomic variables are merely mediating channels for institutional effects.

Table 5. Govt. Size and Institutional Controls $\Delta y_t = \delta_i + \sigma_1 Govt.Size_t + \sigma_2 X_t + \sigma_3 \psi_t + \phi_t$

Dependent Variable: Volatility of GDP Growth				
Independent Variables	(1)	(2)	(3)	(4)
Govt. Expenditures	8.39**	2.37	2.48	2.32
	(0.07)	(0.58)	(0.59)	(0.58)
Govt. Revenue	4.61**	7.77*	7.62*	7.58*
	(0.04)	(0.00)	(0.00)	(0.00)
Govt. Effectiveness	4.24*	-	-	-
	(0.03)			
Political Stability	-	4.80	-	-
		(0.69)		
Absent of Corruption	-	-	9.86	-
			(0.73)	
Rule of Law	-	-	-	1.37
				(0.69)
Adj. R^2	0.82	0.79	0.80	0.79

Note: P-values in parentheses. * and ** represent significance at 1%, and 10% levels

To establish the existence of long run relationship among most of the macroeconomic variables in the models, ARDL Bound Test to Cointegration was employed, and the estimated outcomes are as presented in Table 6. To assess the robustness of the bounds testing procedure, one-time iteration approach was used following Esu (2017), Ang (2010), and Ang (2008 a,b). The estimates show that the computed F-statistics are greater than Narayan (2005)'s critical bounds for models 2, 3, 4 and 5, respectively. The null hypothesis of no cointegration was rejected at 1% significant level. This establishes the presence of cointegration among the variables in the models.

Table 6: Bounds Test to Cointegration

Estimated Models	Model 2	Model 3	Model 4	Model 5
Optimal Lag Structure	(4,1,3)	(4,4,4,4)	(4,4,3,4,4,4)	(4,3,4,0)
Calculated Bounds	46.37*	15.07*	10.38*	13.67*
	Critical value	(T=35)!		
Significant Level	Lower Bound I(0)	Upper Bound I(1)		
1%	5.14	6.61		
5%	3.57	4.66		
10%	3.03	3.99		
Adj. R^2	0.90	0.99	0.89	0.92
F-stat/P-value	377.16 (0.000)*	441.81 (0.000)*	482.09 (0.002)**	549.29 (0.000)*
D-W stats.	2.22	1.99	2.46	1.62

Note: The asterisk (*, **) denotes significance at 1% and 5% level. The optimal lag structure is determined using AIC. Probability values are in parenthesis.! critical bounds value computed by Narayan (2005) following unrestricted intercept and restricted trend.

In the light of the results in Table 6, it can be inferred that there is a long-run relationship between the size of government (automatic stabilizers) and business cycle fluctuations, as well as the control variables in the models. The implication of these outcomes is that *ceteris paribus*, fiscal policy is capable of adjusting business-cycle instability in Nigeria. However, the speed of adjustment can be faster in the face of stable and viable institutions, steady and progressive output growth, and capital growth amidst a stable real interest rate and inflation. Thus, policymakers should be aware that automatic stabilizers can have adverse side effects.

6.0   Summary and Conclusion

The supposition from previous studies that fiscal policy is procyclical in developing countries, aroused the curiosity to test the hypothesis using Nigerian data. These arguments have been advanced and tested in developed regions of the world with interesting outcomes as they are unique, some of which have been reviewed in this work. The study investigates the smoothing effect of fiscal policy on business cycle volatility in Nigeria. To this end, relevant time series data on fiscal policy variables were

employed, with different levels of controls to check for possible effects of macroeconomic and institutional factors. The study applied the Statistics Netherlands Business Cycle Tracer (SNBCT) method, which maps real-time business cycle developments by tracking the cyclical development of a selected set of lagging, coincident and leading economic indicators.

The findings showed that *ceteris paribus*, fiscal policy would have smoothing effects on business cycle fluctuations, but the speed of adjustment is as transmitted by government effectiveness as a proxy of strong institutions and the stability of the macroeconomic environment. Therefore, the study concludes that fiscal policy instruments – government expenditures, taxes, transfers could be countercyclical in the face of other interactive control variables. Overcoming such requires an enhanced macroeconomic environment and an effective government. Comparatively, the results imply that fiscal instruments in Nigeria are less potent, and policy objectives could be more prominent than output stability. The study further supports the assertion that macroeconomic variables are merely mediating channels for institutional effects and that policymakers should be aware that automatic stabilizers can have adverse side effects. Sound fiscal institutions are germane; thus, it is proper to put together well-designed fiscal rules and frameworks to promote good expenditure control over the cycle. Government effectiveness will promote flexible response to variations in output and enable continued access to better financing.

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Appendix

Data Description and Construction Framework
Data Sources: all data are from secondary sources, which include Central Bank of Nigeria (CBN) statistical bulletin (various years); World Development indicators (WDI) 2018 and World Governance Indicators (WGI) 2017. Codes and definition of constructed variables are thus:
GFC = Government Final Consumption Expenditure
SUB/TR = Subsidies/Transfers (out)
DRT = Direct Taxes
IDT = Indirect Taxes
TRG = Transfers Received by Government
GDP = Gross Domestic Product
GDPD = Gross Domestic Product Deflator
GDPPC = Gross Domestic Product Per Capita
GDPPCGR = Gross Domestic Product Per Capita Growth Rate
SDGDPR = Standard Deviation of Real Gross Domestic Product Growth
RTR = Real Interest Rate
GFCF = Gross fixed Capital Formation (consumption of govt. fixed capital)
INF = Inflation
GEFF = Government effectiveness
COC = Control of Corruption
PS = Political Stability

Constructed Data:
EXPENDITURES: GFC + SUB/TR
REVENUES: DRT + IDT + TRG
TRANSFER: TRG – SUB/TR (Net)
PRIMARY DEFICIT: EXPENDITURES – REVENUES – TRG - GFCF