JOURNAL *of* BANKING

- Causal Relationship Between External Reserves and Foreign Exchange Liquidity: Evidence from Nigeria

- Is Nigeria Worse Off Or Better Off with Foreign Aid on its Economic Growth? (1981 To 2021)

- Macroeconomic Fundamentals and Selected Country Economies of Sub-Saharan Africa

- Determinants of Financial Inclusion in Selected Sub-Saharan African Countries

- Impact of Financial Inclusion to Engender Cottage Firms Growth in Nigeria, (2000 – 2021)

Journal of Banking

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EDITORIAL

This edition contains five papers which the Editorial Board considers publishable. While the Board appreciates the efforts of the contributors, it encourages those whose papers were turned down to put in more efforts in future contributions. The accepted and published papers will obviously add value to the work of researchers generally.

In the first paper, Onyendi, H.U. studied the causal relationship between external reserves and foreign exchange liquidity in Nigeria for the period 1970 to 2022 using both descriptive and econometric tools. Among the econometric tools used included Unit Root Test, Correlation Test, Autoregressive Distribution Lag (ARDL) and Granger Causality Test. The study concluded that a long run relationship existed between External Reserves and Foreign Exchange Liquidity. A number of unidirectional causalities were also identified: from external reserves to foreign exchange demand, exchange rate to external reserves and external reserves to foreign exchange liquidity. From the findings, it was obvious that foreign reserves alone could not stabilize the rate of exchange in the domestic foreign exchange market. Enhanced supply of foreign exchange to contain the soaring demand of foreign exchange was therefore recommended.

Dinka et al examined the impact of foreign aid in Nigeria's economic growth for the period 1981 to 2021, using the Autoregressive Distributed Lag (ARDL) model for estimation and came out with the findings of significant and negative impact of foreign aid on the economic development of Nigeria. In the short run, Official Development Assistance, ODA, had a negative and significant impact on economic development while the impact in the long run was insignificant. Also external debt stock had a negative and significant impact on economic growth both in the short run and the long run. The researchers recommended diversification of funding sources and reduced

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reliance on foreign aids to achieve economic growth. They recommended that foreign aids should be directed to productive investments that would have the potentials to accelerate growth.

Odili, Okechukwu appraised the impact of macroeconomic aggregates on Gross Domestic Products growth in sub-Saharan African countries using data from 1981 to 2020. He use Trend Analysis, Unit Root Test, Co-integration Test and Autoregressive Distribution Lag model in his analysis. Findings from his study showed that the currencies of Sub-Saharan Africa were weak and volatile, negatively influencing the output of the countries but indicated no distinction between the effects of exchange rates of Naira-Dollar, Cedi-Dollar and Rand-Dollar on GDP growth of the countries. The study recommended that government policies should discourage imports and promote export produce to strengthen the weak currencies. Contractionary monetary and fiscal policies should also be used to mop up excess liquidity and reduce inflation.

Dunmani A. MarJackson studied the determinants of access to and usage of financial services in Sub-Saharan Africa. He employed panel data spanning 2006 to 2021 using ex-post facto research design and econometric techniques. Pooled Ordinary Least Squares, PLS, Fixed Effects and Random Effects panel estimation techniques were used in the analysis. The findings showed that apart from GDP per capita and political stability that had insignificant effects on access, money supply and regulatory quality had a significant effect on access to financial services. Again, regulatory quality and deposit rate, GDP per capita and Automated Teller Machines exerted significant effects on financial usage. Also, money supply and lending rates significantly stimulated usage of loan accounts whereas regulatory quality was significant. In general, a combination of macroeconomic, institutional and bank-level factors determined the level of financial inclusion in sub-Saharan Africa. The study recommended the formulation of economic policies that would encourage productivity and the growth rate of GDP per capita in the region. Improved

regulatory quality, attractive deposit and lending rates should be target areas. Ekwunife, Faith Chinyere examined the impact of financial inclusion on fostering cottage firms' growth in Nigeria. The study used ex-post facto research design and the annual time series data from 2000 to 2021. Unit Root Test, F-Bound Test, Error Correction Model, ECM, were used in data analysis. Indicators of financial inclusion used in the study included agricultural Credit Guarantee Scheme Fund (ACGSF), Demand deposit from Rural Areas (DDRA), Deposit Bank Loans to Small Scale Enterprises as a percentage of total loans (DBLSC). The study conclusively showed that financial inclusion imparted significantly on the growth of cottage firms in Nigeria. It recommended expanded availability, accessibility and affordability of formal financial products and services to citizens, their economic status notwithstanding.

These studies obviously will be beneficial to policy makers and scholars who may wish to further research in areas they may find interesting.

Akin Morakinyo
Editor -in- Chief

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CAUSAL RELATIONSHIP BETWEEN EXTERNAL RESERVES AND FOREIGN EXCHANGE LIQUIDITY: EVIDENCE FROM NIGERIA

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Hilary Uchenna Onyendi[1]

ABSTRACT

The study investigated the causal relationship between external reserves and foreign exchange liquidity in Nigeria for the period spanning from 1970 to 2022. External reserves are used to intervene in the foreign exchange market to bring about stable exchange rate and hence bring liquidity in foreign exchange. Foreign exchange liquidity remains a catalyst for boosting the quantum of external reserves. In Nigeria, it is yet to be ascertained if it is the external reserves that drives foreign exchange liquidity or vice versa in the country within the reviewed period. This study is set to ascertain this. The source of data is secondary obtained from the Statistical Bulletin of the Central Bank of Nigeria from various issues. Both descriptive and econometric tools are adopted. The descriptive tools include the mean, median , standard deviation and others. The econometric tools used are the unit root tests, correlation test, Auto regressive distributive lag (ARDL) and the Granger causality tests. The findings include that there is a long run relationship between the foreign reserves and foreign exchange

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liquidity; there is unidirectional causality between foreign exchange supply and foreign reserves running from foreign reserves to foreign exchange supply; there is unidirectional causality running from external reserves to foreign exchange demand; there is unidirectional causality between external reserves and exchange rate running from exchange rate to external reserves; there is evidence of unidirectional causality between external reserves and foreign exchange liquidity running from external reserves to foreign exchange liquidity. On the whole, foreign reserves have driven foreign exchange liquidity, while foreign exchange liquidity except for exchange rate has not driven foreign reserves. Policy implications of the findings include that foreign reserves alone cannot stabilize rate of exchange in the domestic economy and provide liquidity in foreign exchange. Recommendation include that there is the need to maintain reasonable supply of foreign exchange so as to be able to contain the soaring demand of foreign exchange.

1. 0 INTRODUCTION

Proponents of the causality running from foreign exchange liquidity to external reserves include and not limited to researchers such as Dornbursch and Fisher (1980), CBN (2008), Mundell-Fleming model (1962), Ononugbo (2005), Ovwielefuoma (1988), Jhingan (1987), Anyanwu (1993), Gosselin and Nicolas (2005), Keynes Liquidity Theory, Akerlof (1970), Spence (1973), and Stiglitz (1976), Terte

(2020), Financial Intermediation Theory, Hudson (2013), Nirav (2012), UNCTAD (2007).

On the other side, proponents of direction of causality from external reserves to foreign exchange liquidity include CBN (2007), the Organization for Economic Cooperation and Development (OECD), Buffer stock Theory of Frenkel and Jonanovic (1981), Jimoh (1997), Kumar (2011), Onyendi (2010), Bhatia (1984), Osabuohien and Egwakhe (2008), Sisson (2012), Archer and Halliday (1998), Chwieroth (2012), Obaseki (2007), among others.

Foreign reserves or external reserves or international reserves or foreign exchange reserves (FER) can be described to be money (monies) or assets held by the Central banks (CBs) or other monetary authority that can be used to offset its liabilities, such as the currency issued by the central bank as well as various banks' reserves deposited with the Central bank by the government and other financial institutions. FER is also called reserve assets in the balance of payments (BOP) accounts and are recorded in the capital account. It is usually an important part of the international investment position index of the country. It can be classified as - gold bullion, unallocated gold account, special drawing right (SDR), interbank position, reserve position in the International Monetary Fund (IMF), other transferable deposits, other deposits, debt security, loans, equity (listed and unlisted), investment fund shares and financial derivatives such as forward contracts and options.

The Central Bank of Nigeria (2014) affirms that international reserves comprise the stock or pool or quantum of assets that are accepted internationally and globally for settling international debts made up of both the privately held stocks (including stocks by individuals and

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private bodies to finance trade, investment, or for speculative purposes), and officially held or government held stocks (held by the government and their Central Banks to basically defend the value of the domestic currency in the foreign exchange market (FEM); and to be used as a precaution or buffer against the likelihood that over a given time period, payments to foreigners may exceed receipts from foreigners leading to balance of payments BOP deficits). This deficit must be financed by way of the external reserves.

These purposes for holding foreign reserves must take place in foreign exchange market (FEM) and is facilitated when the FEM is liquid. Indeed, the role of "intervention" by the central banks in the FEM, must be facilitated by liquid foreign exchange. By intervening in the FEM, the central bank either buys or sells foreign currency to stabilize and strengthen the value of the domestic currency in the FEM. This is determined by the demand and supply of the domestic currency. If the demand for the domestic currency falls in relation to its supply, then value of the domestic currency in the FEM will fall leading to depreciation in the exchange of that currency (supply is greater than demand), so more units of that currency will exchange for less units of other currencies. To bring equilibrium and strengthen the value, the central bank will pump more foreign currency in the FEM. Jhingan (2007) opines that this will increase the supply of foreign currency and force down the value of the foreign currency in relation to the domestic currency. Thus the exchange rate of domestic currency will appreciate. The reverse is the case when the demand of the domestic currency exceeds the supply. All these activities take place in the FEM, therefore the FEM liquidity is expected to drive the external reserves.

Anyanwu (1993) asserts that foreign exchange market is an international market where various currencies are bought and sold against one another. Foreign exchange market liquidity occurs when the FEM is liquid. This is a situation where the supply of foreign exchange exceeds the quantum of demand for foreign exchange. Conversely when the foreign exchange demand exceeds the foreign exchange supply, the FEM is illiquid. In the case where both the demand and supply of foreign exchange are equal the FEM is in equilibrium. The FEM liquidity facilitates the international settlements and debts, therefore is expected to drive the external reserves.

The United Nations Conference on Trade and Development UNCTAD (2007) asserts that the foreign exchange market assists international trade and investments by enabling currency conversion. For example, it permits a business in the United kingdom (UK) to import goods from Nigeria and pay in Naira, even though its income is in Great Britain Pound (GBP) It also supports direct speculation and evaluation relative to the value of currencies, and the carry -trade, speculation based on the interest rate differential between two currencies. This implies that there exists a relationship between the FEM liquidity and external reserve. Terte (2020) asserts that there is inflation and growth.

From the foregoing, the relationship between FEM liquidity and the external reserves is not in doubt. External reserves are used to intervene in the foreign exchange market to bring about stable exchange rate and hence bring liquidity in foreign exchange. Foreign exchange liquidity remains a catalyst for boosting the quantum of external reserves. In Nigeria, it is still inconclusive if it is the external reserves that drive foreign exchange liquidity or vice versa; also, the direction and magnitude of such relationship is yet to be ascertained in literature in

the country within the reviewed period. This study is set to solve these problems.

Every country in one way or the other engages in international trade. Trade prices are characterized by incessant fluctuation and are devoid of stability since these price movements are beyond the control of exporting and importing countries. This translates to unpredictable revenue and by implication unstable external reserves in the country. This has direct negative bearing on the liquidity of the FEM in view of unpredictable foreign exchange supply and demand flows. Therefore, the external reserves are consequently affected especially in the circumstance where the country's foreign earnings is mono-product based.

In the present Nigeria scenario and in view of the foregoing, this study has the objective of finding the direction, size and magnitude of the causal relationship between FEM liquidity and foreign reserves or vice versa.

The relevance of this study is based on its contribution to literature. Hence it is pertinent in view of research concerns and policy issues. With regards to research concerns, since only scarce studies, if any, have been conducted on this area in Nigeria, it becomes vital that further research on the topic is no doubt necessary. On policy issues, this is anchored on the premise that the eventual research findings and suggestions of the study will furnish the economic and monetary managers in the country and other countries with further economic policy tools with the aim of attaining liquid foreign exchange while maintaining the desired quantum of foreign exchange reserves which is a buffer in the case of unforeseen undesirable economic conditions. It will add to previous recommendations in literature that will enable

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economic and monetary managers to initiate and implement policies. This paper ascertains if the FEM liquidity drives external reserves or vice versa.

The remaining part of the paper is Sections 2 and 3 containing the Literature review and methodology respectively, while section 4 is the results and analysis. The paper is concluded in section 5 with conclusion, summary, and recommendation.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

External reserves or reserve assets as defined in the International Monetary Fund (IMF) BOP Manual Fifth edition are "assets held by the monetary authorities usually in different reserve currencies, and used to back its liabilities, such as, local currency issued, and the various bank reserves deposited with the central bank, by government or financial institutions. It includes gold bullion, unallocated gold account, SDRs, foreign currency, reserve position with the IMF, interbank position, other deposits, debt securities, loan, equity (listed and unlisted), investment fund share and financial derivatives. Hence, external reserves include international liquidity plus other claims".

The FEM entail the buying and selling of foreign exchange. In the strictest sense, it is the supply and demand and supply of foreign exchange. The interaction of the foreign exchange supply (FxS) and the foreign exchange demand (FxD) determines the rate of exchange of one currency in relation to the other. When the FxS exceeds the FxD, it means the FEM is liquid, while if the FxS is lesser than the FxD, there is exchange rate illiquidity.

Foreign exchange supply (FxS) is the aggregate domestic currency available for foreigners to exchange for their own currency. The supply of foreign currency arises from the credit side of the Balance of Payments (BoP) and according to the Central Bank of Nigeria (CBN) (2011) is equal to payments made by the foreign countries to our country for goods and services imported from our country plus loans disbursed and investment made in this country. Increased FxS leads to increase in the external reserves position.

Foreign exchange demand (FxD) is the foreign currencies available for exchange by the indigenes. The demand for foreign exchange arises from the debit side of the BoP. It is equal to the value of payment made to foreign countries for goods and services purchased from it plus loans and investments made abroad. Increased FxD leads to depletion in the external reserves.

There is equilibrium exchange rate where FxD is equal to FxS. However, this is not always the case. There is always a mismatch between them as observed by Nirav (2012). This may be positive or negative if FxS is greater than FxD and vice versa. Positive foreign exchange mismatch is synonymous with increased quantum of external reserves while negative mismatch depletes it.

The foreign exchange rate ExR facilitates the FER when it is favorable, that is, when it is appreciating. This occurs when the FxS exceeds the FxD, implying a favourable BOP and thus stimulates the FER. The reverse is the case in the event of depreciating exchange rate.

The a priori expectation of the study is that foreign exchange liquidity drives the reserve assets.

2.2 Theoretical Review

The Buffer stock Theory of Frenkel and Jonanovic (1981) opines that the monetary authorities demand reserve as a buffer to curb fluctuations in external payment imbalances to avoid macroeconomic adjustments costs arising from imbalances in the external payments. This is to avoid macroeconomic adjustment cost arising from imbalances in the external payments. By extension it provides liquidity in the foreign exchange. The advantage of the model over others is its adaptability to both fixed and floating exchange regimes. The model is as relevant in a modern floating exchange regime as it was during the Bretton Woods regime. In their study, Flood and Marion (2002) confirmed the applicability of the buffer stock model in the modern regime of floating exchange rate as it was during the Breton Woods era.

2.3 Empirical Review

Olayungbo et al, (2011) investigate the relationship between exchange rate (nominal and real) and foreign exchange reserve for Nigeria using quarterly data between the period of 1970 Quarter 1 to 2006 Quarter 4. Using Quaudt – Andrew break point and unit root co-integration test and the Granger test with error correction model techniques. The results indicate that there is both short run and long run relationship between foreign reserve and nominal exchange rate. The direction of Granger causality is unidirectional, which suggests that the nominal exchange rate Granger causes foreign exchange reserve in the long run.

Oladipupo (2011) investigates the impact of exchange rate on the Nigeria external sector (BOP position) using the ordinary least square (OLS) method of estimation for data covering 1970-2008 and found that exchange rate has a significant impact on the BOP position. He noted that improper allocation and misuse of allocation misuse of

domestic account, fiscal indiscipline, and lack of appropriate expenditure control policies due to centralization of policies, are some of the causes of persistent BOP deficits. The study recommends that appropriate monitoring machineries be put in place to ensure judicious use of credit and available foreign exchange, also, exchange rate policies have to be used along with the fiscal and monetary policy instruments to get meaningful results.

Tarawalie (2014) studied the exchange rate market pressure and economic growth from 1986 to 2018. The study adopted the ARDL and causality approaches. Finding is that there is a negative relationship between inflation and growth.

Manasseh, Ogbualor and Obiorah (2018) studied the effects of volatile commodity price dynamics in Nigeria using GARCH and causality approach. The study found that there is a positive relationship between the variables.

Mohammad et Al (2018) studying exchange rate and economic growth relationship for Bangladesh found the depreciation of real exchange rate is associated with growth in the long run while in the short run, depreciation of the real exchange rate results to decrease in growth.

Terte (2020) in the study of foreign exchange market demand pressure and commodity dynamics found that there is a negative relationship between inflation and growth.

2.4 Gap in the Literature
From the reviewed literature, it is obvious that there exists little or dearth literature on whether it is the foreign exchange market liquidity that drives the external reserves in Nigeria within the reviewed period

or vice versa. This paper bridges the gap and goes further by making recommendations in order to chart a way forward.

3.0 METHODOLOGY
3.1 Research Design
The data for Nigeria from 1970 to 2021 is employed in order to ascertain if it the foreign exchange reserves that drive foreign exchange liquidity or vice versa in Nigeria. Secondary sourced data is got from the statistical bulletin of the CBN (various issues.) The response variables are foreign exchange reserves while the explanatory variable is the foreign exchange liquidity indicators (including foreign exchange supply- FxS, foreign exchange demend- FxD, exchange rate-ExR, and foreign exchange liquidity- FxL). The tool adopted is the Ordinary Least Squares (OLS) time series data. First, we performed ADF unit root test to ascertain if the variables have unit root. This is to avoid the simultaneity bias associated with the time series data. When the variables survive this test by rejecting the null hypothesis of unit root, we go further to perform the co-integration test.

The model for this study is of the form :
$$L\Delta\ LFER = \beta_0 + \beta_1 LFxS + \beta_2\ FxD + \beta_3 LExR + \beta_4\ FxL + t \ \ldots\ldots\ldots \quad (i)$$
where,
LFER = foreign exchange reserves (external reserves), LFxS = foreign exchange supply, LFxD is the foreign exchange demand, LExR = exchange rate, LFxL= foreign exchange liquidity,
$L = \log$, $\beta_0 =$ constant, $\beta_1, \beta_2 =$ explanatory power of the variables,   t = stochastic error term.

To enable the achievement of the study objective, which is to ascertain the causation between foreign exchange reserves and foreign exchange liquidity, both descriptive and econometric tools were adopted.

3.1.1 Descriptive Test

The mean, mode, standard deviation, kurtosis, probabilities and other descriptive statistical figures were adopted to establish a relationship between the regressors and the regressed variables.

3.1.2 Econometric tools

The tools include – the unit root test (URT), correlation test, autoregressive distributed lags, ARDL and the Granger causality test.

3.1.3 Unit root test

Usually, the unit root and statistical attributes indicate the estimates of the first difference among the series in a specified model. It is used to accept or reject the null hypothesis. The null, H_0, suggests that there is unit root in the individual series. That is to say that there is no stationary in each of the series. We therefore accept the null hypothesis, if the ADF statistic is higher than the critical value at different or various significant levels. This implies that we cannot reject the null if it occurs that the absolute value of the ADF is more than the critical value. Hence there is no instability in the series. The reverse is the case for alternative hypothesis.

If the series are integrated of the same order, the condition for vector error correction mechanism (VECM) and Johansen cointegration tests are met. However, if the series are of mixed integration, the autoregressive distributed lag method is then adopted.

This is depicted as

$$\Delta X_{t\ =}\ \alpha_o\ +\alpha_1 t +\beta X_{t-1}+ \sum_{j=1}^{m} \mathbf{Y_j}\ \Delta X_{t-j} + \mu_1 \ \dots\dots\dots\dots\dots\dots\dots\dots\dots.. (2)$$

where

X_t denotes integration series (explanatory variable), β represents the coefficient, Yj connotes the integrating series (observed variable), Δ shows the initial difference operator; t denotes the time trend; α_o is a drift; t is the linear time trend; m represents the length of lag; μ_1 is a white noise process.

3.1.4 Correlation test
Correlation analysis establishes the relationship existing between a pair of variables.

3.1.5 Autoregressive distributed lag
In the time series domain, ARDL co-integration bounds can be used to find the long run relationship among variables which are mixed for instance, some are stationery at level, and some are stationery at first difference. Pesaran & Shin (1990) and Pesaran et al (2001) opine that "the ARDL co-integration technique is used in determining the long run relationship between series with different order of integration". The re -parameterized result gives the short run dynamics and long run relationship of the considered variables. This implies that ARDL is pertinent in forecasting and disentangling long run relationships from short run dynamics. By long run relationship we mean that some time series are bound together due to equilibrium forces even though the individual time series might move considerably.

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The ARDL is a model for time series data in which a regression equation is used to predict current values of a dependent variable based on both the current values of an explanatory variable and the lagged (past periods) values of the explanatory variable. Cromwell et al (1994) opines that "in statistics and econometrics, a distributed lag model is a model for time series data in which the regression equation is used to predict the current values of the dependent variables".

The starting point for a distributive lag model is an assumed structure of the form:

$$Y_t = \alpha + W_0\chi_t + W_1\chi_{t-1} + W_2\chi_{t-2} + \ldots + W_n\chi_{t-n} + \in \ldots\ldots\ldots\ldots\ldots.(3)$$

Alternatively, the distributive lag model is

$$Y_t = \alpha + W_0\chi_1 + W_1\chi_{t-1} + W_2\chi_{t-2} + \ldots + \in \ldots\ldots\ldots\ldots\ldots. (4)$$

where, Y_t is the value at the time period, t, of the dependent variable y, α = the intercept term to be estimated, W_0 is the explanatory powers of the variables, χ_t = explanatory variable, W_1, W_2 are the lag weight, $\in$ = the error term

In the first equation, the dependent variable is affected by values of the independent variables arbitrarily in the past, so the number of lag model weights is infinite and therefore the model is called infinite distribution model. Conversely in the second and alternative equation, there are only a finite number of lag weights, indicating an assumption that there is a maximum lag beyond which values of the independent variables do not affect the dependent variable. A model based on this assumption is called finite distribution lag model.

The ARDL decision rule is that if the computed F-statistic is greater than or above the upper band critical value, the null hypothesis (there is no co-integration among the variables) is rejected, (the variables are co-integrated). Conversely if the computed F-statistic is less than or below the lower band critical value, the null hypothesis cannot be rejected, (the variables are not co integrated). Also if the computed F-statistic falls within or between the upper band and lower bound critical values the result of the inference is inconclusive and depends on whether the underlying variables are of I(0) or I(1).

3.1.6 Pairwise Granger Causality Test

In the case where there is co-integration among the variables, we go a step further to construct the standard Granger causality test. In order to perform the test for Granger causality, we estimate the equations in the following form:

$$\Delta \text{LFER}_t = \sum_{i=1}^{m-1} \beta \ \Delta\text{LFXL}_{t-1} + \sum_{i=1}^{m-1} \delta_j \Delta\text{LFER}_{t-j} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

$$\Delta L = \sum_{i=1}^{m-1} \beta \Delta LFXL_{t-1} + \sum_{i=1}^{m-1} \lambda_j \Delta LFER_{t-j} + \mu_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

where

LFER$_t$ is the log of external reserves

LFXL is the log of foreign exchange liquidty, including FxS, FxD, ExR

μ_1 is the white noise disturbance term,

ε is also the white noise disturbance term

Next is to take a decision either to accept or reject the null hypothesis. We refuse to reject the null hypothesis where the probability value equals to, or greater than 0.05. This is interpreted that there is no causal relationship (or that one variable does not Granger cause the other) between the variables. However, if the p-value (the probability) is less than 0.05, we reject the null hypothesis that there is no causality existing between the variables and so we refuse to reject the alternative hypothesis that one variable Granger cause the other. Thus, if probability = or > 0.05, accept (do not reject) the null hypothesis, if probability < 0.05, reject (do not accept) the null hypothesis.

4.0 RESULTS AND ANALYSIS
4.1 Results
4.1.0 Descriptive Statistic results

Table 1

	FER	FXS	FXD	EXR	FXL
Mean	3149991.	19000689	18512572	91.07689	2262330.
Median	174309.9	298725.1	493942.5	21.88610	216.0000
Maximum	12343654	1.68E+08	1.54E+08	426.6000	20748300
Minimum	104.6000	253.2000	254.0000	0.546400	-32354500
Std. Dev.	4218092.	45007571	42689453	114.3622	7361991.
Skewness	0.863001	2.516997	2.318289	1.297900	-0.999827
Kurtosis	2.083536	7.731577	6.834461	3.926499	11.85915
Jarque-Bera	8.433602	105.4014	79.94377	16.77577	182.1503
Probability	0.014746	0.000000	0.000000	0.000228	0.000000
Sum	1.67E+06	1.01E+09	9.81E+08	4827.075	1.20E+08
Sum Sq. Dev.	9.25E+14	1.05E+17	9.48E+16	680093.4	2.82E+15
Observations	53	53	53	53	53

Source: Researchers' Computation

We employ descriptive results to enhance comparison between the statistical averages and standard deviations of the dependent and independent variables to help explain the theoretical relationship between the variables. Table 1 shows the mean values, standard deviation etc of the parameters. The average (mean) is 3149991 for the dependent variable- (foreign reserves) , 19000689, 18512572, 91.07, and 2262330 for the explanatory variables - (foreign exchange supply, foreign exchange demand, exchange rate and foreign exchange liquidity) respectively. The variables dispersal from the mean (standard deviation) is between 4218092 for the dependent variable, 45007571, 42689453, 114.3, 7361991 also for the explanatory variables The variables also exhibit an asymmetrical distribution with long tail to the right depicting high positive skew as above zero having values of 0.86 for the dependent variable and 2.51, 2.31, 1.29, and -0.99, for the the explanatory variables respectively. The probability of zero of the variables also explains relationship, the values of the kurtosis which quantifies whether the shape of the data of the distribution matches, are 2.08 for the dependent variable and 7.73, 6.83, 3.92, and 11.85 for the explanatory variables respectively.

Interestingly, all the variables showed reasonable degree of relationship. Although this is the case and while not being unmindful of appreciating that the fluctuating nature of the trends might have affected the normalcy of the variable distribution, we make theoretical case that such trends are likely to lead to causal relationship between the external reserves and foreign exchange liquidity. However, the claim is additionally subjected to more econometric tests for further confirmation or otherwise as depicted below.

4.1.1 Econometric Results

Table 2 Unit Root test result

Variable	Intercept Only	Decision	Trend and Intersect	Decision
LFER	2.629 (-2.9187)*	I(0)	-0.9576 (-3.4986)*	I(0)
LFxS	-10.416 (-2.9199)	I(1)	1.4820 (-2.9199)*	I(0)
LFxD	2.0483 (-2.9187)	I(0)	-6.9291 (-3.5004)*	I(1)
LExR	3.0097 (-2.9187)	I(0)	0.4427 (-3.4986)	I(0)
LFxL	-6.8013 (2.9187)	I(1)	-8.2258 (-3.4980)*	I(1)

Source: Researchers' Computation

The ADF results in Table 2 show that the series are not of the same order but rather of different order of integration. Some of the variables have different integrating order, hence, while some are of I(1) , some are of I(0). Therefore the ARDL co-integration test becomes more appropriate.

Table 3 Correlation Result

	FER	FXS	FXD	EXR	FXL
FER	1				
FXS	0.7470	1			
FXD	0.7729	0.9581	1		
EXR	0.9346	0.8313	0.8681	1	
FXL	0.4934	0.5126	0.4699	0.5182	1

Source: Researchers' Computation

Table 3 depicts the correlation results. From the results, the foreign exchange supply exhibits a very strong positive relationship with external reserves, depicting 74.7%. It implies that both move together, hence as the quantum of foreign reserves increases, the foreign exchange becomes more liquid. Also the FxD shows a strong positive relationship of 77.2% with foreign exchange reserves. The same is for the exchange rate that shows a very strong positive relationship of 93.44% with foreign exchange. On the other hand, FxL shows a weak positive relationship with the dependent variable. This means that as illiquidity increases, foreign exchange reserves decrease.

Table 4 ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FER(-1)	1.652723	0.146816	11.25711	0.0000
FER(-2)	0.684323	0.275479	2.484123	0.0204
FER(-3)	0.545916	0.378443	1.442531	0.1621
FER(-4)	-0.337760	0.314973	-1.072345	0.2942
FXS	-0.841615	0.243507	-3.456220	0.0021
FXS(-1)	-0.023372	0.140776	-0.166026	0.8695
FXS(-2)	-0.852517	0.274985	-3.100229	0.0049
FXS(-3)	-1.152852	0.287868	-4.004802	0.0005
FXS(-4)	-0.664648	0.136467	-4.870378	0.0001
FXD	1.267208	0.294449	4.303667	0.0002
FXD(-1)	-1.486514	0.299601	-4.961642	0.0000
FXD(-2)	1.855935	0.268078	6.923108	0.0000
FXD(-3)	-0.749931	0.100494	-7.462423	0.0000
FXD(-4)	2.735169	0.583920	4.684154	0.0001

EXR	-422.3084	2225.884	-0.189726	0.8511
EXR(-1)	-7934.002	4081.807	-1.943748	0.0637
EXR(-2)	-24526.56	3611.751	-6.790767	0.0000
EXR(-3)	7083.084	3312.732	2.138140	0.0429
EXR(-4)	36664.86	6339.943	5.783153	0.0000
FXL	-0.542737	0.102366	-5.301909	0.0000
FXL(-1)	-0.830785	0.356499	-2.330397	0.0285
FXL(-2)	1.001660	0.320423	3.126055	0.0046
FXL(-3)	-0.337051	0.132520	-2.543402	0.0178
FXL(-4)	2.516646	0.641794	3.921270	0.0006
C	-12003.41	30007.13	-0.400019	0.6927

R-squared	0.999564	Mean dependent var	3407119.
Adjusted R-squared	0.999128	S.D. dependent var	4287274.
S.E. of regression	126616.8	Akaike info criterion	26.64236
Sum squared resid	3.85E+11	Schwarz criterion	27.60757
Log likelihood	-627.7378	Hannan-Quinn criter.	27.00856
F-statistic	2292.032	Durbin-Watson stat	2.853873
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Source: Researchers' Computation

The R-squared value 0.9995 and adjusted R squared of 0.9991 show that only 99 per of foreign reserves is used to intervene in the foreign exchange market to maintain liquidity in the foreign exchange flows.

This confirms significance of the explanatory variable to drive the dependent variable.

The coefficients of the explanatory variable FxS having negative value of -0.84 are significant, having a probability of 0.002. This implies that the foreign exchange supply have a negative significance on foreign reserves. This is so since the decrease of FxS implies depletion of FER. With regards to foreign exchange demand, which has a coefficient value of 1.26, it is significant having a probability of 0.00 less than 5% level of significance. For the exchange rate, the coefficient of -422.3 and probability of 0.85 show negative impact on foreign reserves, although insignificant. For foreign exchange liquidity with a coefficient of -0.5 and a probability of 0.00, it depicts a negative significant relationship to foreign reserves. This is explained since illiquidity in the foreign exchange entails depletion of the foreign reserves as more of it is used to intervene in the FEM to restore liquidity.

Furthermore, we test for the existence of a long run relationship between the dependent variable and the explanatory variables. This is done by using the Wald test that all the coefficients of the variations in levels are equal to zero. We draw a comparison between the estimated F-statistics with bounds and the F-critical or tabulated value. The 50%, 95%, 99% bounds critical F- value test bands for k=6 are (2.960-3.79), (3.12-4.25), (3.93-5.23) for model with both constant and trend. The calculated F-statistic is 2292. This is greater than the bounds F- critical test. This indicates existence of a long-run relationship between the controlled variables and measured variables. The p-values of the explanatory variables are all greater than 0.05, which depicts that the explanatory variables significantly drive trade.

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For the short run speed of adjustment, it is always affirmed that for there to be a long run relationship among the variables, the coefficients of the variables must be negative and also be significant at 5% level of significance. Using the one –lag period, the results depicts that FxD and FxL exhibit long run relationship while FxS and ExR do not as the one-lagged variables are insignificant at 5% level.

From the above, we conclude the existence of long run relationship between the explanatory variables and the dependent variable.

Table 5. Pairwise Granger Causality Result

Null Hypothesis	F- statistic	Probability	Decision	Type of causality
$LFxS \neq> LFER$	0.0008	0.9913	Not Rejected	No Causality
$LFER \neq> LFxS$	3.6842	0.0328	Rejected	Causality
$LFxD \neq> LFER$	0.1758	0.8393	Not Rejected	Not Causality
$LFER \neq> LFxD$	3.6480	0.0338	Rejected	Causality
$LExR \neq> LFER$	4.1034	0.0229	Rejected	Causality
$LFER \neq> LExR$	0.8440	0.4365	Not Rejected	Not Causality
$LFxL \neq> LFER$	0.4290	0.6537	Not Rejected	No Causality
$LFER \neq> LFxL$	11.17	0.0001	Rejected	Causality

Source: Researchers' Computation

We continue in the analysis by performing the Pairwise Granger Causality test. It is a group and descriptive statistics. This is depicted in Table 5. Results depict that the probability of the causality from foreign exchange supply to foreign reserves is 0.99. This is not less than 0.05 and implies no causality and conversely the probability from foreign exchange reserves to foreign exchange supply is 0.03 which is less than 0.05 depicting causality. There is unidirectional causality between foreign exchange supply and foreign reserves running from foreign reserves to foreign exchange supply.

The probability of the causality from external reserves to foreign exchange demand is depicted as 0.03. This is less than 0.05 and depicts causality. However, the probability from foreign exchange demand to external reserves is 0.83 greater than 0.05 and depicting no causality. We conclude that there is unidirectional causality running from external reserves to foreign exchange demand.

Furthermore, the probability of the causality from exchange rate to external reserves is depicted as 0.02. This is not greater than 0.05 and depicts causality. On the contrary, the probability from external reserves to exchange rate is 0.43. This is not less than 0.05 and depicting no causality. This finding implies that there is unidirectional causality between external reserves and exchange rate running from exchange rate to external reserves.

Going further, the probability of the causality from foreign exchange reserves to foreign exchange liquidity is depicted as 0.001. This is not greater than 0.05 and depicts causality while on the contrary, the probability from foreign exchange liquidity to external reserves is 0.65 is greater than 0.05 and depicting no causality. Therefore, there is

evidence of unidirectional causality between external reserves and foreign exchange liquidity running from external reserves to foreign exchange liquidity.

4.2 Discussion of Findings

There is unidirectional causality between foreign exchange supply and foreign reserves running from foreign reserves to foreign exchange supply. Foreign reserves have driven the supply of foreign exchange while foreign exchange supplied did not drive foreign reserves. This implies that foreign exchange intervention through reserves has boosted supply of foreign exchange, however, no such corresponding boost from foreign exchange supply on reserves has been recorded.

There is unidirectional causality running from external reserves to foreign exchange demand. As explained above, while foreign reserves have triggered foreign exchange demand, yet foreign exchange demand has not accounted for the quantum of reserves over the years.

There is unidirectional causality between external reserves and exchange rate running from exchange rate to external reserves. While the rate of exchange has triggered foreign reserves, the reverse is the case for foreign reserves to stabilize exchange rate. Hence the incessant fluctuations and depreciation of the local currency over the years.
There is evidence of unidirectional causality between external reserves and foreign exchange liquidity running from external reserves to foreign exchange liquidity.

On the whole, foreign reserves have driven foreign exchange liquidity, while foreign exchange liquidity except for exchange rate has not driven foreign reserves. As more foreign reserves are employed to

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intervene in the foreign exchange to bring stability of the domestic currency and provide liquidity in the market, foreign exchange liquidity has not responded to facilitate and drive foreign reserves. This shows that the FEM is not really as liquid as it may be thought that it is. That is why the finding that exchange rate is not driven by the foreign reserves despite providing liquidity, is a source of worry to economic managers.

The results depict the following findings. There is a long run relationship existing between external reserves and foreign exchange liquidity.

5.0 CONCLUSION AND RECOMMENDATION

This study is concerned with ascertaining the causal relationship between foreign reserves and foreign exchange liquidity in Nigeria from 1970 to 2022. The descriptive and econometric statistics were adopted for data analysis. Results depict a long run relationship between the dependent and independent variables. On the whole, foreign reserves have driven foreign exchange liquidity, while foreign exchange liquidity except for exchange rate has not driven foreign reserves.

5.1 Policy Implication of Findings

Foreign exchange reserves policies put in place in the country have not provided exchange rate stability although intervention has provided liquidity in the foreign exchange market. It implies that foreign reserves alone cannot stabilize rate of exchange in the domestic economy and provide liquidity in foreign exchange. The liquidity in the foreign exchange market has driven foreign exchange and that depicts illiquidity in foreign exchange. That is, to say that foreign exchange demand is greater than foreign exchange supply and as such, exchange

rate stability remains unattainable. Therefore, the hitherto foreign exchange liquidity policies should have boosted the quantum of foreign reserves if such policies were efficacious. Hence proper liquidity policies have not been implemented. It is thus extended to mean that the policies so far implemented are not foreign reserves friendly.

5.2 Recommendations

The recommendation based on the findings as depicted above include that there is urgent need to review the existing foreign exchange liquidity policies so as to provide liquidity in the foreign exchange market and bring about exchange rate stability. Such policies should reflect the ideals of boosting and driving external reserves. There is the need to maintain a reasonable supply of foreign exchange so as to be able to contain the soaring demand for foreign exchange. This is necessary since foreign reserves intervention alone cannot provide the desired liquidity in the market. Diversification of the product base of the economy should be more pertinent now. This will generate more foreign exchange supply, stabilize the rate of exchange and boost liquidity in the foreign exchange market. This will no doubt enhance and engender more foreign reserves and boost succor a in the event of dire foreign exchange illiquidity.

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IS NIGERIA WORSE OFF OR BETTER OFF WITH FOREIGN AID ON ITS ECONOMIC GROWTH? (1981 TO 2021)

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ABSTRACT

The question of whether Nigeria's increasing foreign aid has an impact on its economic growth has been highly debated in recent years. This study examines the impact of foreign aid on Nigeria's economic growth using annual time series data obtained from the World Development Indicators, World Bank for the period, 1981 to 2021. The variables used in the study include annual GDP per capita growth rate as the dependent variable. The independent variables were net official development assistance received, external debt stock, capital and labour force. Government expenditures and trade openness are the control variables. Official development assistance and external debt stock were used to capture foreign aid. The study employed, the Autoregressive Distributed

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Lag (ARDL) model for estimation, and the empirical findings show a significant and negative impact of foreign aid on the economic growth of Nigeria. Specifically, official development assistance had a negative and significant impact on economic growth in the short run while its impact in the long run is insignificant. Similarly, external debt stock had a negative and significant impact on economic growth both in the long run and in the short run. This evaluation conducts a thorough analysis of the nation's economic growth, and based on its findings, it recommends that the government should diversify sources of funding and not over-rely on foreign aid to achieve economic growth. Also, foreign aid should be strategically allocated with much focus on productive investments with the potential to accelerate growth. In addition to that, more emphasis should be given to encouraging domestic investment, encouraging exports, and allocating aid to productive investments which can potentially have a positive effect on economic growth.

Keywords: *Foreign aid, Development assistance, External debt, Foreign inflows, Foreign capital, Economic growth, ARDL,*

1.0 Introduction
1.1 Background
Countries around the world, both developed and developing, are now connected as a result of globalisation. Therefore, in situations where developing countries are unable to meet the needs of the population and achieve economic growth, they may receive assistance from developed countries (Pohwani, Khoso & Ahmed, 2019). Amongst ways in which developed countries can assist developing countries is by giving aid mostly referred to as foreign aid which can encourage developing countries to invest in various initiatives that will benefit their citizens and boost their countries economically thus reducing the saving and investment gap and leading to economic growth as a result of an increase in the physical capital stock. Additionally, foreign aid enables developing nations to buy capital goods, which boosts economic production and raises their citizens' standards of living and well-being (Abbas, Abbas & Abbassi, 2022). Early literature provided evidence that foreign aid

stimulates economic growth in recipient nations by encouraging the build-up of physical capital. In addition to improving population welfare and achieving economic growth objectives, foreign aid also helps many developing countries to close the technological gap, increasing capital productivity and igniting domestic technological revolution. This is mainly because it supplements domestic savings and resources thus it is safe to say that foreign aid typically promotes growth (Abbas, Abbas & Abbassi, 2022).

Foreign aid is assistance provided by donor nations and multilateral organizations to promote the welfare and economic growth of developing nations (OECD, 2020). It manifests itself as loans, project assistance, food support, relief in emergencies, and bilateral grants as well as multilateral flows and technical support (Anyanwu & Wabekwa, 2022). Aid is distributed under diverse goals and factors, and takes many different forms, including bilateral grants, multilateral flows, loans, project aid, food aid, emergency relief, and technical help. As discussed by Anyanwu and Wabekwa, 2022), foreign aid is a crucial component for facilitating economic activities in the countries receiving it. It also plays a crucial role in bolstering domestic resources to help developing countries overcome their problems with savings and foreign exchange. Developing nations do not have sufficient domestic savings to meet their investment opportunities or do not have foreign exchange to finance necessary capital goods imports (Todaro and Smith, 2009). When imports rise and investment needs materialise, foreign aid is useful for bridging the savings and foreign exchange gaps.

According to the World Bank's compilation of development indicators, derived from officially recognized sources (World Bank, 2023), net official development assistance and official aid received (current US dollars) in Nigeria was recorded at 3357189941 USD in 2021. To support economic growth and welfare in the nations and territories on the Development Assistance Committee (DAC) list of ODA recipients, official agencies of the members of the (DAC), multilateral organizations, and non-DAC countries disburse grants and loans on favourable terms (net of principal repayments). It covers loans having at least a 25% grant

component, calculated at a 10% discount rate. Net official assistance covers loans having at least a 25% grant component, calculated at a 10% discount rate. Net official assistance is the term used to describe aid flows (net of repayments) from official donors to some advanced developing nations and territories as well as countries and territories in Central and Eastern Europe.

However, the relationship between foreign aid and economic growth is still very weak compared to that of other low-income nations, and the foreign aid's impact on the economy is so negligible and ineffective that an empirical time series study looking at how foreign aid affects economic growth in Nigeria is now necessary. Furthermore, some scholars claim that while foreign aid is a significant source of money for development, Nigeria in particular has not taken full advantage of the chance hence the projected results from this external assistance were not appropriately apportioned (Girma, & Tilhun, 2022). According to recent publications, the erratic character of aid does not benefit economies in a good way, leading to macroeconomic volatility and, as a result, making foreign aid a vulnerability instrument for emerging economies like Nigeria, especially Aldashev and Verardi (2012). Many researchers have debated the foreign aid and economic growth nexus using the case of multiple countries but few studies focused on the case of a single country (Mohapatra, & Sehrawat, 2016). This study therefore contributes to knowledge by examining the long-run and short-run effects of foreign aid on the economic growth of Nigeria for the period 1981 to 2021. Specifically, the study analyses the long-run and short-run effects of official development assistance on the economic growth of Nigeria and also determines the impact of external debt on the economic growth of Nigeria

2.0 Review of related literature
Using official development assistance and external debts to represent foreign aid, many scholars have determined the effect of foreign aid on economic growth, with contradicting views. While some studies suggest that foreign aid affects economic growth positively, others suggest the existence of a negative effect. Ogbonna et al (2021) carried out a study on

the effect of institutional quality on the relationship between foreign aid and economic growth in Africa using the generalized method of moment estimation technique and a panel of 40 nations over the period 2010-2018. They found out that the quality of institutions should improve the effect of foreign aid on economic growth and also improve the threshold level. Chomen et al (2023) analysed the impact of foreign aid and remittances on economic growth in the short-run and long-run in a panel of 31 African nations from 1980 to 2019 and using the ARDL Pool Mean Group(PMG) estimation technique it was established that, in the short-run, remittance, and foreign aid respectively harm economic growth and are statistically insignificant meanwhile in the long run remittances have a positive and significant impact on economic growth while foreign aid's impact on economic growth is positive but insignificant on the continent and was proposed that African governments should adopt effective policies to maximize the usefulness and effectiveness of foreign capital such as foreign aid and remittances in boosting economic growth.

Mansoor et al (2018) determined the effect of foreign aid and its volatility on the Pakistan economy from 1972-2015 and the Generalised Method of Moments was employed. They found out that both foreign aid and its volatility negatively impacted growth and recommended that favourable environmental policies can increase the effectiveness of foreign aid. Additionally, Babalola and Shittu (2020) used panel data from the World Bank's world development and governance indicators from 1996 to 2017 to determine the relationship between foreign aid and economic growth in 16 West African nations. They also used the autoregressive distributed lag technique to analyze the role of institutions in this relationship. Governments should focus their efforts on developing strong economic, social, and political institutions to effectively use both domestic and foreign capital to reduce reliance on foreign aid. Foreign aid has a neutral effect on economic growth and turns negative when institutional values are applied. However, the interaction effect of foreign aid and institutional policies on economic growth reduces the negative effect of foreign aid on economic growth.

Nwude et al. (2022) used the level of income, labour participation rate, and domestic capital formation as control variables to determine the effects of foreign aid on economic growth in Sub-Saharan African nations categorized based on their colonial past. The structural model was empirically evaluated using annual data from 1982 to 2018 and the Pooled Mean Group Estimation method. It was determined that only bilateral foreign aid significantly positively influenced growth in low-income, low-middle-income, and upper-middle-income nations over the long and short terms, respectively, and that bilateral foreign aid had strong positive effects on economic growth for francophone SSA nations while multilateral aid had strong negative effects on Anglophone SSA nations. It was concluded that to ensure increased amounts of productivity more bilateral aid is needed. Girma and Tilahun (2022) determined the impact of foreign aid flow on economic growth in Ethiopia which is Ethiopia's macroeconomic policy environment. To achieve this, the autoregressive distributed lag (ARDL) approach was employed using data for the period 1985-2019. Findings revealed that foreign aid has a positive role in economic growth in the long run but its short-run effect was found to be insignificant. In addition to that, the predictability of foreign aid in the long run and short run has a positive effect both on economic growth, also the macroeconomic policy index has a positive effect in the long run, but its short-run effect becomes negative. Finally, it was recommended that governments should allocate external assistance to successful development projects rather than simply on consumption.

Hossain et al. (2022) used the ARDL bounds test approach to determine the effect of foreign aid on Bangladesh's economic growth between 1971 and 2019. The study also tested for the existence of a unit root and used the ARDL bound test for cointegration. It has been determined that both in the short and long terms, foreign aid significantly and favourably affects Bangladesh's economic growth. Asaleye et al. (2023) determined the asymmetric and shock effect of aggregated aid inflows and sectorial aid disbursement on growth and employment in Nigeria using a non-linear Autoregressive Distributed Lags and Vector Error Correction model and the study suggested the need to safeguard the aid inflow into the country and channel it to promote pro-growth in human capital

formation to ensure long-term employment growth, especially education and health aid. Eze et al (2020) carried out a study on how disaggregated foreign aid divisions impacted growth in Nigeria from 1995-2017 using time series data. The Canonical Cointegrating Regression technique was employed to guarantee the robustness of the estimates. From the study, only education aid drives economic growth significantly in Nigeria and they concluded that foreign aid's effect on the Nigerian economy depends on the aid type being considered.

Other authors carried out comparative studies on foreign aid between the two nations, Sethi et al (2019) analysed the relationship between foreign aid and Overseas Development Assistance and economic growth for India and Sri Lanka using annual data from 1960- 2015 and employing the Johansen and Juselius 1990 procedure of testing for the presence of multiple cointegrating vectors and the Vector Error Correction-granger causality test to find out the short run dynamic equilibrium relationships among variables. Results revealed the relationship between foreign aid, economic growth, and other variables in the short and long run in both nations. The relationship between foreign aid and Nigeria's economic growth for the period 1984 to 2017 was explored by Duru *et al* (2020). The Autoregressive Distributed Lag (ARDL) Bound method to cointegration was used and it was established that foreign aid did not contribute to economic growth in both the long run and the short run. Abbas et al (2022) carried out a study investigating the effect of foreign aid on growth considering the role of democracy in some developing nations from 2006-2018 employing the generalized method of the moments test and the results revealed that foreign aid is not beneficial to the growth of some selected developing economies whereas democracy's effect on growth is positive thus donors should consider democratic attributes to make decisions about foreign aid towards developing nations.

Using the Non- linear Autoregressive Distributed Lag model for the period 1985-2018, Anyanwu and Wabekwa (2022) analysed the pattern of asymmetric relationship between foreign aid and economic growth in five aid-receiving nations in the West African Monetary Zone. They found out that multilateral aid positively and significantly impacted

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growth, meanwhile bilateral aid positively impacted growth but the impact was insignificant. They concluded that multilateral aid is more useful to WAMZ economies and bilateral donors should channel their funds through multilateral aid agencies like IMF and World Bank. Han et al (2022) focused on the role of foreign capital which includes foreign direct investment, foreign aid, and poverty alleviation in developing and underdeveloped nations using panel data from 1995-2018 for 71 nations.

They employed the following dynamic ordinary least square, fully modified ordinary least square, dynamic fixed effect, and pooled mean group regression method. From the long-run estimation, it revealed that foreign direct investment could significantly alleviate poverty but increase poverty in the short run but foreign aid plays no significant role in poverty alleviation. It was proposed that policymakers should look at a new paradigm of developmental assistance and the government should also create an aiding environment for foreign investment to support their growth plan. A study to determine whether the complementarity between financial development and foreign aid promotes economic growth was carried out by Tsaurai (2018) in selected emerging markets using the Panel Fully Modified Ordinary Least Square approach for the period 1994-2014. This paper sought to determine the role of financial development in the aid-growth nexus asking if financial development is the channel through which foreign aid positively influences economic growth. The results revealed that complementarily foreign aid and financial development positively and significantly impact growth. It was recommended, to allow foreign aid to positively contribute towards economic growth, that emerging economies should implement policies that will deepen the financial sector.

3.0 Methodology
3.1   Model specification
This study uses the exogenous growth model propounded by Solow and Swan (1956) to analyse how foreign aid affects Nigeria's economic growth. The Solow growth model was initially developed to explain how changes in an economy's capital stock, labour force, and improvement in technology interact and impact a country's overall output of goods and

services (Mankiw, 2002). The study also employed the Cobb-Douglass production function in Equation (1) to develop the econometric model to be used in the investigation.

$$Y_t = A_t K_t^{\alpha} L_t^{\beta} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Where: Yt is Output at time (t): A, K, and L are the total productivity factor, capital stock at time t, and labour force at time t respectively. While α and β are the elasticity of K and L respectively.

The growth function specification of the equation is stated as follows

$$Y_t = f(A, k, L)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(2)$$

Taking the logarithm of both sides, the equation can be stated as:

$$LnY = LnA + \propto LnK + \beta LnL \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.....(3)$$

According to the Solow growth model, the total production of a country is principally determined by the stock of physical capital, which changes over time and is likely to result in economic growth. The model also considers Investment as one of the variables that influences a country to increase its capital stock (Mankiw, 2002). Investment, therefore, has the potential to positively affect the gross domestic product of a country by expanding the stock of physical capital of the country. Public investment is financed through a variety of means, including development assistance, External debts and taxation, amongst others. Using development assistance and external debt as a proxy for foreign aid, equation (4) below describes the empirical model for how foreign aid affects economic growth.

$$LnGDPGR_t = \beta_0 + \beta_1 LnODA_t + \beta_2 LnDS_t + \beta_3 LnFCF_t + \beta_4 LnPGR_t + \beta_5 LnGVEX_t + \beta_6 LnOPEN_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4)$$

Where: GDPR represents the economic growth of the country, proxied by Gross Domestic Product (GDP) per capita growth (annual %), LODA is official development assistance captured by Net Official Development Assistance received (% of GNI), LDS is External debt represented by External debt stocks (% of GNI), LFCF is Capital represented by Gross fixed capital formation (% of GDP), LGVEX is Government expenditure

captured by General government final consumption expenditure (% of GDP), LPGR is Population growth rate captured by Population growth (annual %), LOPEN stands for trade openness represented by Trade (% of GDP)

3.2   Data and variables

The analysis in this study is done using time series data of Nigeria for the period 1981 to 2021. These data were obtained from the World Development Indicators (WDI), World Bank. Table 1 describes the variables used in this study.

Table 1: Variables and data source

Variable	Measurement	Definition
Economic Growth (GDPGR)	GDP per capita growth (annual %)	Annual percentage growth rate of GDP per capita based on constant local currency
Development assistance (ODA)	Net ODA received (% of GNI)	Disbursements of loans made on concessional terms (net of repayments of principal) and grants.
External debt (DS)	External debt stocks (% of GNI)	Total external debt stocks to gross national income.
Capital (FCF)	Gross fixed capital formation (% of GDP)	Includes land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.
Labour Force (LF)	Population growth (annual %)	The exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage

Government Expenditure (GVEX)	General government final consumption expenditure (% of GDP)	All government current expenditures for purchases of goods and services
Trade Openness (OPEN)	Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of the gross domestic product

Source: Authors' construct using MsWord

3.3   Estimation technique

To examine the effect of foreign aid on the economic growth of Nigeria, this study applies the Autoregressive Distributed Lag (ARDL) model as proposed by Pesaran et al. (2001).To apply the ARDL bound test, numerous steps were implemented as seen below.

3.3.1 Unit root test

It is generally recommended to carry out unit root tests for stationarity of the time series data under consideration to determine their order of integration before conducting the ARDL cointegration test. The unit root test is carried out using the Augmented Dickey-Fuller (ADF) test for each variable in the model. The ADF model is stated in Equation (5) as follows:

$$\Delta Y_t = \gamma_0 + \alpha t + \gamma_1 Y_{t-1} + \beta_i \sum_{i=1}^{n} \Delta Y_{t-i} + \varepsilon_t \cdots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

The unit root test carries the lagged difference terms to examine the order of autocorrelation. The maximum number of lags is used based on the Akaike info criterion (AIC) determined through the lag order selection criteria. To apply the ARDL approach and to avoid spurious results, all the variables used in the regression model should not be stationary at order two (I(2), because the computed F-statistics provided by Pesaran et al. (2001) are valid only when the variables are stationary at level I(0) or at first difference I(1). According to literature, when all variables are stationary at level then the ordinary least square method is used. If all the variables are integrated at order one I(1), then the Johansen co-integration test is suitable. Pesaran et al., (2001) have given their consent that none

of the variables should be integrated in the order I(2) in the ARDL Bounds Test. If the variables are integrated at order two I(2), they would nullify the methodology of the technique(Hossain, Hossain, Islam, & Sultanuzzaman, 2022).In this study, the variables are stationary either at order I(0) or order I(1), therefore we have applied the ARDL Bounds Test.

3.3.2 Co-integration with ARDL

This method is chosen above many other conventional methods because it relaxes some assumptions that other conventional methods such as the Johansen co-integration tests by Johansen (1991) and the Engle and Granger approach by Engle and Granger (1987) do not. This method does not provide any assumption that all the variables under consideration must be integrated in a particular order. It allows for the variables to be integrated at order zero (I(0)), one (I(1)), or a combination of the two (I(0) and I(1)). In addition to that, the short-run and long-run coefficients of the explanatory variables are revealed simultaneously by this model. Also, the ARDL bounds test makes it easier to derive reliable estimates with a small sample size. However, it is impossible to extend this model if any variable is integrated in the second order I(2) or above (Golder, Sheikh, & Sultana, 2021). In addition, the main objective of this study is to examine the effect of foreign aid on the economic growth of Nigeria. While modelling the effectiveness of foreign aid, some studies include the lagged forms of both dependent and independent variables as extra predictors because foreign aid does not just have an immediate effect on economic growth but also has long-term effects. This issue can be automatically handled in the ARDL sense because the method is dynamic and openly considers the behaviour of the variable across a measurable period (Mustafa, Elshakh, & Ebaidalla, 2019).

To investigate the long-run relationship among the variables in Equation 4, the ARDL bounds test for the cointegration can be specified in Equation (6) as follows:

$$\text{LnGDPGR}_t = \theta_1 + \sum_{i=1}^{n} \vartheta_1 \Delta \text{LnGDPGR}_{t-i} + \sum_{i=0}^{n} \vartheta_2 \Delta \text{LnODA}_{t-I}$$
$$+\sum_{i=0}^{n} \vartheta_3 \Delta \text{LnDS}_{t-i} \quad +\sum_{i=0}^{n} \vartheta_4 \Delta \text{LnFCF}_{t-i} +\sum_{i=0}^{n} \vartheta_5 \Delta \text{LnPGR}_{t-i}$$
$$+\sum_{i=0}^{n} \vartheta_6 \Delta \text{LnGVEX}_{t-i} +\sum_{i=0}^{n} \vartheta_7 \Delta \text{LnOPEN}_{t-i} + \delta_1 \text{LnGDPGR}_{t-1}+$$
$$\delta_2 \text{LnODA}_{t-1}+ \delta_3 \text{LnDS}_{t-1}+ \delta_4 \text{LnFCF}_{t-1} + \delta_5 \text{LnPGR}_{t-1}+ \delta_6 \text{LnGVEX}_{t-1}+$$
$$\delta_7 \text{LnOPEN}_{t-1}+\tau_{1t}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Where Δ is a first-difference operator, and n is the optimal lag length. Analysing the presence of the long-run relationship amongst the variables in the above equations is done using the bounds testing procedure, which is the first stage in the ARDL cointegration method. It is based on the F-test statistic. Both the long-run and short-run parameters are combined in each equation. The hypotheses are stated as:

H_0: $\vartheta_2 = \vartheta_3 = \vartheta_4 = \vartheta_5 = \vartheta_6 = \vartheta_7 = 0$. (No Cointegration exists among the variables)

H_1: $\vartheta_2 \neq \vartheta_3 \neq \vartheta_4 \vartheta_5 \neq \vartheta_6 \neq \vartheta_7 \neq 0$. (Cointegration exists among the variables)

Two bounds of critical values are computed by Pesaran et al. (2001) for decision rule. The lower bound accepts that all the variables are I(0) and the upper bound assumes they are all I(1). If the computed F - statistic is greater than the upper critical value, there is cointegration. But when the F-statistic is between the two bounds of critical values, the analyses become inconclusive. Lastly, when the F - statistic is less than the lower critical value, it suggests no cointegration.

3.3.4 ARDL short-run and long-run parameters
The ARDL short-run and long-run are used to determine the effect of foreign aid on Nigeria's economic growth. It estimates the long-run and short-run effects of development assistance and economic growth and also the long-run and short-run effects of external debt stock on economic growth. If the bounds test in equation (6) revealed the absence of cointegration among the variables, the procedure terminates. However, if it was established that there is cointegration among the variables in the model, the short-run and long-run parameters, which reflect the impact of each variable on economic growth in the short-run and long run

respectively can be evaluated (Duru *et al*, 2020). ARDL's long-run model for LnGDPGR can be estimated as seen in Equation (7).

$$\text{LnGDPGR}_t = \delta_1 + \sum_{i=1}^{n} \delta_1 \text{LnGDPGR}_{t-i} + \sum_{i=0}^{n} \delta_2 \text{LnODA}_{t-i} + \sum_{i=0}^{n} \delta_3 \text{LnDS}_{t-i} + \sum_{i=0}^{n} \delta_4 \text{LnFCF}_{t-i} + \sum_{i=0}^{n} \delta_5 \text{LnPGR}_{t-i} + \sum_{i=0}^{n} \delta_6 \text{LnGVEX}_{t-i} + \sum_{i=0}^{n} \delta_7 \text{LnOPEN}_{t-i} + \tau_{1t} \ldots \ldots \ldots \ldots (7)$$

This involves selecting the orders of ARDL (n, n_1, n_2, n_3, n_4, n_5, n_6, n_7) models using the Akaike info criterion (AIC). In the final step, short-run elasticities will be estimated. The estimation of an error correction model associated with the long-run estimates was done to find the dynamics of the short-run parameter. In this case, causality is established using an error correction model associated with the long-run estimates as described in equation (8) below.

$$\Delta \text{LnGDPGR}_t = \theta_0 + \sum_{i=1}^{n} \vartheta_1 \Delta \text{LnGDPGR}_{t-i} + \sum_{i=0}^{n} \vartheta_2 \Delta \text{LnODA}_{t-i} + \sum_{i=0}^{n} \vartheta_3 \Delta \text{LnDS}_{t-i} + \sum_{i=0}^{n} \vartheta_4 \Delta \text{LnFCF}_{t-i} + \sum_{i=0}^{n} \vartheta_5 \Delta \text{LnPGR}_{t-i} + \sum_{i=0}^{n} \vartheta_6 \Delta \text{LnGVEX}_{t-i} + \sum_{i=0}^{n} \vartheta_7 \Delta \text{LnOPEN}_{t-i} + \emptyset \text{ECT}_{t-1} + \tau_{1t} \ldots \ldots \ldots (8)$$

Where θ_1, θ_2, θ_3, θ_4, θ_5, θ_6, θ_7, are the short-run dynamic coefficients of the model's convergence to equilibrium, and Ø is the speed of adjustment coefficient to long-run equilibrium following a shock to the system.

3.3.5 Diagnostic and stability test:

The study did diagnostic tests to see whether the coefficients of the estimations were consistent and reliable enough to be used for drawing economic conclusions. To ascertain the OLS assumption on the error term, the study used the Breuch-Godfrey serial correlation test and the Lagrange multiplier test for heteroscedasticity (ARCH) on the residuals. We employed the Ramsey RESET test to make sure the error term was supplied appropriately. The normality test was performed using the Jarque-Berra statistic, which helps to ascertain whether the sample data's skewness and kurtosis reflect a normal distribution.

Also, the cumulative sum of squares (CUMSUM) and the cumulative sum squares recursive (CUMSUMSQ) tests proposed by Borensztein et al. (1998) to check the stability of the long-run parameters and the short-run movements were used. With the CUSUM test, it is possible to detect systematic changes in the regression coefficients, while the CUSUMSQ test is useful when the deviation from the consistency of the regression coefficients is random and abrupt (Pesaran & Pesaran, 2009) as cited in Ojambo (2009).

4.0 Findings and Discussion
4.1 Descriptive statistics
The descriptive statistics of the variables were calculated to know the nature of the data before analysis was made. Table 2 below shows the mean, median, standard deviation, and Jarque-Bera statistics for the variables under consideration.

Table 2: Descriptive statistics

	LNGDPGR	LNODA	LNDS	LNFCF	LNGVEX	LNPGR	LNOPEN
Mean	1.159512	1.220856	1.634161	1.687002	1.294135	1.269924	1.661974
Median	1.235095	1.216492	1.607039	1.691147	1.257833	1.269580	1.696529
Std. Dev.	0.314224	0.021678	0.254090	0.149360	0.060497	0.002845	0.124781
Jarque-Bera	707.9716	364.6748	3.412575	1.502480	4.713084	6.193803	3.722123
Probability	0.000000	0.000000	0.181538	0.471781	0.094747	0.045189	0.155507

Source: Authors' construct using Eviews

The results of the Jarque-Bera test show that external debt stock, fixed capital formation, government expenses, and trade openness were found to be normally distributed. However, the GDP per capita growth rate, official development assistance, and population growth rate were not normally distributed. We proceeded with the analysis since we will crosscheck it after running our model.

4.2 Correlation analysis

Correlation analysis was carried out to investigate the strength and direction of the linear relationship between the variables under consideration. The correlation matrix in Table 3 does not show any sign of a strong correlation between the variables.

Table 3: Correlation matrix

t-Statistic	LNGDPGR	LNODA	LNDS	LNFCF	LNGVEX	LNPGR	LNOPEN
LNGDPGR	1.000000						
LNODA	0.187507	1.000000					
LNDS	0.136111	-0.173326	1.000000				
LNFCF	-0.552336	-0.258869	0.498408	1.000000			
LNGVEX	0.199748	0.216352	-0.794945	-0.740788	1.000000		
LNPGR	-0.317434	0.010725	-0.375514	0.080354	0.156413	1.000000	
LNOPEN	0.413278	0.238677	0.080191	-0.488455	0.161191	0.101901	1.000000

Source: Authors' construct using Eviews

4.3 Lag Order Selection

The vector autoregression (VAR) lag order selection criteria was used to determine the minimum lag to be considered for the study. Table 4 shows the lag order for the different criteria. This study used the Akaike Information Criteria (AIC) which is lag 3 since it had the lowest value among the various criteria (-33.44612).

Table 4: Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	489.5412	NA	2.20e-20	-25.39691	-25.09525	-25.28958
1	653.0386	258.1538	5.56e-23	-31.42309	-29.00980*	-30.56446
2	715.9841	76.19711*	3.51e-23	-32.15706	-27.63215	-30.54713
3	789.4763	61.88823	2.21e-23*	-33.44612*	-26.80959	-31.08489*

Source: Authors' construct using Eviews

* indicates the optimal lag selected by the criterion

LR: sequential modified LR test statistic (each test at 5% confidence level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

4.4 Unit Root

The results of the unit root test conducted on the variables are presented in Table 5. The ADF test was employed to test for unit root using the minimum lag length earlier selected. The test results revealed that the variables were stationary at level I(0) or at first difference I(1). LnGDPGR was stationary at order zero I(0) while the other variables were all stationary at order one I(1).

Table 5: Unit Root Test Results

Variables	LnGDPGR	LnODA	LnDS	LnFCF	LnGVEX	LnPGR	LnOPEN
ADF	-9.659420 *** (0.0000)	-4.498497 *** (0.0048)	-4.538310 *** (0.0043)	-5.465902 *** (0.0003)	-6.463821 **** (0.0000)	-1.883375 *** (0.6423)	-4.232039 ** (0.0113)
ORDER	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)

Source: Authors' Construct using Eviews 10 (2023)

Notes:
- 1% level = ***, 5% level = ** and 10% level of significance = * (indicates the significance of all p-values at the respective degree of freedom).
- Null hypothesis: The Series has a unit root.
- ADF represents Augmented Dickey-Fuller.
- The decision is taken based on p-values.

4.5 Bound test to Cointegration

The Bounds test was conducted to investigate the existence of cointegration among the variables in the model. The estimated F-statistic

for the joint test of the coefficients ϑ_2, ϑ_3, ϑ_4, ϑ_5, ϑ_6, ϑ_7 was 15.29353. The critical values for the lower and upper bounds at a 95 percent significance level were 2.45 and 3.61 respectively. Table 6 shows the results of the bounds test.

Table 6: Results of bound testing

Test Statistic	Value	Significance Level	Lower Bound I(0)	Upper Bound I(1)
F-statistic	15.29353	10%	2.12	3.23
K	6	5%	2.45	3.61
		1%	3.15	4.43

Critical value bounds for the F-statistic at 95% confidence level from Pesaran, Shin, and Smith (2001).

Source: Authors' Construct using Eviews 10 (2023)

The computed F-statistic value is compared with the lower bound and upper bound critical values provided by Pesaran et al. (2001) and Narayan (2004). The bound test results show that the F-Statistic value is greater than the lower and upper bounds critical values at the different levels of significance. This means that we reject the null hypothesis of no cointegration and accept the alternative that the variables in the model are cointegrated in the long run. This justifies the estimation of the long-run and short-run coefficients of the growth equation through the ARDL cointegration method.

4.6   Long-run ARDL model estimation
After confirming the existence of cointegration among the variables from the bound test, it is necessary to estimate the ARDL model to find out the long-run coefficients of the variables as presented in Table 7.

Table 7: Estimated long-run coefficients in ARDL (3, 0, 1, 0, 0, 0, 2)

Dependent variable	LNGDPGR			
Variable	Coefficient	Standard Error	t-Statistic	P-value
LNODA	-1.733740	0.859496	-2.017157	0.0545
LNDS	-0.633744	0.227335	-2.787704	0.0100

	Coefficient	Standard Error	t-Statistic	P-value
LNFCF	0.700484	0.345699	2.026284	0.0535
LNGVEX	-1.489847	0.630948	-2.361284	0.0263
LNPGR	23.71477	7.029867	3.373431	0.0024
LNOPEN	0.160765	0.190024	0.846022	0.4056

Source: Authors' Construct using Eviews 10 (2023)

The long-run results reveal that LNDS and LNGVEX have significant and negative effects on LNGDPGR in the long run at 1% and 5% levels of significance respectively. LNPGR has a positive and significant effect on economic growth at a 1% level of significance. However, LNODA has a negative and insignificant effect on economic growth in the long run.

4.7   Short-run ARDL model estimation

The variables have long-run as well as short-run relationships. Table 8 shows the short-run relationship among the variables.

Table 8: Estimated short-run results in ARDL (3, 0, 1, 0, 0, 0, 2)

Dependent Variable LNGDPGR				
Variable	Coefficient	Standard Error	t-Statistic	P-value
LNGDPGR(-1)	-0.108963	0.135001	-0.807125	0.4272
LNGDPGR(-2)	0.119688	0.086953	1.376465	0.1809
LNGDPGR(-3)	0.161163	0.080324	2.006411	0.0557
LNODA	-1.435730	0.629531	-2.280632	0.0314
LNDS	-0.794382	0.210567	-3.772586	0.0009
LNDS(-1)	0.269571	0.207700	1.297885	0.2062
LNFCF	0.580079	0.265698	2.183225	0.0386
LNGVEX	-1.233760	0.486853	-2.534154	0.0179
LNPGR	19.63847	6.044291	3.249095	0.0033
LNOPEN	0.003524	0.159358	0.022117	0.9825
LNOPEN(-1)	0.337776	0.187041	1.805894	0.0830
LNOPEN(-2)	-0.208169	0.148156	-1.405067	0.1723
C	-20.86642	7.625286	-2.736478	0.0113

Source: Authors' Construct using Eviews 10 (2023)

The short-run ARDL results revealed that LNODA affects LNGDPGR negatively in the short run. LNDS and LNGVEX also have a significant negative effect on LNGDPGR. The results also revealed that LNFCF and

LNPGR significantly affect LNGDPGR positively in the short run. Table 9 presents the results of the error correction model. From the estimated error correction model results, the figure of the error correction coefficient is -0.828112 and highly significant at a 1% level of significance. This shows a faster and stronger speed of adjustment to equilibrium. This means that 83% of the disequilibrium in the short-run converges back to the long-run equilibrium within 1 year.

Table 9: Estimated Error correction model, ARDL (3, 0, 1, 0, 0, 0, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-20.86642	1.811710	-11.51753	0.0000
D(LNGDPGR(-1))	-0.280851	0.072168	-3.891641	0.0007
D(LNGDPGR(-2))	-0.161163	0.057561	-2.799859	0.0097
D(LNDS)	-0.794382	0.133199	-5.963869	0.0000
D(LNOPEN)	0.003524	0.121455	0.029019	0.9771
D(LNOPEN(-1))	0.208169	0.119645	1.739885	0.0942
CointEq(-1)*	-0.828112	0.071875	-11.52163	0.0000

Source: Authors' Construct using Eviews 10 (2023)

4.8 Diagnostic tests for the ARDL model

Several diagnostic tests were conducted on the model. Table 10 shows the diagnostic test results which include tests for serial correlation, heteroskedasticity, ARCH effect, normality, and omitted variables.

Table 10: Diagnostic tests for ARDL model

Test	Test – Statistic	P-Value	Null Hypothesis	Result
Breusch-Godfrey Serial Correlation LM Test	0.397561	0.7561	H_0: There is no serial correlation	Accept the null hypothesis
Heteroskedasticity test: Breusch-Pagan-Godfrey	0.960073	0.5088	H_0: There is no heteroskedasticity	Accept the null hypothesis
Heteroskedasticity test: ARCH	1.078050	0.3728	H_0: There is no ARCH effect	Accept the null hypothesis

|				
Jarque-Bera test for Normality	0.382611	0.825880	H_0: The distribution is normal	Accept the null hypothesis
Ramsey RESET Test	0.906534	0.4539	H_0:The model has no omitted variables	Accept the null hypothesis

Source: Authors' Construct using Eviews 10 (2023)

Serial correlation was tested using the Breusch-Godfrey Serial Correlation LM Test which has a null hypothesis that there is no serial correlation in the model. The test results show a P-value of 0.7561 which is greater than 5%, the selected level of significance. We therefore accept the null hypothesis which means that the model is free from serial correlation. Secondly, the Breusch-Pagan—Godfrey test was employed to test for the presence of heteroskedasticity in the model. The null hypothesis in this test is that there is no heteroskedasticity in the model. The test results revealed that there is no heteroskedasticity as the P-value was 0.5088 which is greater than the 5% level of significance. The ARCH test was also conducted to investigate if the model is suffering from ARCH effect. The null hypothesis states that there is no ARCH effect in the model. The results revealed the absence of ARCH effect in the model as the P-value was 0.3728 greater than 5% level of significance so we accepted the null hypothesis. It was also necessary to test if the model is normally distributed. This was done using the Jarque-Bera test for normality which has a null hypothesis stating that the model is normally distributed. The P-value of 0.4539 which is above 5% significance level means the distribution is normal. The Ramsey RESET test was to ensure the model has no omitted variables. The test result revealed there are no omitted variables in the model as the P-value was 0.4539 greater than the selected level of significance, therefore we accepted the null hypothesis and rejected the alternative meaning that no variables are omitted from the model.

4.9   Stability diagnosis test

To ascertain the robustness of the long-run dynamics and short-run results of the model, we employed the stability test based on the cumulative sum of recursive residuals (CUMSUM) and cumulative sum of recursive residuals of squares (CUMSUMQ) following the study of Pesaran et al. (1997) and Brown et al. (1975). Figure 1 and Figure 2 show the graphical representation of CUMSUM and CUMSUMQ respectively.
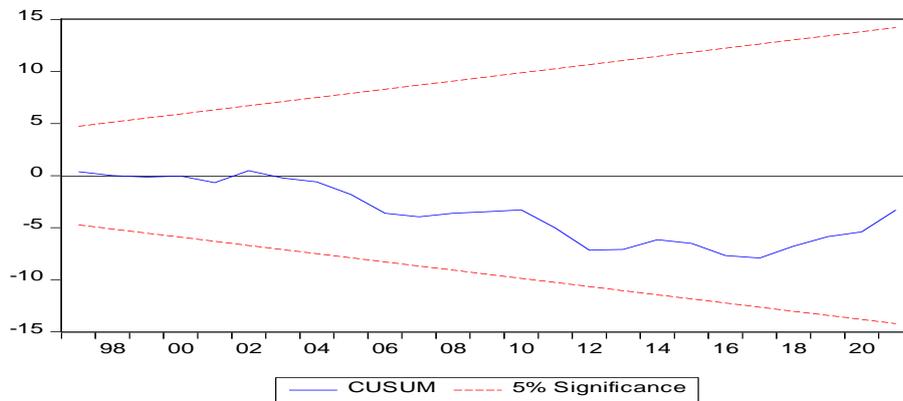
Source: Authors' Construct using Eviews 10 (2023)

Fig 1: Plot of the cumulative sum of recursive residuals
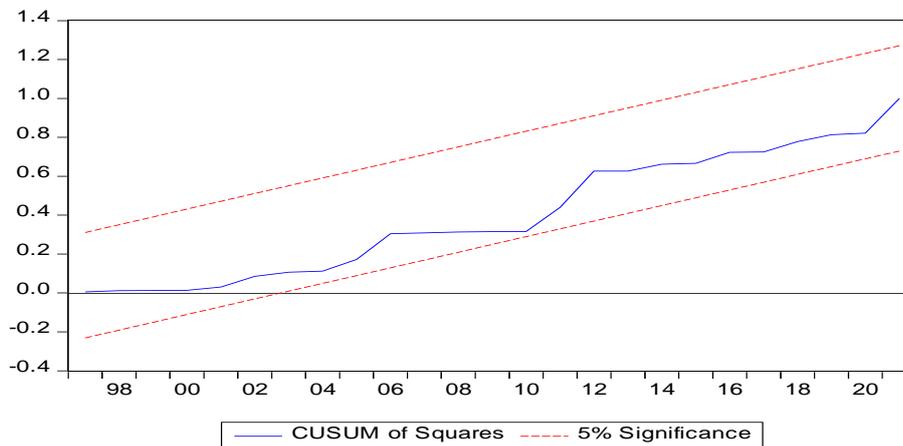
Source: Authors' Construct using Eviews 10 (2023)

Fig 2: Plot of the cumulative sum of squares of recursive residuals square

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In research generally, the constancy of the parameter and stability of the model is confirmed if the plot of the CUMSUM and CUMSUMQ lies within the critical bound of 5% (Hossain *et al*, 2022). Both graphs in Figure 1 and 2 show the CUMSUM and CUMSUM of squares respectively in the blue line which falls within the 5% significance level plotted in red. This implies that the model is stable.

5.0 Summary of Findings

The study primarily focuses on the impact of the effect of foreign aid on Nigeria's economic growth from 1981 to 2021. Specifically, the study examines the long-run and short-run effects of development assistance on Nigeria's economic growth and the effect of external debt on Nigeria's economic growth. The dependent variable is the annual growth rate of GDP per capita (LNGDPGR) as a proxy for Economic growth, The independent variables are net official development assistance received (LNODA) as a proxy for development assistance, external debt stock (LNDS) as a proxy for external debt, gross fixed capital formation (LNFCF) as a proxy for capital.

The control variables are population growth rate (LNLF) as a proxy for labour force and general government final consumption expenditure (LNGVEX) as a proxy for government expenditure and trade (LNOPEN) as a proxy for trade openness. Data was extracted from world development indicators (WDI) and estimated using the Auto Regressive Distributed Lag (ARDL) model. Several pre-tests and post-tests diagnostics tests were also conducted. The descriptive statistics revealed that LNGDPGR, LNODA, and LNLF were not normally distributed but LNGVEX and LNOPEN were normally distributed. Also from the correlation analysis, no variable was strongly correlated and with an optimal lag selection of 3 from the Akaike Information Criteria, the unit root results revealed stationarity at level ($I(0)$) for LNGDPGR and at first difference (I(1)) for the rest of the variables. The bound test result showed the existence of cointegration.

The findings revealed that in the long run, LNDS (external debt stock) and LNGVEX (government expenditure) significantly and negatively affect LNGDPGR (economic growth) at 1% and 5% levels of significance, respectively. On the other hand, LNPGR (population growth) has a positive and significant impact on LNGDPGR (economic growth) at a 1% level of significance. However, LNODA (official development assistance) exhibits a negative and insignificant effect on LNGDPGR (economic growth). In the short run, the findings revealed that LNODA (official development assistance) and LNDS both affect LNGDPGR (economic growth) negatively. LNGVEX (government expenditure) also negatively affects LNGDPGR (economic growth) in the short run. Contrarily, LNFCF (gross fixed capital) and LNLF (labour force) significantly and positively affect LNGDPGR (economic growth) in the short run. The results also revealed the error correction coefficient is estimated at -0.828112 and is highly significant. The coefficient implies that short-run disequilibrium converges to equilibrium in the long run at the speed of 83%.

5.1 Conclusion and policy implications

The findings of this study throw more light on the foreign aid and economic growth nexus. Using official development assistance and external debt stock to capture foreign aid, the study reveals a negative effect of foreign aid on Nigeria's economic growth in both the long run and in the short run. External debt's effect on economic growth is significant in the long run while official development assistance does not show a significant effect on the economic growth of Nigeria in the long run. In the short run, both official development assistance and external debt stock significantly and negatively affect Nigeria's economic growth. Based on the findings, we, therefore, recommend that Nigeria's policymakers should reduce overreliance on foreign aid in financing economic growth and intensify efforts to diversify the sources of financing of economic growth considering the negative effect of foreign aid on the country's economic growth in both the long run and in the short run. Secondly, there is a need to strategically and diligently allocate foreign aid with much focus on productive investments that exert a positive effect on the country's economic growth. According to Ogbonna

et al, (2021), when foreign aid is used for productive purposes, it is expected to boost economic growth. Thirdly, domestic investment should be highly encouraged, given the fact that capital has a positive effect on economic growth. Policymakers should also prioritise policies that promote investment in capital goods and infrastructures as it goes a long way to boost economic activities and hence economic growth.

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MACROECONOMIC FUNDAMENTALS AND SELECTED COUNTRY ECONOMIES OF SUB-SAHARAN AFRICA

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Abstract

This study appraised the impact of macroeconomic aggregates on gross domestic product (GDP) growth in Sub-Saharan African economies, from 1981 to 2020 and provided information to economic managers on the indices co-movement with GDP growth rate. Econometrics tools used in estimating the variables include trend analysis, unit root test, co-integration test, and Autoregressive Distributed Lag model. The findings revealed that the currencies of SSA were weak and volatile, negatively influencing the output of the countries but indicated no distinction between the effect of exchange rate of Naira-Dollar, Cedi-Dollar, and Rand-Dollar on GDP growth in the three countries. Inflation influenced GDP negatively in the three countries but was only significant in Nigeria and South Africa. The discount rate across the selected countries was negative. The effects were only significant in Ghana. Unemployment rate exerted a negative and non-significant impact on Nigeria and South Africa, while its effect on Ghana economy was negative and significant. This study concludes that macroeconomic indicators are significant determinants of GDP growth rate in Sub-Sahara Africa and the macroeconomic aggregates have co-movement with GDP growth rate.

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The study recommended that government policies should discourage imports and promote export produce to strengthen the weak currencies. The monetary authorities should use contractionary monetary and fiscal policies to mop up too much money in circulation and reduce inflation. Economic managers in SSA should use discount rate policies that will facilitate credit extension and accelerate investment in productive activities. The government should prioritize policies that will formalize the informal sub-sector and invest in human capital development.

1.0 INTRODUCTION

The Sub-Saharan African (SSA) region has demographic features that can enhance economic sustainability. The region is projected to grow by 17% by 2030 considering its growing middle-class population, making it the fastest growing region with high labour force as opposed to ageing population and projected urbanization growth rate of 28% by 2030 (IMF, 2019). Notwithstanding the high growth expectations, economic development and sustainability in SSA is hindered due to national restrictions, debt, low technological advancement, insecurity, corruption, poor governance, and lack of good macroeconomic environment.

Exchange rate, inflation, interest rate, and unemployment are macroeconomic aggregates for measuring economic performance. Other known macroeconomic indicators are productivity and balance of payments. Gross domestic product (GDP) is an index of macroeconomic measurement. The periodic change in GDP (positive or negative) shows the growth rate of output of the economy. Figure 1 depicts GDP growth rate in Nigeria from 1980 to 2020.
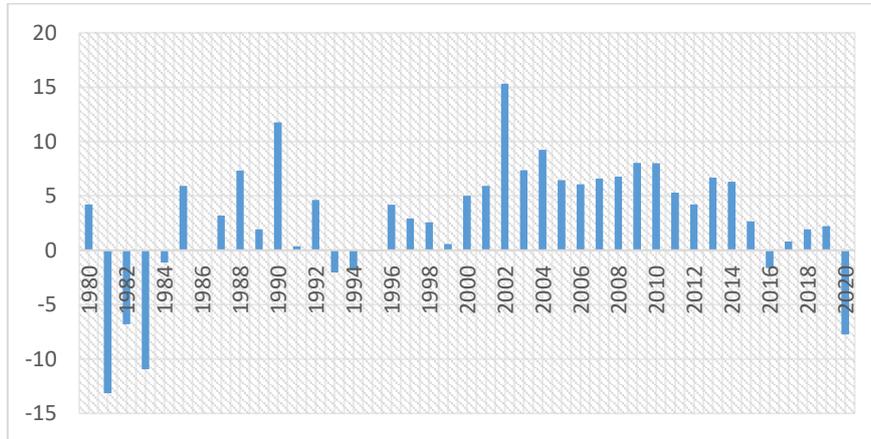
Figure 1: GDP growth rate of Nigeria; Source: Central Bank of Nigeria Statistical Bulletin

From 1980 to 1999, Nigeria's GDP growth varied from negative to positive at deferent times, ranging from 4.2% in 1980 to -13.1%, -6.8%, 5.9%, 11.8%, -2.0%, 4.2%, and 0.5% in 1981, 1982, 1985, 1990, 1993, 1996, 1999 respectively. From 2000 to 2014, Nigeria's GDP grew at an average of 7% annually. Following the collapse of oil price between 2014 and 2016, the GDP growth rate dropped significantly to 2.7% in 2015. In 2016, during the recession, the country experienced economic contraction of 1.6% (Agri, Mailaifa and Umejiaku, 2017; Agbarakwe, 2017) and by 2020, following the outbreak of COVID-19 pandemic, the GDP growth rate was negative -7.73%.

In Ghana, the economy experienced decline in output in the early 1980s, and it was during this period that about a million Ghanaians were extradited from Nigeria back to Ghana which made the economy to be overburdened with upsurge in population. Figure 2 captures the GDP growth of Ghanaian economy.
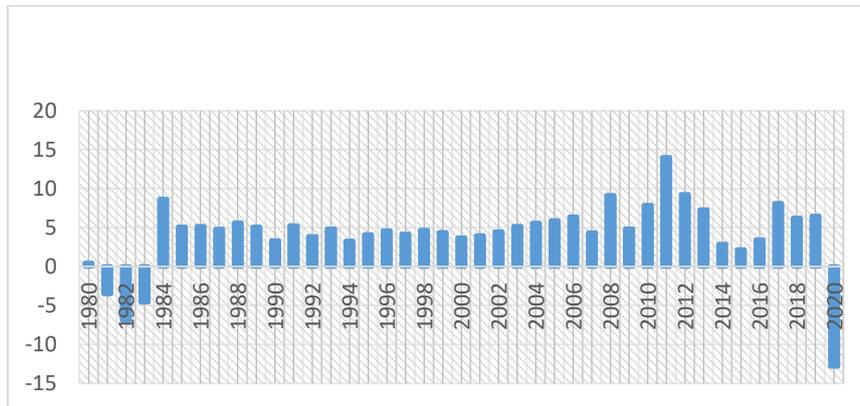
Figure 2: GDP growth rate of Ghana; Source: World Development Indicators

From 1985 to 2006, GDP growth rate was relatively stable, averaging 4.9%. From 2007 to 2018, the economic outlook was volatile, but the growth rate remained positive. In 2019, Ghana's economy expanded as the first-quarter GDP growth was about 6.7%, compared to 5.4% in the first quarter of 2018. Non-oil output growth was increased by 6.0% (World Bank, 2019b). The growth was achieved by a strong economic recovery which surged by 7.2% compared to 1.2% recorded in 2018 (World Bank, 2019a). The GDP growth rate dropped significantly to -12.8% in 2020 due to COVID-19 pandemic that ravaged the world.

In Southern Africa, annual GDP growth rate was 1.6% from 1994 to 2009, and it increased to 2.2% from 2000 onwards to 2019, compared to 3.1% global growth rate. Figure 3 depicts the economic front of South Africa from 1980 onwards to 2020.
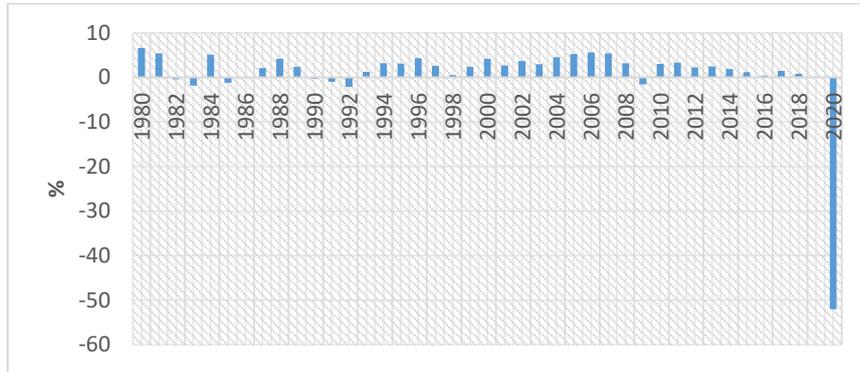
Figure 3: GDP growth rate of South Africa; Source: World Development Indicators

Analysis of the trend in GDP growth rate presented in figure 3 shows that the economy of South Africa was relatively stable compared to Nigeria and Ghana. The growth rate was mostly positive except in 1982, 1983, 1985, 1991, 1992, 2009, and 2020 where -0.38339, -1.84654, -1.211483, -1.018219, -2.137056, -1.538089, and -52.01 were respectively recorded. The recorded all-time high negative value of -52.01 in 2020 was due to COVID-19 pandemic in which the global economy experienced great economic misfortune.

Governments across countries of the world have made efforts in stabilizing their economy by adjusting monetary and fiscal policies to regulate and control macroeconomic aggregates such as exchange rate, interest rate, inflation, unemployment, and money supply (Akinjare, Babajide, Isibor and Okafor, 2016). Numerous studies have been done with regards to the impact of macroeconomic variables on the economies of SSA. In Nigeria, Onakoya (2018) found that prevailing exchange rates, interest rate, inflation and money supply negatively influenced economic output. Similarly, Karki (2018); Iwedi (2017); Abdalla (2016); Worlu and Omodero (2017) confirmed significant relationship between macroeconomic dynamics and economic output in Nigeria. In Ghana, Ho and Iyke (2018); and Mwinlaaru and Ofori (2017) found that debt servicing, financial and human capital development, and exchange rate

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were significant determinants of economic growth. Kargbo (2007) showed that shocks to macroeconomic fundamentals such as exchange rate, interest rate, inflation and money supply exert strong influences on the trend of economic sector like agriculture in South Africa. Hackland (2015) also found that inflation and prime lending rate were negatively correlated with growth in South Africa.

In Nigeria, Ghana, and South Africa, governments have used contractionary and expansionary monetary and fiscal policies as tools for macroeconomic management. These policies have great implications on output performance of SSA countries and may have influenced differently the level of growth in the region (Nwoye, Obiorah and Ekesiobi, 2015; Vermeulen, 2017). Nevertheless, it is notable that while different studies do agree that the dynamics of macroeconomic fundamentals such as interest rates, inflation, unemployment, exchange rate, do impact on the level of economic output, they were not able to establish if these variables co-move to influence economic growth processes. This study focuses on understanding the extent of co-movement of macroeconomic fundamentals and their impact on the economy of Nigeria, Ghana, and South Africa.

2.0 LITERATURE REVIEW
2.1 Conceptual Framework
A country's economy is often influenced by different macroeconomic factors such as exchange rate, inflation, interest rate, unemployment rate, money supply (Iwedi, 2017). A negative growth rate is associated with volatile macroeconomic environment characterized by fluctuating exchange rates, unemployment, unstable interest rates, high inflation, and deficit balance of payments. In such a macroeconomic environment, output is negatively affected due to high lending rates (Agbarakwe, 2017). Rates of interest affect the cost of capital, which is the interest expenses and in turn affects income, domestic demand, foreign exchange earnings and exchange rate stability. Inflation discourages further production activities (Agri, Mailaifa and Umejiaku, 2017). It affects prices for inputs and outputs in the short run and long run in an economy. Similarly, rising exchange rate causes the price of domestic export commodities to

increase, while high unemployment rate implies underutilization of human capital (Hoang, Tih and Minh, 2020). The macroeconomic dynamics is therefore uncertain. The uncertainties might deter potential investors from committing funds to new investments or to desire short-term investments over longer term projects that potentially can generate higher returns leading to low economic output.

To provide a comprehensive understanding of the macroeconomic dynamics and economic growth, the conceptual framework for this study was developed and presented in Figure 4.
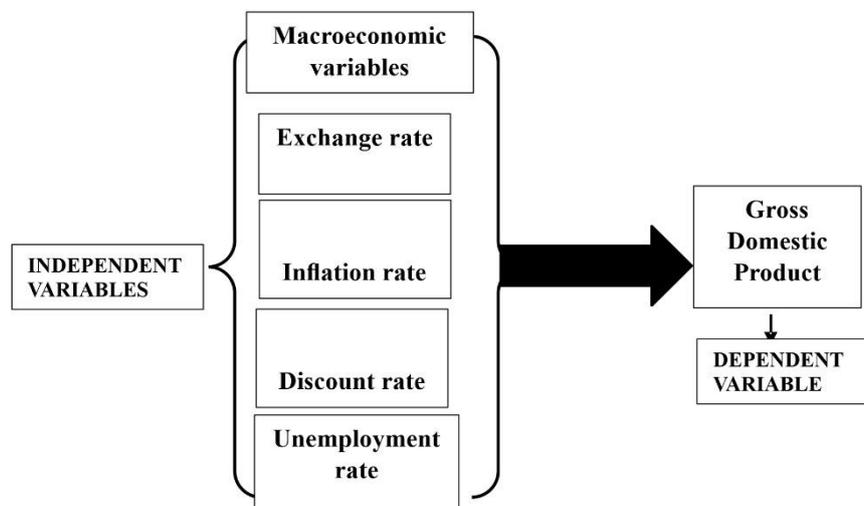

Figure 4: Conceptual Framework

Source: Developed by Author (2023).

The macroeconomic aggregates are endogenous factors because they can be controlled to some extent within the economy, and to a large extent, they dictate the macroeconomic policy direction of a country as they influence the trend of economic front. The performance of the real economy is measured by gross domestic product, of which one of the core objectives of governments across the globe is to accelerate GDP. Nominal GDP is the market value of goods and services produced in an economy,

unadjusted for inflation. Real GDP is nominal GDP deflated for inflation (CBN, 2014). Researchers have used both RGDP and nominal GDP to measure real economic outcomes, but their usage depends on the model specification. In this study, nominal GDP has been used as a proxy for the economies of sub-Saharan Africa in order to ascertain the dynamic interaction and trends of inflation in the economies of the selected countries.

2.2   Theoretical Construct
This study hinges on two theories; endogenous growth model and the Keynesian theory.

2.2.1 Endogenous growth model
Endogenous growth is a long run output growth determined by internal forces, particularly those macroeconomic aggregates governing incentives and opportunities that create technological knowledge. Romer, (1986, 1990) initiated the introduction of endogenous growth theory, and proposed that the introduction of new accumulation factors, such as knowledge, and innovation, will foster economic growth. Romer (1990) stated that macroeconomic policies play a substantial role in advancing growth on a long run basis. Barro and Sala-i-Martin (1995) state: "The determination of long-run growth within the model, rather than by some exogenously growing variables like unexplained technological progress, is the reason for the name 'endogenous growth'." The fundamental element of endogenous growth is education, new knowledge, innovation, and R&D. Massive investment in education results in a highly skilled workforce that will develop a new and more efficient economy and create sustainable domestic growth. Building on the works of Romer (1990) and Lucas (1988), the endogenous growth theory suggests that government interventions are required for any economy to achieve long-run growth. Government policies on interest rate, exchange rate, money supply, capital and recurrent spending, unemployment rate, and inflation rate are macroeconomic and their effects results in increased investment thereby leading to economic growth.

2.2.2 Keynesian theory

Keynes (1936) argued that in the short run, especially during recessions, output is strongly influenced by aggregate demand. Aggregate demand is not always equal to productivity, but it is driven by factors that are volatile and have influence on output, employment, and prices. Keynesian economists argue that the decision of private sector sometimes result in inefficient macroeconomic outcome which demands active monetary policy response by the apex bank and fiscal policy by the government to enhance output growth and ensure sustainability of the economy.

2.3 Empirical Literature Review

The pattern and co-movement of macroeconomic variables and the impact of these indicators on the growth of Sub-Saharan African economies have not been well researched. Previous studies focused on the effect of macroeconomic indices on economic growth in Sub Saharan Africa.

In Nigeria, using yearly data from 1986 to 2020, Idris (2021) investigated the effects of inflation, and unemployment on the economy. The study used the OLS technique to analyse the data. The study found that rising unemployment significantly reduced domestic production, while inflation produced an increase in output performance. The study suggested policies that would encourage self- employment and reduce the cost of doing business.

Similarly, Seth, John and Dalhatu (2018) studied the effect of unemployment on economic growth in Nigeria. Secondary data sourced from the CBN Statistical Bulletin from 1986 onwards to 2015 were used to analyze the data based on ARDL model. The study reported that long run and short run increases in unemployment level hindered economic growth but were statistically insignificant. The study recommended that policies that would ensure entrepreneurship development are imperative in reducing unemployment.

In another study, Anidiobu, Okolie and Oleka (2018) appraised the effect of inflation on economic growth in Nigeria from 1986 to 2015. Annual data was sourced from CBN statistical bulletin, and the data estimation

was carried out with OLS model. RGDP was the dependent parameter while inflation, interest and exchange rates were the explanatory indices. The results revealed that RGDP was positively influenced by changes in inflation rate. The study suggested tight monetary policy approaches to impede the effect of inflationary pressures on the economy.

In Ghana, Saeed (2022) focused on ascertaining the impact price and money supply have on GDP growth by using forty-year data set from 1980 to 2020. Vector Error Correction Model (VECM), impulse response function and Granger causality techniques were used to estimate the variables. Analysis of VECM estimates revealed that broad money supply significantly impacts GDP growth. The results further showed that last year's income and price level have negative effects on current year output. Long-run estimates show that supply of money does not have any effect on GDP growth. The study recommends that Bank of Ghana should direct monetary policy rate policies towards achieving price stability and sustainability of output growth level.

In the same light, Berko, Hammond and Amissah (2022) applied Engel granger two-step procedure based on OLS technique to investigate the effect of interest rate spread on GDP growth using data from 1975 to 2018. The study reported that interest rate spread is a statistically determined GDP growth, but the impact was negative over time. The result also indicated that exports, labour force, and capital stock influenced GDP growth in Ghana positively. Government expenditure did not contribute significantly to economic growth. The study recommended policies that will promote exports and create investment opportunities and ensure capacity building.

Tankia-Allou (2021) used vector autoregressive model and OLS to ascertain the impact of exchange rate movement on GDP growth of Ghana from 1980 to 2018. Trend analysis revealed a linear trend between exchange rate movement and economic growth. The study discovered that exchange rate movement produces negative shock during periods of significant depression resulting in sharp fall in GDP growth. The study recommended that Ghanaian economic managers should employy

strategies such as restriction of import and improving macroeconomic aggregates such as inflation and money supply to stabilize the cedi.

In South Africa, Ndou (2021) examined exchange rate and trade balance to ascertain their impact on South Africa economy from 1970 to 2019. ARDL bounds testing was applied in estimating the data. Results showed that overtime exchange rate elasticity influenced net trade balance. The study discovered that domestic income had the highest influence on net trade balance followed by inflation, and then exchange rate. The study suggested that policymakers should use exchange rate policies that promote industrial revolution to eradicate adverse net trade balance.

Similarly, Seoela (2020) employed structural vector autoregressive (SVAR) model to evaluate how economic output, inflation, money supply, domestic credit, and interest rate spread respond to shocks in repo rate based on monthly data from 2000M2 to 2018M12. The study observed that a positive repo rate shock was followed by low economic output and high price levels. It further indicated that there was asymmetric response in money supply, credit and interest rate spread to a positive shock on repo rate. The results suggest that policymakers should use monetary policy measures to direct and regulate the South African financial sector.

Related research within the globe also produced varying results. Burcu, *et al.,* (2022), provided preliminary information to the investor by determining indices co-movement, with the data mining method. Data sets containing daily opening and closing prices between 2001 and 2019 collected for 11 stock market indexes in the world were estimated. The association rule algorithm, one of the data mining techniques, was used in the analysis of the data. It was observed that the US stock market indices take part in the highest confidence levels between association rules. The XU100 stock index co-moved with both the European stock market indices and the US stock indices. In addition, the Hang Seng Index (HSI) (Hong Kong) takes part in the association rules of all stock market indices. The study concludes that the world stock indices have co-movement, and it is cyclical.

In Bangladesh, Chowdhury, Hamid, and Akhi (2019) look at the impact of macroeconomic aggregates on GDP growth rate from 1987 through 2015. Correlation and OLS analyses were applied for the data analysis. It was found that GDP growth rate had positive correlation with other indices except interest rate. The study concluded that macroeconomic aggregates had significant influence on economic output of Bangladesh.

A study of selected European countries by Srebnijs (2018) applied Bayesian Model Averaging (BMA) to evaluate the determinants of economic growth for 276 European regions from 2006 to 2015. It was discovered that quality of education was one of the significant determinants of economic growth. It further revealed that higher education levels, ICT patents, prime-age as well as higher manufacturing output were positively linked with GDP growth. It also identified positive spillover effects from neighbouring regions. The study confirmed conditional convergence mechanism among European regions – regions with more initial income tend to have slow pace of GDP growth.

3.0 METHODOLOGY
3.1 Data
Three SSA countries were selected for this study. The countries were selected based on shared similarities relating to the monetary and fiscal policies, economic output, historical antecedents, developmental stage, and business development. Secondary data were sourced from the Central Bank of Nigeria Statistical Bulletin, World development indicators (WDI), and Federal Reserve Economic Data (FRED).

3.2 Model Specification
This study developed a model rooted in endogenous growth theory. Romer, (1986, 1990) proposed that the introduction of knowledge, and innovation, will foster economic growth. Researchers usually classify the determinants of economic growth in different ways as exogenous and endogenous; direct and indirect; economic and non-economic; intensive and extensive. In this study, the determinants of economic growth have been classified into exogenous and endogenous factors. Many of these determinants to some extent, can belong to both groups of determinants,

but the principle followed in this study is that exogenous factors are predetermined and uncontrollable, while endogenous variables can be manipulated. Based on this classification, nominal GDP is an exogenous factor in this study, since it is a proxy for the real economy whose value cannot be manipulated. It is determined by the dynamic interaction of the macroeconomic aggregates. According to Romer (1986) and Lucas (1988), macroeconomic policies play an important role in accelerating growth on a long run basis. The proxies of economic policies and macroeconomic conditions in this study are inflation, exchange rate, discount rate, and unemployment rate. These macroeconomic variables can be easily controlled and manipulated and therefore are naturally, endogenous factors.

The model for this study is specified in equation 1.

$GDP_{it} = \beta_0 + \beta_1(EXR)_{it} + \beta_2(INR)_{it} + \beta_3(DIR)_{it} + \beta_4(UER)_{it} + \varepsilon$ ………..(1)

Where, GDP = GDP growth rate; EXR = Exchange rate; INR = Inflation rate; DIR = Discount rate; UER = Unemployment rate; β_0 = Constant parameter; $\beta_1 - \beta_4$ = Coefficient of the independent variables; ε = Stochastic term; t = time period; i = Country i starting from 1 to 3.

3.3 Technique of Data Analysis

Econometrics analysis can only be performed on a series of stationary data. In order to check for stationarity of data, Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979) was carried out. The general model for ADF unit root test is represented in equation 2.

$\Delta y_t = \beta_0 + \beta_1 t + \beta \lambda y_{t-1} + \sum_{j-1}^{p} \delta_j \Delta y_{t-j} + \mu_t$ …………………….....(2)

Where, y_{t-1} = Lagged value of y_t at first difference; Δy_{t-j} = A change in lagged value; δ = Measure of lag length; Δy_t = First difference of y_t; μ_t = Error term

The study applied Autoregressive Distributed Lag (ARDL) bounds test approach in estimating the variables. The model was adopted because it allows the long-run and short-run analysis to be carried out simultaneously, given that the variables are of mixed order integration

(some were stationary at level i.e. I(0), while others became stationary after first differencing I(1), none is integrated at second difference, 1(2)) (Pesaran *et al.*, 2001). The ARDL bounds testing specification of equation 1 is expressed in equation 3.

$$\Delta GDP_t = \delta_o + \sum_{i=1}^{p} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{p} \delta_2 EXR_{t-i} + \sum_{i=0}^{p} \delta_3 INR_{t-i} +$$
$$\sum_{i=0}^{p} \delta_4 DIR_{t-i} + \sum_{i=0}^{p} \delta_5 UER_{t-i} + \beta_1 EXR_{t-1} + \beta_2 INR_{t-1} +$$
$$\beta_3 DIR_{t-1} + \beta_4 UER_{t-1} + \mu_t \ \dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3)$$

After cointegration was established, the long-run relationship was estimated as presented in equation 4.

$$\Delta GDP_t = \delta_0 + \beta_1 GDP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INR_{t-1} + \beta_4 DIR_{t-1} +$$
$$\beta_5 UER_{t-1} + \mu_t \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (4)$$

An error correction mechanism was used to estimate the short-run relationship as presented in equation 5.

$$\Delta GDP_t = \delta_o + \sum_{i=1}^{p} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{p} \delta_2 \Delta EER_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta INR_{t-i} +$$
$$\sum_{i=0}^{p} \delta_4 \Delta DIR_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta UER_{t-i} + \theta ecm_{t-i} + \mu_t \ \dots\dots 5)$$

Where, δ_0 = Constant; δ_1 - δ_6 = short-run elasticities (coefficients of the first-differenced explanatory variables); β_1 - β_6 = long-run elasticities (coefficients of the explanatory variables); θ = Speed of adjustment; ecm_{t-i} = Error correction term lagged for one period; Δ = First difference operator; p = Lag length.

4.0 RESULTS AND DICUSSIONS
4.1 Trend analysis of data
Trend analyses of macroeconomic aggregates of the countries were carried out. Figure 5 depicts the trend of inflation rate (INR) for the selected SSA countries.
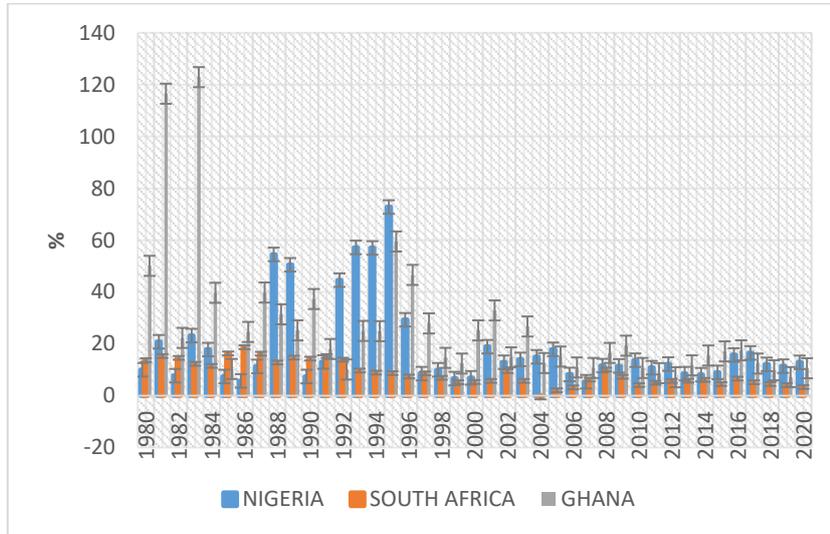
Figure 5: Trend of inflation rate; Source: Author's using EViews 10.0 (processed data)

Figure 5 show that the rate of inflation in Ghana is high compared to Nigeria and South Africa, especially between 1980 and 1985. This could be due to low productivity occasioned by high cost of production in Ghana (Appienti, Ofori, Damptey and Kusi, 2016). The trends revealed a similar pattern in the three SSA countries. The implication is that there is co-movement of inflation pressure in the three counties. However, Nigeria and Ghana recorded high inflation compared to South Africa from 1988 due to the lower interest rate on borrowings. In 2020, inflation rate reduced in South Africa but increased in Nigeria and Ghana because both countries failed to reduce their discount rate, while South Africa reduced her discount rate in the face of COVID-19 which probably allowed for an increase in production.

Figure 6 presents the trend of the exchange rate (EXR) for Nigeria, South Africa, and Ghana.
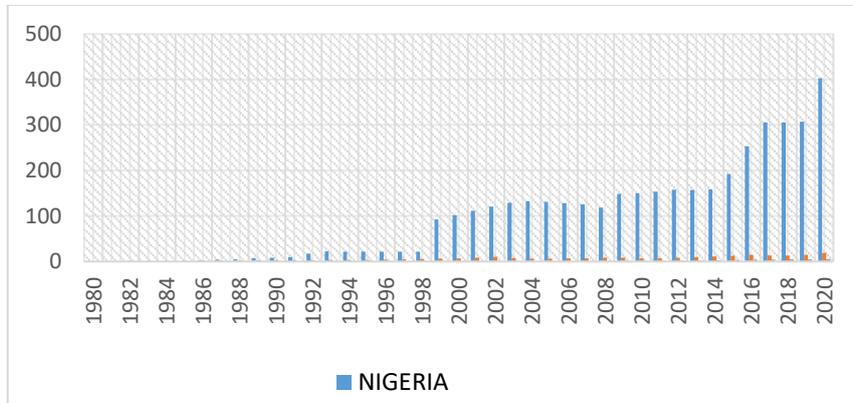

Figure 6: Trend of exchange rate; Source: Author's using EViews 10.0 (processed data)

Figure 6 reveals that from 1980 to 1988, the Nigerian currency was more stable compared to those of South Africa and Ghana. Nigerian economy was agrarian alongside the booming oil exports. From 1989 onwards to 2020, naira exchange rate to the US Dollar was extremely volatile and shows that Nigeria's economy experienced more exchange rate crises compared to South Africa and Ghana. This could be attributed to the fact that monetary authorities often used exchange rate depreciation to encourage exportation of non-crude oil commodities. On the other hand, the South African and Ghanaian economies are more diversified and not dependent on a single product for foreign exchange which explains the lower exchange rate (IMF, 2014). The implication is that the exchange rate moves in line with monetary policy pursued by the apex bank.

Figure 7 shows the trend of monetary policy rate, known as discount rate among the selected countries.
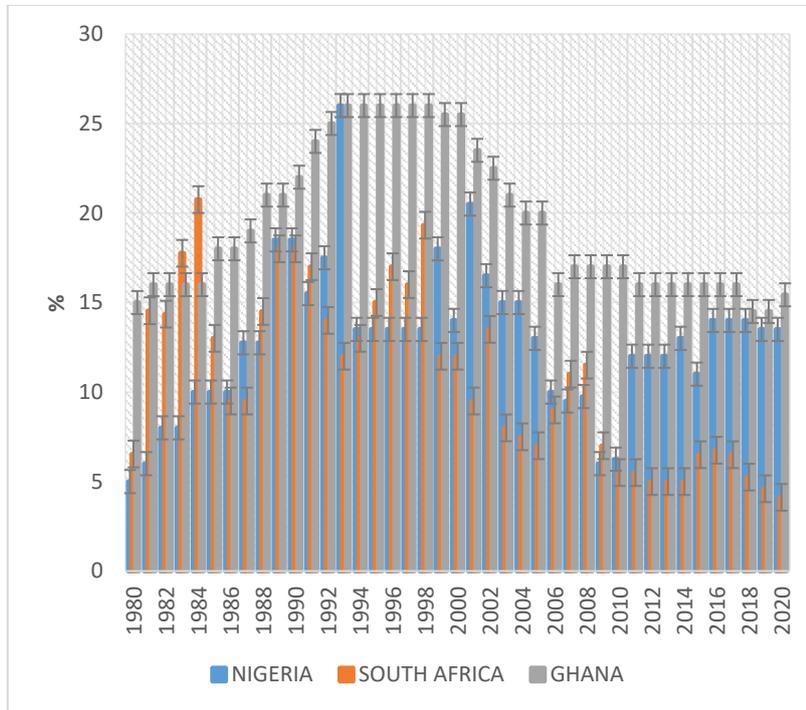
Figure 7: Trend of discount rate; Source: Author's using EViews 10.0 (processed data)

Figure 7 identified Ghana as the country that has the highest discount rate followed by Nigeria and then, South Africa. This implies that the monetary policy in Ghana is more of contractionary, while that of Nigeria and South Africa tends towards expansionary monetary policy. During the year 2020 that was marred by the coronavirus infectious disease pandemic, South Africa reduced its discount rate while Nigeria retained the 13.50% it maintained in 2019; Ghana increased theirs from 14.5% in 2019 to 15.43% in 2020. This explains the upward trending DIR curve for Ghana, the stagnation observed for Nigeria and the downward trending DIR curve for South Africa.

Similarly, the trend of the unemployment rate was reviewed and presented in Table 8.
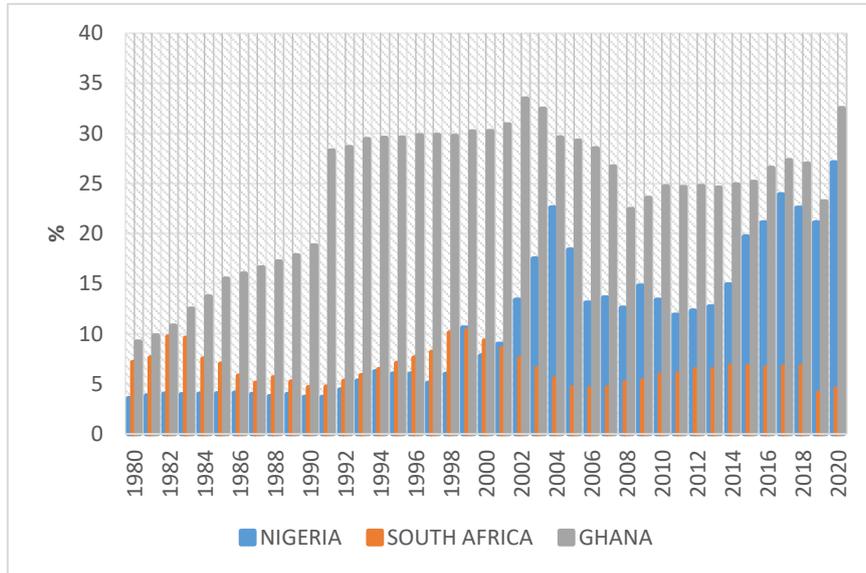
Figure 8: Trend of unemployment rate; Source: Author's using EViews 10.0 (processed data)

Figure 8 shows that between 1980 and 1999, Nigeria recorded the lowest unemployment rate followed by Ghana with South Africa having the highest. This is because, within the aforementioned period, Nigeria's economy had many functional industries including textiles, cement, vehicle manufacture, fertilizer, agro-allied, etc., South Africa was still battling with apartheid while Ghana was largely underdevelopment coupled with series of political crises. From 2000, the unemployment rate of Nigeria increased more than that of Ghana probably due to a higher population as Nigeria's population was increasing at an average of 4.89% while that of Ghana was increasing at an average of .45% annually (see, World Development Indicators). It is also observed that unemployment rose in the three countries in 2020 due to the COVID-19 health crisis.

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Figure 9 shows the trend of GDP for Nigeria, South Africa, and Ghana.
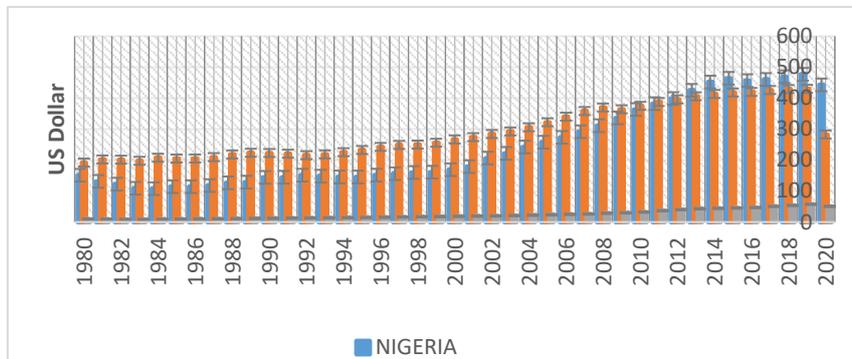
Figure 9: Trend of GDP; Source: Author's using EViews 10.0 (processed data)

Figure 9 indicates that between 1980 and 2011, South African and Nigerian economies increased in output compared to Ghana. Ghana had the lowest value of GDP. This implies that South Africa had the largest economy among the three countries between 1980 and 2011. However, in 2011, South Africa and Nigeria come close in terms of GDP value ($382 billion and $387.70 billion, respectively) in a period when Ghanaian GDP was $36.7 billion. After 2011, the Nigerian economy leap-frogged that of South Africa as it recorded the highest GDP between 2012 and 2018, while the Ghanaian GDP was still low. A plausible reason for the rise in GDP of Nigeria above that of South Africa in 2011 could be due to the rise in crude oil prices which was above $100 per barrel for three consecutive years of 2012 to 2015 after which the trend of Nigeria's GDP slowed down but remained higher than those of South Africa and Ghana. However, in 2020, due to the COVID-19 pandemic and the global economic meltdown, the GDP of the three countries nose-dived with the economy of South Africa being more severely affected followed by Nigeria and then Ghana.

4.2 Summary Statistics

The summary statistics of the data set used for the study is presented in Table 1 to compare the trends of macroeconomic parameters and GDP of selected SSA countries.

Table 1: Summary statistics

	GDP	EXR	INR	DIR	UER
Mean					
Nigeria	244.2907	98.82146	18.75122	12.84146	10.80244
Ghana	23.89024	1.160244	26.14829	19.54707	6.579024
South Africa	292.0783	6.367628	8.656098	10.89878	24.38268
Std. Dev.					
Nigeria	130.6456	102.0667	16.72696	5.146443	7.190502
Ghana	14.75882	1.609411	24.80273	4.116959	1.633588
South Africa	82.71678	4.293274	4.660475	4.806657	6.957950
Skewness					
Nigeria	0.664619	0.972904	1.861752	0.574840	0.790492
Ghana	0.863726	1.567743	2.726882	0.495507	0.677599
South Africa	0.449519	0.627387	0.370672	0.265744	-0.693970
Kurtosis					
Nigeria	1.839960	4.243001	5.306280	4.210665	2.660720
Ghana	2.411150	4.325067	10.63863	1.663935	2.748040
South Africa	1.656184	2.465563	2.152898	1.879529	2.549814
Jarque-Bera					
Nigeria	5.317304	6.568911	32.77166	4.761932	4.466640
Ghana	5.690177	19.79458	150.4907	4.727262	3.245911
South Africa	4.465773	3.177635	2.164752	2.627304	3.637117
Probability					
Nigeria	0.070043	0.047461	0.000000	0.092461	0.107172
Ghana	0.058129	0.000050	0.000000	0.094078	0.197315
South Africa	0.107218	0.204167	0.338790	0.268836	0.162259

Source: Author's computations using EViews 10.0

Table 1, shows that the mean value GDP is higher in South Africa, followed by Nigeria and then Ghana. The implication is that South African economy has higher output level compared to Nigeria and Ghana. The mean value of exchange rate variable is very high in Nigeria, and the implication is that Nigeria's currency is very weak. Similarly, inflation rate and interest rate in Ghana are higher than that of Nigeria and South Africa. In contrast, Unemployment rate signals the strength of Ghanaian economy vis-à-vis the economies of Nigeria and South Africa.

On the front of standard deviation, Nigeria's variables are higher, followed by South Africa and then Ghana. This implies that Nigeria's economy is highly volatile than South Africa and Ghana in that order.

The asymmetry of the data set is measured by skewness. The distribution exhibits positive skewness. The skewness of the variables in the three countries being other than 0, and the kurtosis other than 3, signify the existence of non-normal distribution of the variables. Similarly, the distribution with reference to the Jarque-Bera estimates and probability values revealed that all the variables are not normally distributed at 5% level of significance except exchange rate in Ghana, and inflation rate in Nigeria and Ghana that are normally distributed.

4.3   Stationarity Test

Stationarity is exhibited when the ADF t-Statistic is greater than the McKinnon critical values at 5% level (Dickey and Fuller, 1979). Alternatively, a variable is said to be stationary when its p-value is less than 0.05. The ADF unit root test results are presented in Table 2:

Table 2: Unit root test results

Variables	Nigeria			Ghana			South Africa		
	Level: I(0)	First diff: I(1)	Order	Level: I(0)	First diff: I(1)	Order	Level: I(0)	First diff: I(1)	Order
GDP	-1.7254 {0.6185}	-3.5874 {0.0402}	I(1)	-3.3491 {0.0676}	-3.6502 {0.0415}	I(1)	-0.5846 {0.9744}	4.5067 {0.0036}	I(1)
EXR	-0.0067 {0.9750}	-4.6167 {0.0045}	I(1)	-2.5932 {0.3865}	-4.0965 {0.0234}	I(1)	-2.2639 {0.4434}	-4.6587 {0.0034}	I(1)
INR	-3.7659 {0.0235}	--	I(0)	-6.6686 {0.0021}	--	I(0)	-2.8589 {0.1838}	-5.3809 {0.0008}	I(1)
DIR	-3.1623 {0.1073}	-8.7018 {0.0000}	I(1)	-1.7623 {0.7076}	-5.5465 {0.0004}	I(1)	-4.5965 {0.0058}	--	I(0)
UER	-2.8468 {0.2909}	-4.7131 {0.0037}	I(1)	-2.5977 {0.3830}	-4.3713 {0.0057}	I(1)	-1.8885 {0.5414}	-4.7874 {0.0014}	I(1)
5%	-3.52968								

Source: Author's computations using EViews 10.0; Figures in { } are the p-values of the ADF t-Statistic

Stationarity test results exhibited mixed level of integration at I(0) and I(1). INR and UER variables in Nigeria were integrated at level, while GDP, EXR and DIR were stationary at first difference. For Ghana, only INR was stationary at level, while the other indices were stationary at first difference. Similarly, for South Africa, all the variables were stationary at first difference except DIR that was stationary at level. The series therefore exhibits mixed order of integration I(0) and I(1) and none of the aggregates were stationary at second difference, I(2), hence ARDL model was used to estimate the variables.

4.4 Diagnostic tests

The robustness of the model was ascertained by carrying out diagnostic tests of serial correlation using Breusch–Godfrey test, heteroskedasticity and normality of residuals checks for the model specification using Jarque-Bera. The results are summarized in Table 3.

Table 3: Diagnostic test results

LM-diagnostic test		t-Statistic	p-value
Breusch-Godfrey Serial Correlation:			
Nigeria(F-statistic)		0.600125	0.6673
Ghana(F-statistic)		2.003217	0.1718
S. Africa(F-statistic)		0.030260	0.8702
Heteroskedasticity Test: Breusch-Pagan-Godfrey:			
Nigeria(F-statistic)		2.455701	0.0724
Ghana(F-statistic)		0.912242	0.4808
S. Africa(F-statistic)		1.549539	0.0876
Normality Test:			
Nigeria	Jarque-Bera	0.618731	0.7582
Ghana	Jarque-Bera	1.4197	0.4372
S. Africa	Jarque-Bera	4.7234	0.0855

Source: Author's computations using EViews 10.0

These results demonstrate that the ARDL model passed the diagnostic tests. Residuals are not serially correlated, and the model passed the test for normality. There is no presence of heteroscedasticity in the model and the model is stable.

To test the stability of the estimates, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) are applied. Figures 10 to 15

are expositions of CUSUM and CUSUMSQ for Nigeria, Ghana, and South Africa.
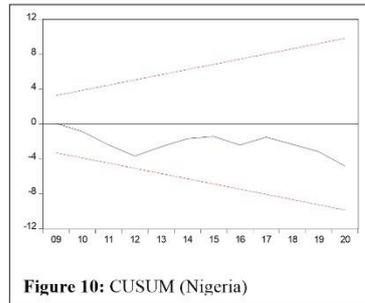
Figure 10: CUSUM (Nigeria)
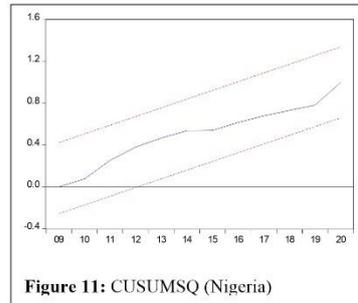
Figure 11: CUSUMSQ (Nigeria)
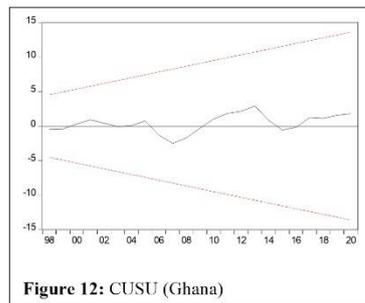
Figure 12: CUSU (Ghana)
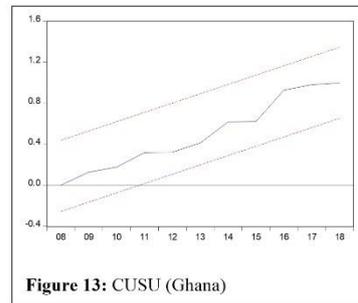
Figure 13: CUSU (Ghana)
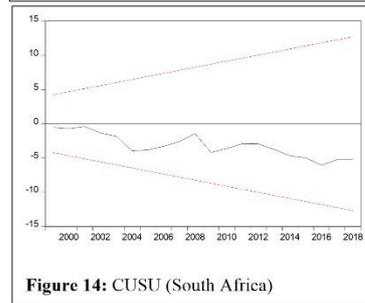
Figure 14: CUSU (South Africa)
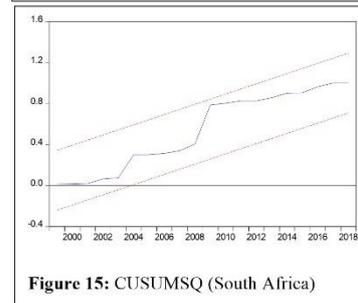
Figure 15: CUSUMSQ (South Africa)

Figures 10, 12, and 14 denote the CUSUM, while figures 11, 13, and 15 depict CUSUM Sum of Squares for Nigeria, Ghana, and South Africa respectively.

The plots of CUSUM and CUSUMSQ are within the boundaries. The model is stable and properly specified given that none of the two tests statistics goes outside the bounds of the 5 per cent level of significance.

4.5 ARDL bounds test

ARDL bounds test was used to investigate whether the variables are cointegrated. Table 4 shows the outcome of the bounds test.

Table 4: ARDL bounds test results (cointegration)

Nigeria Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.890813	10%	2.2	3.09
k	4	5%	2.56	3.49
Ghana F-statistic	17.06325	10%	2.2	3.09
k	4	5%	2.56	3.49
South Africa F-statistic	4.688352	10%	2.2	3.09
k	4	5%	2.56	3.49

Source: Author's computations using EViews 10.0

The ARDL bounds test for cointegration produced F-statistic value of 5.890813 for Nigeria, 17.06325 for Ghana, and 4.288392 for South Africa. The calculated values are greater than the lower bounds I(0) and the upper bounds I(1) values at 5% level of significance. This implies that the models demonstrate the existence of long-run relationship in Nigeria, Ghana, and South Africa. This is in tandem with the endogenous growth model that ascribes improvement in economic productivity to innovations in macroeconomic fundamentals.

Table 5: Long-run estimates

Variables	Nigeria Coefficient	Prob.	Ghana Coefficient	Prob.	Coefficient	South Africa Prob.
EXR(-1)	-3.082024	0.0414	-3.125187	0.0013	-10.03204	0.0003
INR(-1)	-3.090187	0.0358	-0.006821	0.7812	-4.620973	0.0021
DIR(-1)	-0.087201	0.0604	-3.342080	0.0136	-0.239054	0.7028
UER(-1)	-0.046714	0.2019	-3.125481	0.0306	-0.378795	0.8368

Source: Author's computations using EViews 10.0

The long-run estimates presented in Table 5 show that the coefficient of exchange rate (EXR) for the three countries are negative. This implies that Nigeria, Ghana, and South Africa experienced a decrease in GDP by 3.082 units, 3.125 units, and 10.032 units due to a unit increase Naira-Dollar, Cedi-Dollar, and Rand-Dollar exchange rates respectively. The probability values indicate that the effects are significant in the three countries. Similarly, the GDP of the selected Sub-Saharan African countries were negatively influenced by a unit increase in the inflation rate. The effects were however only significant in Nigeria and South Africa. Discount rate (DIR) and unemployment rate (UER) exhibited the same pattern in the three SSA economies. They influenced the GDP negatively, but it was only in Ghana that the effects were significant.

4.6   Error correction mechanism (ECM)

The focus of the ECM is to study the pressure of the estimated long-run equilibrium on the short-run dynamics and the *a priori* expectation is that error-correction coefficients, which examines the adjustment from shock, are statistically significant, negatively signed, and have a sizable range of values which has to be between zero and one (Enders, 2010). Table 6 presents the results of the ECM:

Table 6: Error correction mechanism (ECM)

Variables	Nigeria Coeff.	P-value	Ghana Coeff.	P-value	South Africa Coeff.	P-value
ECM(-1)	-0.077278	0.0000	-0.238191	0.0002	-0.835075	0.0013
D(EXR)	-0.485049	0.0011	-8.892940	0.0043	0.855261	0.3367
D(EXR(-1))	-0.433838	0.0021	11.42431	0.0008	-0.235820	0.7940

D(EXR(-2))	0.596785	0.0002	5.307372	0.0785	5.846034	0.0001
D(INR)	-0.313605	0.0047	0.382616	0.8130	-0.071578	0.0408
D(INR(-1))	-0.073241	0.3801	0.390172	0.6505	0.457171	0.0001
D(DIR)	-1.739075	0.0008	1.892723	0.0205	-0.405238	0.0039
D(DIR(-1))	-0.256651	0.4731	--	--	-0.058472	0.6434
D(UER)	-2.275132	0.0075	-4.749378	0.0001	-0.561353	0.0086
D(UER(-1))	-1.648967	0.0208	1.743531	0.0697	1.001962	0.0000
Adj. R^2	0.805634		0.814341		0.866871	
Prob. (F-stat.)	0.00001		0.000008		0.00000	
Durbin-Watson	2.349587		1.685851		2.549370	

Source: Author's computations using EViews 10.0

The Adj. R^2 shows that macroeconomic variables (EXR, INR, DIR and UER) collectively explained approximately 80.56%, 81.43% and 86.68% of the total variations in GDP growth rate in Nigeria, Ghana, and South Africa respectively. The ECM reveals that approximately 7.72%, 23.82% and 83.51% deviation of GDP from its long-run level is adjusted in one year in Nigeria, South Africa, and Ghana, respectively. The significant ECM further confirmed the existence of long-run co-movement between EXR, INR, DIR, UER and GDP in Nigeria. However, the adjustment mechanism was relatively slow in Nigeria and South Africa, but rapid in Ghana.

The implication is that the transmission of the macroeconomic aggregates into the economies of Nigeria and South Africa is less effective compared to that of Ghana. Looking at the short-run estimates, it is seen that the exchange rate (EXR) negatively impacted GDP in Nigeria and South Africa but has a positive impact in Ghana. In the short run, inflation (INR) has a negative impact on gross domestic product (GDP) in Nigeria and Ghana but has a positive impact on GDP in South Africa. The short-run impact of the discount rate (DIR) on GDP was negative in Nigeria and Ghana but it was positive in South Africa. On the other hand, GDP for Nigeria increased with an increase in unemployment rate (UER) in the

short run but those of South Africa and Ghana decreased as the unemployment rate increased in the short run.

4.7   Discussions

The findings of this study, indicate no distinction between the effect of exchange rate of Naira-Dollar, Cedi-Dollar, and Rand-Dollar on GDP in the long-run, while in the short-run its effect was not significant on South African economy, but it was significant on Nigeria and Ghana economies. The implication is that in SSA, depreciation of currency brings about reduction of output in the long run. They co-moved in three SSA countries. This is attributed to the fact that Sub-Saharan African countries rely on imported goods for consumption and imported capital or raw materials for domestic production (Shimu and Islam, 2018). In the short run, Nigeria and Ghana were the most affected by exchange rate fluctuations probably due to weak currency and poor level of integration with foreign markets as a result of low quality and standard of locally made goods. Onakoya (2018); Chizonde (2016); Darko (2015); Antwi, Mills and Zhao (2013) recorded similar results, and stated that depreciation in currency exchange rates influences negatively domestic production in the short run.

Inflation also influenced GDP negatively in the three countries but was only significant in South Africa. In the short run, Nigeria and South African economies were negatively impacted by inflation and the effects were significant, while in Ghana, it was found to be positive and non-significant. This also implies that in the long run, rising inflation weakens the currency, increases the cost of production, and reduces output. In the three countries, inflation determined the level of economic productivity and therefore moves in tandem with GDP, but the co-movement is stronger in Nigeria and South Africa than in Ghana. This finding is supported by Toh (2016) who reported that an increase in inflation rate could discourage domestic production in the long run and reduce GDP growth. The discount rate across the selected countries was negative. The effects were only significant in Ghana. The implication is that the monetary policy in Ghana is more of contractionary, while that of Nigeria and South Africa tends towards expansionary monetary policy. Lending

rate is therefore higher in Ghana compared to Nigeria and South Africa. Investment may be negatively affected but inflation is also reduced. This is why inflation rate in Ghana is positive. The discount rate therefore moves in tandem with the total output of an economy within a given period. In the short-run, DIR appeared to be a significant macroeconomic variable across the countries but negative for Nigeria and South Africa while positive for Ghana. The implication is that discount rate has a direct impact on total productivity of an economy since it influences investment. These findings aligned with (Onakoya, 2018). In a situation where the discount rate exerts a negative impact on GDP, Shimu, and Islam (2018), attributed such negative impact to limitations occasioned by concurrent pursuit of other economic objectives. Discount rate policy whether expansionary or contractionary, co-moved with GDP growth rate.

In the long run, unemployment rates (UER) exerted a negative and non-significant impact on Nigeria and South Africa, while its effect on Ghana economy was also negative but significant. In the short run, UER influenced GDP negatively and significantly in the three countries. Ghana and Nigeria have the informal sub-sectors that lack efficient and effective legal framework and therefore difficult to control and coordinate. This must have influenced the non-significant outcome of UER variable on their economies. UER therefore did not influence substantially GDP growth in the SSA. This is in line with the studies of Onakoya (2018); Teboho (2016); Ashika (2015); Ho and Iyke (2018), who identified that unemployment rate may not exert significant effect on GDP growth in an economy that is characterized by informal unregulated sectors.

5.0 CONCLUSION AND RECOMMENDATIONS
5.1 Conclusion
This study appraised the impact of macroeconomic aggregates on GDP growth in Sub-Saharan African economies (SSA), for a period of forty years; from 1981 to 2020 and ascertained the existence or note of co-movement between the macroeconomic variables and GDP growth rate. The findings indicate no distinction between the effect of exchange rate of Naira-Dollar, Cedi-Dollar, and Rand-Dollar on GDP in the long-run, while in the short-run its effect was not significant on South African

economy, but it was significant on Nigeria and Ghana economies. Inflation influenced GDP negatively in the three countries but was only significant in Nigeria and South Africa. In the short run, Nigeria and South African economies were negatively impacted by inflation and the effects were significant, while in Ghana, it was found to be positive and non-significant. The discount rate across the selected countries was negative. The effects were only significant in Ghana. Lending rate is therefore higher in Ghana compared to Nigeria and South Africa. In the short-run, DIR appeared to be a significant macroeconomic variable across the countries but negative for Nigeria and South Africa and positive for Ghana.

In the long run, unemployment rates exert a negative and non-significant impact on Nigeria and South Africa, while its effect on Ghana economy was negative and significant. In the short run, UER influenced GDP negatively and significantly in the three countries. Ghana and Nigeria have the informal sub-sector that lack efficient and effective legal framework and therefore difficult to control and coordinate. This study concludes that macroeconomic indicators are significant determinants of GDP growth rate in Sub-Sahara Africa and that there is co-movement between macroeconomic aggregates and GDP growth rate.

5.2 Recommendations

Currency of SSA countries especially Nigeria and Ghana are weak and volatile influencing negatively the output of the countries. Government policies should discourage imports and promote export produce to strengthen the currencies. Producers should be made to produce standard goods and integrate with global markets to create outlets for the sale of goods produced locally. The monetary authorities should use contractionary monetary and fiscal policies to mop-up too much money in circulation and invest in infrastructural development and diversify foreign receipt base to reduce inflationary pressures. Monetary authorities should use interest rates to control demand and supply of goods and services within the economies when appropriate. Economic managers should use discount rate policies that will facilitate credit extension and accelerate investment in productive activities. This will increase output,

reduce inflation, and stabilize prices. Economic managers of SSA should pursue policies that will formalize the informal sub-sector of the region through capacity building. Government should ensure data capturing and provide legal framework for effective control and coordination of the informal sub-sector.

5.3 Contributions to knowledge

How macroeconomic fundamentals transmit to growth in output level in Sub-Saharan Africa is the focus of this research and has made notable contributions to the existing body of knowledge. First, previous studies selected macroeconomic parameters based on individual country's economic experiences. The current study developed a model that captured macroeconomic fundamentals like exchange rate; discount rate, inflation rate, and unemployment rate based on variables that are hinged on macroeconomic policies that are common to the economies of SSA. Second, this study developed a unique model that captured macroeconomic aggregates to ascertain the transmission mechanisms that describes the co-movement between macroeconomic indices and growth rate of SSA economies. Third, previous studies considered diverse macroeconomic aggregates that influenced economic growth of different countries but did not compare the macroeconomic fundamentals of SSA. The current research is a comparative study of Nigeria, Ghana, and South Africa.

5.4 Limitations of the study

There was lack of convergence in Sub-Saharan Africa macroeconomic dynamics. This resulted in difficulties in choosing the appropriate scope of the study because of significant differences in economic policies. This was circumvented by focusing on macroeconomic indices common to the selected SSA countries. Secondly, this study used gross domestic product, exchange rate, inflation rate, discount rate and unemployment rate as macroeconomic aggregates. They are other factors such as governance parameters, international economic environment and security situations that influence economic output that were not included in the current research. They may form a research front for further research.

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DETERMINANTS OF FINANCIAL INCLUSION IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES

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ABSTRACT

The study examines the determinants of access to and usage of financial services in sub-Saharan Africa. It employed panel data spanning 2006 to 2021 from 12 sub-Sahara African countries. The ex-post facto research design and econometric techniques were employed to explain the determinants of financial inclusion. Descriptive statistics were employed to describe the nature of the data. The LLC and IPS tests of stationarity indicated that all the variables were stationary at first difference. The Pearson pairwise correlation test revealed that the strength of association among the regressors were weak. The panel data was estimated using Pooled OLS, Fixed Effects, and Random Effects panel estimation techniques. The findings show that aside GDP per capita and political stability that had insignificant effect on access, money supply and regulatory quality had a significant effect on access to financial services. Furthermore, the findings suggest that aside regulatory quality and deposit rate, GDP per capita and automated teller machines exert significant effect on financial usage. The study further reveals that money supply and lending rate significantly stimulate usage of loan accounts, while regulatory quality was insignificant. The study concludes that a combination of macroeconomic, institutional, and bank-level factors determines the level of financial inclusion in sub-Saharan Africa. The study recommends the formulation of economic policies that encourage productivity and the growth rate of GDP per capital in the region due to the beneficial role it plays on access to and usage of financial

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products and services in SSA. Regulatory institutions should improve regulatory quality to enhance the effectiveness of financial regulations in sub-Saharan Africa. Monetary authorities should encourage the lending interest rate and deposit interest rate to be attractive to enhance access and usage of financial products in the SSA.

Keywords: Financial access; financial inclusion; financial usage; financial service industry; regulatory quality; sub-Saharan Africa

1.1   Introduction

The buying and selling of funds by financial intermediaries are a corollary to the supply and demand of bank financial services. The level of outreach and the penetrative impetus of the products and services offered by financial institutions determine the accumulative and distributive ability of intermediaries (Soumare et al., 2016). Financial intermediaries play a dominant role in bridging the gap between the deficit units and the surplus units, through deposit mobilization and allocation (American Bankers Association, 2014). This middleman function of financial intermediaries has severally been documented in finance literature as a propellant to economic progress (Markjackson, 2021; Abiola et al., 2015; Olaniyi, 2017; Kama & Adigun, 2013). Consequent on this, the ability of the financial superstructure to scale up demand by integrating the unbanked via offering products and services that cater for the various consumer groups, enhamces the business of banking and the economy.

The United Nations, amongst others, identified financial inclusion as one of the key propellant for global inclusive human capital development (Gamito, 2018). The importance of financial inclusion transcends the academic circles, it is a core critical subject for policy makers as well. The rave for financial access, usage, and quality is as a result of the notion that access to affordable quality financial products and services has the capacity to spur up the wellbeing of the people and sustain the gains on economic progress (Yah & Chamberlain, 2018).

Financial availability, accessibility and usage are the three basic objectives of financial inclusion. This connotes that availability begets access and access begets usage given an existing demand. Financial access simply implies the supply of financial products like savings, customer or credit card loans, and

services like insurance, investment, and retirement plan to various consumer groups (Katoroogo, 2016). Financial products and services help the transfer of liquidity from surplus units to deficit economic actors, through the intermediation networks available. Financial usage, on the other hand, entails use and participation in formal financial networks. It reflects the depth of financial inclusion. Financial usage is predicated on availability, ease of access, and the perceived benefits from it.

The continent of Africa, comprising 54 sovereign countries ranks extremely low in terms of financial access and use (Yah & Chamberlain, 2018). This connotes that the degree of financial exclusion is high on the continent. Records indicate that, in 2014, about 75 percent of Africa's adult population did not have bank accounts and were regarded as unbanked (Demirguc-Kunt et al., 2015). Zins & Weill, (2016) estimated this group of people without access to formal banking services to be 2.5 billion. This group of financially excluded and unbanked people make use of the informal system in meeting their financial needs in Africa. Zins and Weill (2016) further stated that loan accounts from formal bank networks rack 6.7% compared to 37.5% from informal networks in Africa. They further documented that 41% of the adult population on the continent had loan accounts from sources outside the banking system, whereas 51.4% had no line of credit in the past 1 year.

In sub-Saharan Africa (SSA), there is an estimated 590 million people aged 15 and above, 350 million people out of this lot are reportedly unbanked (European Investment Bank, 2017). Again, data indicate that the level of inclusion varies on the continent of Africa. For instance, banking inclusion in Mauritius, Kenya, South Africa and Nigeria stands between 60 and 80 percent, the proportion in Congo, Niger and Mozambique stands between 5 and 13 percent (Yah & Chamberlain, 2018; Chinoda & Kwenda, 2019). Although sub-Saharan Africa has made tremendous efforts in ensuring increase in deposit accounts from 29.5% in 2016, there was still a decline of about 7.4% in 2017 (World Development Indicators, 2019). This indicates that more still needs to be done to scale up the degree of inclusion to reap the attendant benefits therein.

Financial inclusion, which typically represents formal participation in banking and nonbanking financial networks regarding the ownership of deposit and loan accounts, savings, insurance and remittances has the capacity to scale up the

financial position of households, micro-enterprises and other members of the deficit sector, and further build the fixed capital resources of a nation (Allen et al., 2016; Efobi et al., 2014). Gaps in financial inclusion are unattractive to growth and impairs capital formation (Efobi et al., 2014; Eze & Markjackson, 2020). This puts African countries in dire disadvantage to start and grow their ventures and mitigate sudden financial mishaps (World Bank, 2015). Low per capita income, unreliable remittance and online systems, undue transaction failure and resolutions, lack of suitable credit and savings products, poor educational and financial literacy levels are some of the impediments to FI in the region (Eze & Markjackson, 2020; Kama & Adigun, 2013; Katoroogo, 2016; Ozili, 2020; Ajide, 2017).

Scholars have documented in literature that banking the unbanked households, small scale businesses and other economic units in the long run, leads to inclusive growth (Allen et al., 2016; Efobi et al., 2014; Nwafor & Yomi, 2018; Olaniyi, 2017; Eze & Markjackson, 2020; Fadun, 2014). Also, it is documented that access to and usage of financial services could increase per capita income, marginal propensity to save, enhance business growth, ease diaspora remittances, and the accumulation of fixed and circulating capital in an economy (World Bank, 2017).

Despite compelling evidence about the attendant benefits from financial inclusion, African countries are finding the agenda to reduce financial exclusion and embrace accelerated FI in terms of the use of deposit and loan accounts a daunting task. For instances, whilst fourty-three and twenty-one percent of business ventures and family units have loan accounts in 'median non-African countries', the figures for 'median African countries' rack a paltry twenty-one and approximately seventeen percent respectively (Zins & Weill, 2016). This connotes that the universe of people that are excluded relies on informal financial networks for their credit needs. This further alludes to possible barriers of cost, maturity and collateral requirements for owning a loan account (Allen et al., 2016; Ozili, 2020).

Clearly, the quest for FI is still a continuum (Beck & Demirguc-Kunt, 2008). Hence, the study interrogates the variables that accounts for inclusive finance in sub-Saharan Africa. The study specifically examined the effect of per capita income, regulatory quality, political stability and no violence, deposit interest

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rate, lending interest rate, broad money supply, automated teller machines on FI (the number of deposit and loan accounts) in SSA.

2.0   Empirical Review

The foundation of financial inclusion is hinged on access to and usage of affordable quality financial products and services, which is spurred by the depth and breadth of formal participation. Thus, it is widely held that financial inclusion scales up the economic status of households, businesses, and the marginal propensity to produce at the macroeconomic level. Consequent on this, this section presents documented empirical studies on the causes of FI on the continent.

Evans and Adeoye (2016) used panel data from 15 African countries to establish the underpinnings of financial inclusion. The Arellano-Bond dynamic panel data analytical techniques were employed to estimate the dynamic model. The estimates suggest that GDP per capita, M_2/GDP, adult literacy rate, access to interest, and a dummy were all found to be linear significant determinants of the number of deposit account ownership in Africa. Whilst savings interest rate and population growth were found to be a positive but insignificant determinant of the number of deposit accounts in Africa.

Eze and Markjackson (2020) empirically studied variables influencing the use of deposit accounts in Nigeria. The study focused on the dimensions of financial usage by employing the number of deposit accounts as the dependent variable and employed other bank level data like loan accounts of firms, bank spread and the ratio of loans to deposits, and further used macroeconomic indicators like GDP per capita, lending interest rate and savings deposit interest rate as the explanatory variables. The study found loan accounts, lending interest rate and the ratio of rural loans to deposits as significant drivers to the use of deposit accounts in Nigeria. Other explanatory variables like GDP per capita was linear and statistically insignificant, whilst savings interest rate and bank spread had a significantly adverse effect on deposit account ownership in Nigeria.

Seman (2016) examined the role financial institutions and other determinants play in stimulating inclusive finance. The author employed panel data regression technique for the estimation of the model. The results indicate that Islamic banking plays a moderate but important role in enhancing inclusive finance. Legal rights and governance play a measured significant role in

enhancing inclusive finance. Contracts however, was found to be insignificant, yet plays an important role in enhancing access and usage of financial services. Lending interest rate exerts an adverse but significant influence on loan account ownership. Finally, physical infrastructure and gross domestic product are positively associated with FI.

Ajide (2017) examined how institutional factors determine the level of financial inclusion in sub-Sahara Africa (SSA). The results indicate that the institutional indicators of the explanatory variables and the other effect variables are significant determinants of financial access in SSA.

Gorfu and Mamo (2013) examined factors determining commercial bank branch networks in Ethiopia. The results showed that the factors determining the location of a bank branch is a combination of economic, socio-cultural and demographic factors. Thus, the study concluded that public capital expenditure, firm size in the private sector, number of enrolees in vocational schools, and undergraduate students are the significant factors influencing the spread of bank branch physical infrastructure in Ethiopia.

The review of extant studies indicates that there are several indicators of access to and usage of financial products and services. Researchers have tested macroeconomic, bank-level, and institutional factors in their attempts at identifying the crux of FI with varying conclusions. Financial inclusion is still an evolving subject, thus, this study employed econometric techniques to further strengthening our understanding and contribute to the discourse of financial inclusion in Africa.

3.0 Methodology
3.1 Research Design and Data

The *ex-post facto* research design and quantitative methods (panel least square (PLS) and panel estimated generalized least squares (EGLS) techniques) were employed to ensure that conditions prior to the conduct of this study can properly be understood and explained using econometric techniques. The EGLS is the most effective in handling cases of heteroskedasticity or auto-correlation problems. In addition, the redundant fixed effect test and Hausman test for endogeneity, also known as the Durbin-Wu-Hausman specification test was employed to determine the most preferable model between pooled OLS, and the Fixed Effects (FE) and the Random Effects (RE) panel regression techniques

respectively. The reason for the Hausman test in this study was to ensure that the models are built and estimated based on the unique data characteristics. That is, the test portends the need for synergy between the study data and the model.

Panel data was collated from 12 sub-Sahara African countries representing the southern, eastern, and **western** regions. The data was sourced and collated from World Development Indicators (WDI) and Worldwide Governance Indicators covering the period 2006 to 2021.

3.2   Model Specification

The econometric models for the study are expressed as follows;

$$\ln NDA_{it} = b_0 + b_1 \ln GDPC_{it} + b_2 \ln RQU_{it} + b_3 \ln DIR_{it} + b_4 \ln ATM_{it} + b_5 \ln BBN_{it} + b_6 \ln POPC_{it} + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$\ln NLA_{it} = c_0 + c_1 \ln GDPC_{it} + c_2 \ln BM_{it} + c_3 \ln LIR_{it} + c_4 \ln RQU_{it} + c_5 \ln BBN_{it} + c_6 \ln POPC_{it} + k_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where;

Notations b_0 and c_0 stand for the intercepts of models (1) and (2) respectively. Ln is the natural logarithm of the variables. The subscripts *i* and *t* represents *i-th* country and *t-th* year respectively. That is, *i* is 12 cross-sections or countries, while *t* is 15 years. Notations $b_1 - b_4$ and $c_1 - c_4$ are the coefficients of the explanatory variables of explanatory models (1) and (2) respectively. Notations $b_5 - b_6$ & $c_5 - c_6$ are control variables in models (1) and (2) respectively. NDA is number of deposit accounts with commercial banks (per 1,000 adults), NLA is number of loan accounts owned by the private sector, GDPC is gross domestic product per capita, BM is broad money supply, LIR is lending interest rate, DIR is deposit interest rate, ATM is automated teller machines (ATMs) (per 1000 adults), POPC is population (potential customers), RQU is regulatory quality, PSTA is political stability and no violence

4.0   Empirical Results
4.1   Descriptive Statistics

This section presents the statistical characteristics of the variables used in the models. The results of the descriptive statistics are presented in table 4.1.

Table 4.1: Summary Descriptive Statistics

Variable	Mean	Median	J-B Stat.	Min	Max
NLA	25.34	16.74	140.19***	3.88	98.02
NDA	311.25	184.64	25.61***	10.62	1066.92
BBN	5.89	4.53	67.17***	0.48	22.04
GDPC	2.35	2.27	31.78***	-9.44	11.32
BM	31.26	25.58	38.90***	9.40	73.80
RQU	-0.44	-0.44	31.56***	-2.16	0.61
PSTA	-0.30	-0.13	7.06**	-2.21	1.20
POPC	84.83	37.94	224.37***	2.39	498.66
LIR	13.17	12.45	9.56***	0.00	32.75
DIR	7.49	7.81	3.51	0.00	17.06
ATM	10.32	4.35	316.73***	0.00	71.95

Source: Author's computation, 2022

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

The results showed that the means of the variables are positive except for the RQU and PSTA. For the NLA, the average value is far below the maximum than the minimum but not far from the median value; we can infer that the number of accounts owned in the SSA countries are not by far many. The same thing applies to the NDA; the minimum value is about 30% of the mean which is about 4% of the maximum value. It can thus be said that the NDA in the SSA countries is low on average. The minimum value of BBN shows that some of the commercial banks in the SSA countries are having few branches compared to the average value. Both the mean and median value of GDPC is almost the same; however, the minimum value shows that one of the SSA countries experienced negative growth in a particular year. Also, some of the SSA countries are likely to have experienced high inflation in some years as the maximum value of the BM shows that about 73.80% rise in broad money is experienced by one of the selected countries. The mean value of the RQU reveals that regulatory quality in the region is very low and the mean value of the PSTA also reveals that the degree of political instability is very high in sub-Saharan Africa. Both the mean and median value of LIR and DIR are close to each other. However, we can infer that both rates are moderately high in the region as their maximum values are about twice their mean. The average number of ATMs in the SSA countries is very low compared to the maximum.

4.2　　Correlation Analysis

This section presents the results of the degree of association between the variables using the Pearson pairwise correlation approach. The results of the Pearson pairwise correlation test is presented in Table 4.2.

Table 4.2: Correlation Matrix

	NLA	NDA	BBN	GDPC	BM	RQU	PSTA	POPC	LIR	DIR	ATM
NLA	1.00										
NDA	0.66	1.00									
BBN	**0.93**	**0.77**	1.00								
GDPC	-0.13	-0.10	-0.05	1.00							
BM	**0.92**	**0.71**	**0.93**	-0.08	1.00						
RQU	-0.36	-0.14	-0.24	0.13	-0.16	1.00					
PSTA	0.16	0.04	0.16	0.11	0.29	0.62	1.00				
POPC	-0.26	-0.04	-0.25	0.22	-0.29	0.08	-0.20	1.00			
LIR	0.14	0.37	0.25	0.30	0.12	-0.22	-0.07	0.41	1.00		
DIR	0.06	0.23	0.14	0.06	0.01	-0.24	-0.17	0.21	0.43	1.00	
ATM	0.41	0.57	0.50	-0.10	0.55	0.42	0.45	-0.23	-0.08	-0.28	1.00

Source: Author's computation

Table 4.2 shows that there should be not perfect or near-perfect relationship among the regressors to circumvent the problem of estimation bias.

It should be noted that NLA, NDA and BBN are the dependent variables; therefore, the strong degree of correlations between them posed no problem to the regression models. The fourth row shows that BM correlates strongly with the three dependent variables and this is further proven in the regression models. It can be seen that there is no strong degree of association among the regressors (independent variables), hence we may infer that the problem of multicollinearity (linear dependency) is not perceived in this study.

4.3 Panel Regression Analyses

The results of the pooled-OLS, fixed-effect (FE), and random-effect (RE) estimates are presented in tables 4.3 and 4.4 respectively.

Table 4.3: Regression Results for the Number of Deposit Accounts

Variables	Dependent Variable: NDA		
	Pooled-OLS Estimate	Fixed-Effect Estimate	Random-Effect Estimate
GDPC	-0.028**	-0.014	-0.023**
	(0.014)	(0.012)	(0.012)
	{-1.978}	{-1.126}	{-1.990}
RQU	0.035	0.400*	0.177
	(0.078)	(0.222)	(0.155)
	{0.449}	{1.799}	{1.138}
DIR	0.012	0.030*	0.001
	(0.015)	(0.018)	(0.016)
	{0.839}	{1.678}	{0.593}
ATM	0.021***	0.029***	0.030***
	(0.004)	(0.001)	(0.005)
	{4.980}	{5.328}	{6.687}
BBN	1.080***	0.890***	1.209***
	(0.063)	(0.220)	(0.099)
	{17.064}	{4.028}	{12.269}
POPC	0.270***	1.721***	0.400***
	(0.032)	(0.618)	(0.083)
	{8.228}	{2.786}	{4.838}
R^2	0.83	0.91	0.67
Adj-R^2	0.82	0.90	0.66
F-Stat	118***	82***	50***
CI-test	-	11.28***	-
Hausman	-	-	10.78*

Source: Author's computation

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$, () standard error, { }t-statistics

The random-effect results show that except RQU and DIR are statistically significant at the conventional level. It can be seen from the result that a unit rise in the gross domestic product per capita (GDPC) results in about 2.3% units decrease in the average value of domestic account with the commercial banks (NDA). Also, the result shows that if commercial bank branch networks (BBN) rise by one percent, the average value of domestic account with the commercial banks (NDA) goes up by about 1.209%. The result likewise shows that a unit increase in ATMs will result in about 3% units increase in the average value of domestic account with the commercial banks (NDA). It can be deduced from the result that if POPC rises by one percent, the average value of domestic account with the commercial banks (NDA) goes up by about 0.4%.

Table 4.4: Regression Results for the Number of Loan Accounts

Variables	Dependent Variable: NLA		
	Pooled-OLS Estimates	Fixed-Effect Estimates	Random-Effect Estimates
GDPC	-0.006	-0.010**	0.011**
	(0.008)	(0.005)	(0.005)
	{-0.764}	{-2.184}	{-2.429}
BM	0.747***	0.343***	0.377***
	(0.096)	(0.102)	(0.091)
	{7.767}	{3.370}	{4.146}
LIR	-0.009***	-	-0.023***
	(0.003)	0.026***	(0.004)
		(0.006)	
	{-2.845}	{-4.581}	{-5.410}
RQU	-0.174***	0.113	-0.020
	(0.037)	(0.090)	(0.067)
	{-4.763}	{1.261}	{-0.294}
BBN	0.324***	0.541***	0.579***
	(0.053)	(0.085)	(0.052)
	{6.107}	{6.378}	{11.032}

POPC	-0.0244	0.134	0.025
	(0.017)	(0.227)	(0.038)
	{-1.431}	{0.592}	{0.665}
R^2	0.87	0.96	0.72
Adj-R^2	0.86	0.95	0.71
F-Stat	160***	188***	63***
CI-test	-	27.59***	-
Hausman	-	-	17.65***

Source: Author's computation

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$, () standard error, {}t-statistics

The random-effect results indicate that POPC and RQU are statistically non-significant at the conventional levels. It can be seen from the result that a unit increase in the gross domestic product per capita (GDPC) accelerates the use of loan accounts by 1.1%. Also from the result, it can be seen that a one percent rise in the broad money supply (BM) causes a 0.377% change in the average number of credit facilities (NLA). A unit rise in the LIR is found to cause a decrease in the average number of loan accounts owned by the private sector (NLA) by about 2.3%. Also, the result shows that if commercial bank branch networks (BBN) rise by one percent, the average number of loan accounts owned by the private sector (NLA) goes up by about 0.579%. The results also indicate that increase in population leads to about 0.025% increase in the number of loan accounts. The effect of regulatory quality on the number of loan accounts in the region was found to be negative. The coefficient of determination (R^2) shows that about 72% of the variation in NLA is explained by the regressors. The F-stat 63 is shown to be statistically significant and this implies that all the regressor parameters are jointly significant and different from zero.

5.0   Discussion of Findings
5.1   Determinants of the Number of Deposit Accounts in SSA
The estimated results suggest that GDP per capita and automated teller machines significant effects on the number of deposit accounts. Aside GDP per capita, deposit interest rate, regulatory quality, and automated teller machines met the positive a priori expectation. The findings are specifically discussed in the following section.

Firstly, the regression results indicate that there is a statistically significant relationship between per capita GDP and the number of deposit accounts owned by the households and other private sector participants. Furthermore, the results showed that the connection between income per head and the number of deposit accounts is negative (-0.023). This simply means that the use of deposit accounts responds negatively to every increase in GDP per capita in SSA. This is not in line with the demand-following hypothesis, which avers that increase in productive endeavours in the real (or private) sectors increase formal participation in the financial system (Evans & Alenoghena, 2017).

The findings of statistical significance are in agreement with the study of Evans and Adeoye (2016) who reported that the total value of production per head exerts a major role on the usage of deposit accounts in the continent. Similarly, the significant role GDP per capita plays in enhancing inclusion as reported in this study have severally been affirmed (Ajide, 2017; Wokabi and Fatoki, 2019; Berdibayev and Kwon, 2020; Sha'ban et al., 2020; Asuming et al., 2019; Evans & Alenoghena, 2017; Chu, 2019). However, unlike the adverse coefficient reported in this study, the study by Evans and Adeoye (2016) and Eze and Markjackson (2020) affirmed the link between the variables to be positive. Unlike others, the studies by Eze and Markjackson (2020) and Ngo (2019) reported that the variable exerts an insignificant role in the usage of deposit accounts in Nigeria and Asia respectively.

Regarding the negative coefficient reported, it can be argued that this may have been caused by the rise in the usage of digital currencies such as bitcoin and crypto currencies. This encourages peer-to-peer transactions over the digital space. This may have a positive effect on the economy, but exert an adverse effect on the number of transactions in commercial banks.

Secondly, the estimates suggest that there is no statistically significant relationship between regulatory quality and the usage of deposit accounts by households and other private sector participants in sub-Saharan Africa. However, the results showed that the relationship between quality regulation and bank account is positive. This connotes that deposit accounts respond positively to every improvement in regulatory quality in the region. This goes to say that the formulation and implementation of quality regulatory framework instills confidence and enhances deposit accumulation as a result of increase in deposit

accounts. The positive result corroborates with the New Institutional Economic (NIE) theory, which posits that regulatory institutions encourage certainty, stability, and growth (in this case, number of deposit accounts).

In corroborating our findings of statistical insignificance, Yah, and Chamberlain (2018) reported that the reason for poor usage of financial services in Africa is poor legal origin. This implies that the legal framework on the continent is not adequate to significantly stimulate trust and the number of deposit accounts in SSA. In fact, the absence of a proper regulatory framework gives service providers opportunities to explore loopholes and engage in reckless activities that could derail confidence and induce instability. Again, the reason for the insignificant coefficient could be attributed to unsuitable guidelines that are not attractive to providers and users of funds, and the cost of bridging the gap without a matching lessening effect on the risk to financial institutions (Jansson & Wenner, 1997).

Conversely, the results of Muriu (2020) and Bermeo (2019) contradicted the findings of this study when it reported that quality of regulation significantly determine the accumulation and use of deposit accounts. Similar studies by Allen et al. (2016) and Berdibayev and Kwon (2020) also reported that a stable regulatory environment is a significant contributor to the use of deposit accounts and digital financial service inclusion respectively. This may imply that improved regulations with adequate legislation and implementation of set rules and policies could significantly permit and promote growth in deposit accumulation and use in the region.

Thirdly, the estimated results suggest that the nexus between deposit interest rate and ownership of deposit accounts is positive in SSA. Deposit interest rate responds positively to the number of demand, time, or savings deposit accounts. This is corroborated by the financial deepening hypothesis, which posits that deposit accounts react positively to rising savings rates (Shaw, 1973). Similar study by Oyelami et al. (2017) affirms this to be true when it reported that the response of deposit accounts to deposit interest rate is positive in SSA. Documented results by Eke (2019), however suggest that the nexus between bank rate and the number of deposit accounts is negative in Nigeria. Similar studies also found the coefficient of deposit interest rate to be negative (Eze & Markjackson, 2020; Evans & Alenoghena, 2017).

Furthermore, the results showed that deposit rate is statistically non-significant. This supports the null hypothesis of no statistical significance. This supports the findings of insignificance in Africa reported by Evans and Alenoghena (2017) and Evans and Adeoye (2016). However, the study by Saba and Ahmed (2017) reported that the number of deposit accounts in Christian nations is determined by the savings interest rate. In following the theory, this was found to be statistically insignificant in Muslim countries.

Consequently, the study argues that deposit interest rate which is the cost banks pay for deposits is usually very meager hence the positive non-significant coefficient. This entails that oftentimes, the supply of banking products and services is available, but due to poor interest rates and other implications, demand and usage remains a major barrier to banking the unbanked in the region. Again, the study argues that poor deposit interest rate could be a reason for dissatisfaction and willful exclusion in SSA. This is the position of the dissatisfaction theory of financial inclusion which adduces that cost and non-cost related factors make people willfully stop formal financial patronage (Ozili, 2020). In this era of digital and crypto currencies, funds that are usually deposited in the conventional banks are converted into different types of crypto currencies and held in digital wallets, mostly due to the continuing decline in the value of national currencies of developing countries and the likelihood of making gain. Thus, the opportunity cost of keeping one's funds in a conventional bank is to forego the opportunity of leveraging on digital assets and capital gains. These may have caused the explanatory variable to be positive, yet statistical non-significant in SSA.

Fourthly, the results indicate that the relationship between automated teller machines and deposit accounts is statistically significant. In fact, the results show that there is a positive connection between the variables. Asuming et al. (2019) and Oyelami et al. (2017) similarly reported that the ATM presence significantly contribute to financial access and usage in SSA. Similar study by Awad and Eid (2018) also reported that proximity or nearness to financial service providers is positively associated with the use of accounts in Egypt.

Although the advent of fintech has to a large extent de-emphasized location due to the added ability of banks to reach remote areas with their products and services. This is limited due to demand-side factors like income, employment, literacy, internet, and others. Thus, for enhanced service delivery and sustained

advantage, the geographic spread of bank branches is still a sine-qua-non (Barbieri et al. 2015; Gorfu & Mamo, 2013). Branching, though expensive, could enable banks to spread their deposit portfolios and further minimize deposit concentration.

5.2 Determinants of the Number of Loan Accounts in SSA

The results are discussed in the following section;

Firstly, the findings indicate that per capita GDP (or income per head) significantly explains changes in the number of loan accounts in SSA. And that there is a positive link between income per head and the number of loan accounts. This implies that the regressor is a vital determinant of loan account creation in the region. This suffices that per capita income has the capacity to accelerate increase in the number of loan accounts, which is a function of increase in output and income. The demand-following hypothesis portends that this translates to increased participation and use in financial system. Thus, the results portend that economic growth policies can accelerate the ownership of deposit and loan accounts, and access to bank service outlets (Evans & Alenoghena, 2017).

The results support the positive findings reported by Maiti et al. (2020). In direct contrast with our findings of statistical significance, their study however reported that per capita income exerts zero effect on the number of loan accounts in Ghana. In a similar study by Alter and Yontcheva (2015) and Wokabi and Fatoki (2019. This was found to be true in SSA and East Africa respectively. There are few studies contradicting the beneficial role of per capita income on access to credit. For instance, in studying how social and macroeconomic variables affect financial inclusion, Ngo (2019) reported that, financial development responds negatively to GDP per capita in Asia. Similarly, Oyelami et al. (2017) also found this to be the case in SSA. While Rafeeq (2018) found that GDP per capita plays an insignificant or zero effect on financial inclusion. The reason for the contrary results could be as a result of poor economic activity that may have caused a decline in the income of businesses and households and their consumption of credit facilities.

Secondly, the findings suggest that the relationship between broad money supply and the number of loan accounts is significantly positive in sub-Saharan Africa. This implies that expansionary monetary policy measures could accelerate the ownership and use of loan accounts in SSA. The result is in agreement with the

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study of Evans and Adeoye (2016). A similar study by Evans and Alenoghena (2017) also reported that the coefficient of broad money supply is positive and significant in Africa. Similarly, David et al. (2018) also found that the nexus between broad money supply and usage of financial services are significant and positive in Nigeria. Again, Maiti et al. (2020) also reported that money supply exerts a positive but statistically insignificant effect on loan account ownership. Furthermore, other studies reported that money stock causes a significant increase in economic growth (Olaniyi, 2017).

However, the significant positive results connote that increase in the volume of cash in the purses of people and formal accounts lead to increase in accounts ownership (credit facilities) by corporations, small businesses and households in SSA. This result is consistent with the H theory of money supply. The theory holds that rising bank's deposit liabilities inadvertently leads to an upsurge in the creation of loan accounts and new deposits. In affirming the role money supply plays in enhancing efforts of financial inclusion, Barbieri et al. (2015) reported that deposit accounts exert a significant role in determining access to financial services in Italy. This connotes that when there is a decline in the supply of money (that is, cash in circulation and deposits), the inclusion rate in terms of access to credit will certainly be affected.

Thirdly, the results further suggest that there is a significant relationship between lending interest rate (that is, the cost of credit) and the number of loan accounts in sub-Saharan Africa. In fact, the results allude that the estimate of cost of credit is negative. This simply implies that the cost of credit facilities or loanable funds causes a noteworthy negative result on the number of loan accounts in the region. This means that a rise in lending interest rate makes credit unattractive and discourages financial depth and development in the region.

The significant negative finding is consistent with theory. For instance, the dissatisfaction theory of financial inclusion holds that cost and non-cost related factors make people to willfully stop the formal usage of credit instruments. And that increase in the cost of maintaining loan accounts causes a decline in the usage of loan accounts. Thus, inferring high cost of credit as a barrier to loan account inclusion in sub-Saharan Africa.

In comparing the results with documented extant studies, we found that the study by Maiti et al (2020) similarly found a negative relationship between cost of credit

and the number of loan accounts in Ghana. The results further showed that the coefficient of the variable is not significant. Similar studies by Wokabi and Fatoki (2019) and Oyelami et al. (2017) reported that the relationship between lending interest rate and credit facilities is positive, and that the coefficient exerts zero effect on loan accounts in East Africa. This implies that people are not constrained from applying for and owning loan accounts as a result of the increase in the cost of loan accounts (that is, the lending rate). The possible reason for this could be that lending interest rate is within a bearable threshold for economic agents. For instance, Evans (2017) estimated the tolerable threshold to be 16.9% in Nigeria.

In addition, Seman (2016) reported that lending interest rate exerts an adverse but significant influence on loan account ownership. The findings of other extant studies are consistent with the findings of this study (Tuesta et al., 2015; Ali et al., 2017; Saghir and Aston, 2018; Inganga et al., 2014; Eze and Markjackson, 2020). Consequently, the findings infer that changes in the lending interest rate directly affect access to credit or ownership of loan accounts by households and businesses.

Fourthly, the results showed that the link between regulatory quality and the number of loan accounts is insignificantly negative. This means that regulatory quality (RQU) causes a decline in the number of loan accounts by the private sector in region. This failed to corroborate with the a priori expectation. A possible explanation for this is that the activities of the financial sector in SSA countries are badly affected by poor regulatory governance and laxity.

The findings support the results of Sha'ban et al. (2020) when it reported that capital regulations do not stimulate financial access and use. Given this, it can be argued that regulatory institutions have been inadequate in the formulation and implementation of the legislations guiding the operations of the business of banking and lending. Consequently, the absence of proper regulatory frameworks can be adduced as one of the major causes of delinquent facilities and banking distress due to reckless lending, excessive risk-taking and insider abuses. Further causing instability and bank runs in the financial ecosystem. This is not in line with the NIE theory, which posits that regulatory institutions matter and help breed stability and growth (in this case, the number of loan accounts).

Furthermore, similar studies by Muriu (2020) and Ajide (2017) reported contrasting results. Their findings affirmed that regulatory quality is a key

determinant to access to bank branches and usage of deposit accounts. Seman (2016) also reported that legal rights and regulatory governance plays a measured significant role in enhancing inclusive finance. Contrasts, however, were found to be insignificant, yet play a positive role in enhancing access and usage of financial services. In essence, our findings infer that regulators have not been able formulate and implement sound policies and regulations that permit and promote private sector development. This may have been caused by the command-and-control policies of regulators and the government. The independence of regulatory bodies in developing countries is highly jeopardized (Cukierman et al., 1992). This makes it virtually impossible to formulate and implement policies that would encourage financialization, stability, and private sector growth without political interferences.

6.0 Conclusion and Recommendations

The study suggests that all the independent variables are potential drivers of financial access and usage in the sub-Sahara African region. However, the signs and magnitude of their effectiveness to the measures of financial inclusion varies. Aside GDP per capita that had insignificant effect on access; broad money supply, political stability, and regulatory quality had a significant effect on the level of financial access in the region. Furthermore, the study suggests that GDP per capita and ATMS exert a significant effect on the usage of deposit accounts, while deposit interest rate and regulatory quality were insignificant.

The study further reveals that GDP per capita, broad money supply, and lending interest rate significantly stimulate the ownership and use of loan accounts, while regulatory quality played an insignificant effect on the usage of loan accounts in sub-Saharan Africa. The study concludes that a combination of macroeconomic, institutional, and bank-level factors determines the level of financial inclusion in sub-Saharan Africa. This could be as a result of GDP per capita, broad money supply, regulatory quality, political stability, interest rates, and point of service machines. Based on the findings, the study made the following recommendations:

1. Government should formulate economic policies that encourage productivity and the growth rate of GDP per capita in the region due to the beneficial role it plays on access to and usage of financial products and services in SSA.

2. Regulatory institutions should improve regulatory quality through Regulatory Impact Assessment (RIA) to enhance the quality of financial regulations in sub-Saharan Africa. This may reduce financial exclusion caused by lack of confidence due to inadequate regulatory environment.

3. Monetary authorities should encourage the lending interest rate and deposit interest rate to be attractive due to the significant effects they play on FI in SSA. This may encourage formal participation and attract funds from the informal sector to the mainstream financial system.

4. Government should encourage political and social stability considering the due to significant role political stability and no violence have on financial access. This could create a stable and conducive climate for private sector growth and financial inclusion in SSA.

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IMPACT OF FINANCIAL INCLUSION TO ENGENDER COTTAGE FIRMS GROWTH IN NIGERIA, (2000 – 2021)

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ABSTRACT

This study examines the impact of financial inclusion to engender cottage firms' growth in Nigeria. Financial problems associated with cottage firms in Nigeria can be traced to financial exclusion of smaller economic units or sector of the economy. Ex-post facto research design was employed and the annual time series data from 2000 to 2021 were obtained from Central Bank of Nigeria (CBN) Statistical Bulletin and African statistical yearbook. Unit Root Test, the F-Bound test, Error correction Model (ECM) were employed in analyzing the data collected. Agricultural credit guarantee scheme fund (ACGSF), demand for deposit from rural areas (DDRA), deposit bank loans to small scale enterprises as a percentage of total loan (DBLSE) are used as indicators of financial inclusion. The P- value of ECM regression indicated that ACGSF has a positive statistically significant on the growth of cottage firm with a coefficient value of 0.248447. DBLSE was also found to positively impact on cottage firm with a coefficient value of 0.422808 while DDRA showed a negative significant impact on cottage firm with a coefficient value of -0.150803. Thus, the result of the study shows that financial inclusion process of the government has significant impact on the growth of cottage firms with F-Statistic of 0.003039 in Nigeria within the period of study. The study recommends that it is important to expand availability, accessibility, and affordability of formal financial products and services to all citizens of a country, regardless of their economic status.

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1.0 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Financial inclusion is expected to increase the growth and development of the system by making sure that funds are accessible in the economy for investment purposes in the areas that they are deficit. Harnessing and accumulating these resources provide a huge source of cheap long term investable capital. Cottage firms are those business that are owned by members of a family such as husbandry, farming, tapping of palm wine, blacksmithing, hunting, basket crafting, beadwork, woodwork etc and they are characterized by traditional settings. The scope covers only the nuclear and extended family and friends and most of the business skills are inheritance and natural talents. Most of the cottage entrepreneurs are illiterates and unexposed, the business is not mechanized, the level of business and their owners are always ignored by the government policy makers in formulating their policies (Camillus, 2020).

Government of developing nations in targeting the improvement of their cottage firms and farmers are expected to embrace policies like financial inclusion, financial deepening, financial liberalization, and an effective financial intermediation process that will enhance the activities of cottage firms and facilitate the growth and development of the economy at large. Financial inclusion and cottage firms cannot be effectively discussed without the activities of government, banks and other financial institutions who play the major role of facilitating the availability of credit facilities as well as Micro, Small and Medium Scale Enterprises (MSMEs) being the largest consumers and beneficiaries of credit facilities and services as one of the major pillars of economic development.

Mushtag and Bruneau (2019) observed that micro loans make a very great difference to low-income earners and micro entrepreneurs. These

financial services enable low-income earners to have better housing, education for children and better healthcare and improve standard of living. There is evidence of depiction of these financial services in Nigeria and there is still high level of poverty in Nigeria. This is obvious be since the Nigerian financial system is under-developed when compared with that of the advanced nations. Deepening the financial sector in terms of assets volume and instrument diversity could lead to serious reduction of fiscal deficit financing and freeing resources for lending to the private sector. Reforms will bring about structural financing for cheap funds to be channeled to the productive sector and financial accommodation for small and rural credit schemes. The G20 and World Bank led the initiative for increased financial inclusion in developing countries to alleviate poverty and promote firms' growth in emerging economies (Global Partnership for Financial Inclusion (GPFI). According to Nizam, Karim and Rahman (2020). Financial inclusion is among the pillars of inclusive and sustainable growth.

1.2 Statement of the Problem

There seems to be no significant impact of government policies on growth of cottage firms and poverty had remained prevalent in the nation for many years in spite of efforts at financial inclusion. Financial inclusion is core for many developing nations and many research findings have identified its importance to the economy in reducing the poverty levels in households (Global Findex, 2019). Cottage industries of Nigeria is in severe crisis as banks and other financial institutions are not willing to give credit to the subsector. (The cottage industry is being financially excluded). Unavailability of financing requirements is among the key hindrances in the growth of cottage firms.

The importance of financial inclusion to growth is theoretically and empirically acknowledged. Over the last two decades, the relationship between financial inclusion and growth is well documented in some empirical studies (Abdul Bahri et al., 2018; Park and Mercardo, 2018; Nizam et al, 2020 ; Camillus, 2020). Thus, there has been more focus of financial inclusion on general economic growth by researcher than cottage firm which stimulate growth. Creating way into a well-functioning

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financial system, by giving equal opportunities enables socially and economically excluded persons to be absorb into the economy productive and intensely add to economic development, thereby helping the financial system carry out its task of engendering inclusive in developing economies.

In Nigeria, the government in collaboration with CBN has been promulgating various policies since 1970s in trying to mitigate the challenges of cottage firms. It has been integral part of Nigeria financial industry reform for over 30 years. From the rural banking program in 1977 to the establishment of micro finance banks in 2005. Over the years, the agricultural sector growth in Nigeria had unrelenting decline despite various policies of government at revamping the sector. Most of the policies that came up in the 1970s died natural death and the major cause of failure of these early policies was associated with squandering of money with impunity by some privileged Nigerians and government officials, especially since the return of democratic government in 1999.

This research is contributing in its own way by establishing the various effects of financial inclusion on growth of cottage firms and farmers in Nigeria. First it is establishing that Agricultural credit guarantee scheme fund, demand for deposit from rural areas, channeling of bank loans to small scale enterprises as a percentage of total loan has significant impact on growth of cottage firm and farmers in Nigeria.

1.3 Objectives of the Study

The general objective of the study is to establish the impact of financial inclusion on the growth of cottage firms in Nigeria from 2000 to 2021. In view of the general objective, this study attempts to determine the extent to which Agricultural Credit Guarantee Scheme Fund, deposit money bank loans given to small and medium enterprises (SME) and demand for deposit from rural areas affects the growth of cottage firms in Nigeria.

2.0 REVIEW OF RELATED LITERATURE
2.1 Conceptual Framework
2.1.1. Financial Inclusion
Financial inclusion is a state in which all people who use financial service have access to a complement of quality financial services, provided at affordable prices in a convenient manner and with dignity for the clients. Financial inclusion can also be simply defined as having access to a basic bank account, which serves a foundation to other financial services (Neelamegam, 2016). According to the World Bank (2017), financial inclusion is 'the process by which individuals and businesses have access to sustainable financial services for the purpose of transactions, payments, savings, credit, and insurance. Ene (2019) defined financial inclusion as the provision of banking services at an affordable cost, particularly to the disadvantaged who are largely outside the formal banking system.

2.1.2. Cottage Firms
 Cottage firms are small scale businesses in which work is done by the business operators in their homes. Cottage industries provide economic opportunities for the low- middle income segment through employment and income creation schemes all over the world, and especially in low income and technologically under-developed countries, (Camillus, 2020). Some of the features that distinguish cottage/ handicraft enterprises in developing nations from other small-scale businesses are that cottage firms are always run in the owners' homes, it has a traditional setting, the scope of the business is local and only covers the members of immediate and extended family, friends with little or no employment. Most of the business skills are inheritance and natural talents, most people that handle the business are illiterates and unexposed, the business is not mechanized and that level of business and their owners are mostly ignored by government and policy makers in their economic policies in developing countries. Some of the existing cottage businesses in Nigeria are farming, palm wine tapping, hunting, animal husbandry, blacksmithing, goldsmithing, basket making, bead making, and carpentry etc. Traditionally, cottage firms have been rural based, but in recent time, with technological advancements, they have broadened to urban areas to avail

themselves of transport, marketing facilities and financial support from financial institutions, (Tasneem and Biswas, 2018).

The conceptual framework for this study is presented diagrammatically in Figure 1. Figure 1 captures the interaction between financial inclusion and cottage firm growth.
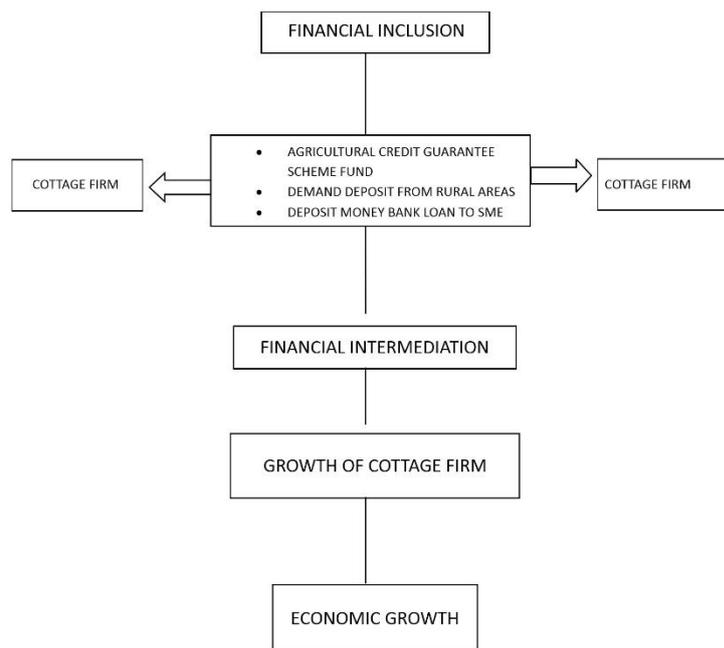

Figure 1: Financial Inclusion Concept

2.2 Theoretical Framework

Contemporary economic theories explain the relationship between financial inclusion and growth. The most common theories related to finance-growth nexus include the demand-following hypothesis, and the supplying-leading hypothesis.

Patrick (1966), Revell and Goldsmith (1970), and McKinnon (1973), on the other hand, were the proponents of the supplying-leading hypothesis and advocated the importance of finance for economic growth. In line

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with the supply-leading theory, finance promotes entrepreneurship and innovations that boost economic growth. The financial sector plays an important role in mobilizing the financial resources necessary for investment and thereby promoting economic growth. Patrick (1966) argued that the financial system can influence economic growth in three important ways. Firstly, the financial system spurs changes in ownership in the course of financial intermediation among the different asset holders. Secondly, financial institutions stimulate the transfer of funds and efficient allocation of resources from relatively low to more productive uses. Thirdly, financial institutions add to the rise of capital accumulation when there is convenient business environment, savings, and investment.

Hence this study is anchored on the financial intermediation and inclusion hypotheses theories to postulate that growth of cottage firms and farmers depends on the extent the financial products and services are extended to the poor, low-income earners, and households' entrepreneurs.

2.3 Empirical Review

Nwankwo and Nwankwo (2014) studies "sustainability of financial inclusion to rural dwellers in Nigeria: problems and way forward", They focused on the services of deposit money bank, microfinance banks and communication services providers in enhancing intermediation of financial services to the rural dwellers, using survey method, Pearson Product Moment Correlation techniques was used to establish the relationship between the variables. The study found that the poor and low-income earners in the rural areas are aware of banking services but also afraid of frauds. The financial institutions in the rural areas are not adequate to enlarge financial inclusion.

Awoyemi, Osunyikanmi and Akomolafe (2015), studied Microfinance Banks and Small-Scale Enterprises in Nigeria: Empirical Analysis from Abuja. They employed Descriptive Analysis and used Chi-square Techniques to achieve their objective. The result of their analysis shows that the microfinance banks do not have a significant impact on the growth of Small-Scale Enterprises in Nigeria, Microfinance Banks Credits are not easy to get, they have high interest rate charge on loan, the repayment

period is unsatisfactory among other challenges that reduce the impact of MFBs to growth of SSEs.

Nwanne (2015) explored descriptive research and content analysis of mobile phones banking, automated teller machine (ATM), agent banking and point of sale (POS) devices. The study found that the sustainability of financial inclusion among rural dwellers in Nigeria is the mainstream for economic growth and development.

Abiola, Folasade and Onankhanlen (2015) examine financial inclusion and economic growth in Nigeria the study used secondary data and Ordinary least square regression model in the analysis. The study found that financial inclusion is a significant determinant of per capita per earning and total factor of production, which consistently determines the final level of output in the economy.

Onakpo (2015) in his research work titled "effects of financial inclusion on the economic growth of Nigeria (1982-2012)'' the study found that financial inclusion activities greatly influenced poverty reduction but marginally determined national economic growth and financial intermediation through enhanced banks branch networks, loans to rural areas and loans to small enterprises. The researcher used secondary data which was analyzed using ordinary least square method.

Okaro (2016) researched on Financial Inclusion and Nigeria Economy (1990-2015). He defined financial inclusion as the provision of a broad range of high-quality financial products such as savings, insurance, credit, and pension, which are affordable to all the country. The study employed Ordinary Least Squares (OLS) regression technique, and the result indicates that DMBIS? Financial Intermediation activities, financial accessibility, Financial Deepening, and Institutional Infrastructures all have positive effect on the Economic Growth while there was no relationship between Financial Inclusion and Poverty Eradication in Nigeria.

Ajinaja, and Odeyale, (2017) study Microfinance and the challenge of financial inclusion for SME's development in Nigeria. In the study, two

model was specified as follows: financial inclusion and low-income savers as, SDA = βo + β1BBranch + β2LRA + μ and microfinance and small-scale enterprises as (LSMEs=βo+β1LRA+β2LDR+ γ). OLS was used to analyse the data and the results indicated that in model one, the number of bank branches and Bank loans to the rural area have a positive impact on the SDA. The analysis of model two indicated that loan to rural areas (LRA) indicated negative impact while loan to deposit ratio (LDR) showed a positive impact on the small-scale enterprises (LSME).

Koomso and Muazu (2017) studied financial inclusion and growth of non-farm enterprise in Ghana. Using data from the sixth round of the Ghana Living Standards Survey, the study examined financial inclusion on growth and constructed a multi-dimensional measure (index) of financial inclusion relying on 14 indicators while employing an instrumental variable approach to examine financial inclusion-firm growth nexus. The indicators of financial inclusion were grouped into ownership of financial products account, use of financial products transact account. the findings of the study suggests that improvement in non-farm entrepreneurs' level of financial inclusion is growth enhancing with higher probability in the urban relative to rural areas.

Anisiuba. Ezeaku and Emengini (2020) examines the effect of financial inclusion on entrepreneurial growth in retail and wholesale sub-sectors: Evidence from Nigeria. The study used quarterly data. Data were analyzed using correlation analysis and error correction approach. The results reveal that financial inclusion has a significant positive effect on entrepreneur growth particularly in the context of the retail and the wholesale sub sector contributions to gross domestic product. The result further indicates that account ownership (CAN) did not have significant influence on the growth rate of the retail and wholesale sub-sectors, while commercial bank branches was found to have significant influence on the growth of the retail and wholesale sub-sector. The study recommends that government should establish more CMB in all rural areas in Nigeria for easy access to official financial products by the unbanked entrepreneurs. Enueshike and Okpebru (2020) examine the effects of financial inclusion on economic growth in Nigeria from 2000 to 2018. The study used

contributions of financial institutions to gross domestic product (GDP), loan to small and medium enterprises (LSME), rural bank deposit (RBD) as proxies for financial inclusion and control variable of inflation (INF). The ARDL result shows that Loan to small and medium enterprise (LSME), rural bank deposit (RBD) and inflation (INF) have a significant effect on economic growth in Nigeria.

Okoro, Obiekwe and Okoro (2020) investigate the impact of financial inclusion on Sub-Saharan economies: Nigeria and Ghana using time series from 1985 to 2018. The variables used in the study are Unemployment rate (UNPR), Commercial banks credit to private sector (BCPS), lending interest rates (LINT), number of rural bank branches (NRBB), Total bank loans to rural dwellers (CBLR), Bank Credit to Agriculture (CBCA) and commercial banks liquidity ratios. The study found that there exists a significant link between financial inclusion and economic growth.

3.0 RESEARCH METHODOLOGY

3.1 Research Design and Data
This study employed ex-post facto research design. This is a type of research design that is not experimental, and the researcher does not have direct control over the value of the variables included in the study. To achieve the objective of the study, variables were used based on theoretical and past empirical findings. The frequency of the data used was yearly spanning from 2000 to 2021. The data used in this research work was mainly secondary data gathered from previous journals, CBN statistical bulletin of 2021 and African statistical yearbook.

3.2 Model Specification
This research applied a quantitative approach, wherein an econometric technique was used to analyse the impact of financial inclusion on the growth of cottage firms in Nigeria from 2000 to 2021.The researcher followed a detailed review of previous studies and improved upon the theoretical postulate and econometric models of Okaro (2016); Anisiuba. Ezeaku and Emengini (2020) in studying financial inclusion and growth in Nigeria economy. In achieving a robust result in this study, the

researcher modified the models of previous researchers and therefore states the model of impact of financial inclusion on cottage firms in Nigeria as follows: -

The functional form of the model is;

GRAFF = F (ACGSF, DDRA, DBLSE).

Reforming this model mathematically, we have;

$GRAFF = \beta_0 + \beta_1 ACGSF + \beta_2 DDRA + \beta_3 DBLSE + \mu$

The econometric log linear form of the model is

$GRAFF = \beta_0 + \beta_1 LnACGSF + \beta_2 LnDDRA + \beta_3 LnDBLSE + \mu$

Where β_0 = Constant term (intercept),

β_{n1-3} = Coefficient of Explanatory Variables

μ = Disturbance,Stochastic or Error term, Ln = the natural log

3.3 Appriori Expectation
The apriori expectation of the coefficient of the econometric model is $\beta 1 > 0$, $\beta 2 > 0$, $\beta 3 > 0$. This shows the theoretical relationship on the magnitude of parameter of the specified functions. The greater than (>) sign indicates growth of cottage firms as financial inclusion measures increases by a unit. While, lesser than (<) sign indicate declines of growth of cottage firms with a unit increase in the explanatory variables.

3.4 Method of Data Analysis
The study used E-view 10 statistical package to aid in analysis of the data. It employed the Unit Root Test to determine the stationarity of the series. The Augmented Dickey Fuller (ADF) Test was conducted under (1) intercept, (11) trend and intercept. When the time series are stationary in their level then they are said to be integrated of order zero, that is 1(0), when stationary in their first differences, then they are said to be integrated of order one, that is 1(1), if stationary is in second difference, then they are integrated of order two that is 1(2), (Nwakobi & Alajekwu,

2016). Subsequently, other tests like ARDL, F-Bound test and Error Correction Model Test were conducted.

3.5. Description and Justification of Variables

3.5.1. Dependent Variable: The regressed variable in this study is cottage firms and farmers in Nigeria which is proxied by Growth Rate of Agricultural, Forestry and Fishing (GRAFF). Most of the government/CBN policies since after the oil crisis of 1973 have been to disintegrate and diversify the economy more especially through the agricultural sector and household firms. The government interest on Agricultural sector and household business industries have been traced to their impact on the economy prior to oil boom of late 1960s to early 1970s.

3.5.2. Explanatory Variable

The independent variable is the financial inclusion measured mostly as relates to cottage firms in Nigeria and these have been a mechanism to drive, enhance, reactivate, and revive the agricultural sector in Nigeria. The independent/explanatory variables are proxied by the following indicators: Agricultural Credit Guarantee Scheme Fund (ACGSF), demand for deposit from rural areas (DDRA), deposit bank loans to small scale enterprises as a percentage of total loan (DBLSE).

4.0 ANALYSIS OF DATA

In this section, unit Root test is conducted to guarantee a non-spurious result, the second test conducted is co-integration test to capture equilibrium long-run relationship between the dependent variable and explanatory variables. In order to avoid spurious results, the research employed unit root.

4.1. Unit Root Test

Unit Root test is conducted to guarantee a non-spurious result. Table presents the properties of the time series data under review and the stationarity of the series is first tested using Augmented Dickey Fuller Unit Root Test and results are stated below.

Augmented Dickey Fuller Root Test Result.

S/N	VARIABLES	LEVELS	PROBABILITY	1st Difference	Result
1	GRAFF	-3.063193	0.0460		1(0)
2	ACGSF		0.0086	-4.699909	1(1)
3	DBLSE		0.0008	-5.886730	1(1)
4	DDRA		0.011	-2.639237	1(1)

Source: Author Computation

The result from the table above shows that GRAFF is stationary at levels while ACGSF, DBLSE and DDRA are stationary at differences. This shows that we have a mixed order of integration of order (1) and order (0) among our variables of interest. It is important at this stage to examine if the variables could be co-integrated in the long run to establish a long run relationship among the variables. Therefore, an ARDL bound test will be conducted to check if there is a long run relationship.

ARDL F-Bounds Test

Test Statistic	Value	Signif.	1(0)	1(1)
F-Statistic	10.23713	5%	3.79	4.85

Source: Author Computation

The result from the test above shows that F-Statistic has a value of 10.23713 which is greater than the lower bound of 3.79 at 5% and the upper bound of 4.85 at 5%. This shows that there is a long run relationship between the growth of cottage firms as proxied by GRAFF and financial inclusion proxies ACGSF, DBLSE and DDRA.

ECM Regression

Dependent Variable: GRAFF
Method: Least Squares
Date: 08/25/23   Time: 19:32
Sample: 2000 2021
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.85415	1.251601	5.258572	0.0039
D(ACGSF)	0.248447	0.046565	-3.871071	0.0060
DBLSE	0.422808	0.028947	4.243045	0.0004
DDRA	-0.150803	0.030547	5.243575	0.6100

R-squared	0.548969	Mean dependent var		-0.145455
Adjusted R-squared	0.606418	S.D. dependent var		4.590966
S.E. of regression	1.931285	Akaike info criterion		4.591166
Sum squared resid	78.67096	Schwarz criterion		3.690351
Log likelihood	-61.50282	Hannan-Quinn criter.		4.614531
F-statistic	7.500908	Durbin-Watson stat		1.344478
Prob(F-statistic)	0.003039			

Source: E-view 10

5.0   DISCUSSION OF FINDINGS

The findings of this study show that Agricultural credit guarantee scheme fund (ACGSF) has a positive statistically significant impact on the growth of cottage firms in Nigeria. The coefficient value of 0.248447 and probability value of 0.0060 conform with our apriori expectation and indicate that financial inclusion variable ACGSF have a significant impact on the growth of cottage firms. Studies such as Camillus (2020), Okoro, Obiekwe and Okoro (2020) used ACGSF in measuring financial inclusion and their study found that ACGSF impact positively on growth in developing economies such as Nigeria and Ghana respectively. These findings shows that the availability of capital for the Agricultural segment of the cottage industries spurs growth of cottage industry in Nigeria. When

farmers have access to finance, it will help in facilitating easy and fast production.

The coefficient value of deposit bank loan to small scale enterprise is 0.422808. This indicates that DBLSE contribute positively to the growth of cottage firms in Nigeria. The P-value of 0.0004 which is less than 5% also show that it is statistically significant to the growth of cottage firms in Nigeria. This finding shows that if cottage business owners have adequate access to loans from banks it will help in mitigating funding challenges faced by cottage entrepreneurs. Cottage industries require finance from the period of growth to maturity. For example, those in the knitting business, if they have access to a machine that can assist in fast knitting of their products, they will produce more products within a few minutes. This finding agrees with Enueshike and Okpebru (2020). This conforms to our apriori expectation. Therefore, the null hypothesis will be rejected.

Demand deposit to the rural areas coefficient value is -0.150803. This indicates a negative impact in the growth of cottage firms in Nigeria. Also, the probability value of 0.06100 which is greater than 5% show that DDRA does not have any significant effect on cottage firms in Nigeria. This indicates that mobilization of savings in the rural areas to improve financial viability is limited. Traditionally, efforts to mobilize savings were limited to urban areas because of the assumption that poor rural people cannot save.

The table above shows that the R-squared is 0.548969 which indicates that the model has a good fit. The Prob(F-statistic) of 0.003039 also shows that the model is statistically significant. The Adj. R-squared of the ECM shows that the indicators of financial inclusion accounted for approximately 61% of the total variations in the growth of cottage firms in Nigeria while the remaining unexplained variations are due to the error term.

The result is in conformity with some reviewed studies such as Awoyemi, Osunyikanmi and Akomolafe (2015); Koomso and Muazu (2017); Ajinaja and Odeyale (2017); Camillus (2020); Okoro, Obiekwe and Okoro (2020) and others.

6.0 CONCLUSION AND RECOMMENDATIONS
6.1 Conclusion
This study examined the impact of financial inclusion on the growth of cottage firms in Nigeria using time series data from 2000 to 2021. The study explored previous studies related to the area of research. The study conducted unit root test to ascertain the stationarity of financial inclusion and cottage firms' variables as well as establishing the long run relationship and convergence of the variables. Considering the result of the analysis, the study concluded that 54.8% of the changes in growth of cottage firms in Nigeria are influenced by the financial inclusion policies and the findings of the study imply that financial inclusion has significant impact on the growth of cottage industries in Nigeria except demand deposit to rural areas which was not statistically significant.

There are large number of cottage firms in Nigeria, hence the need for more financial inclusion policies to stimulate their growth as they have impact on the general growth of the economy. ACGSF was established as a need for government in Nigeria to resolve the problem of poverty and agricultural decline in the rural areas. About 90% of farmers in the rural areas in developing countries engage in subsistence agriculture and are having inadequate funds to facilitate their business expansion and practice mechanized system of farming, with modern equipment like tractors and other labor-saving equipment.

6.2 Recommendations
The study in consideration of the objectives, findings and conclusion recommends that:
I. The government and policy makers should restructure and monitor the Agricultural Credit Guarantee Scheme Fund by ensuring the fund is always available and extended to the rural farmers.
II. Loans to small business entrepreneurs / cottage businesses should be friendly to stimulate continuous growth of the cottage industries

as most often, the nature and type of the collaterals requested from cottage firms by financial institutions are assets that the owners of the business cannot afford. The credit due date should also be considered for the cottage industries to have enough time for repayment.

III.   The government and policy makers should sensitize the cottage entrepreneurs in the rural areas on the benefits of savings culture. Educate them about the need to have a saving account for finance viability and availability.

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APPENDIX

Table 1: FINANCIAL INCLUSION AND COTTAGE FIRMS' VARIABLE

AGRICULTURAL CREDIT GUARANTEE SCHEME FUND (ACGSC), DEMAND DEPOSIT FROM RURAL AREAS (DDRA), DEPOSIT MONEY BANK LOAN TO SMALL SCALE ENTERPRISES (DBLSE) AND GROWTH RATE OF AGRICULTURAL, FORESTRY AND FISHING (GRAFF).

S/N	GRAFF	ACGSF	DDRA	DBLSE
2000	2.9	361449	20.64	7.58
2001	3.9	728545.40	16.88	6.21
2002	55.2	1050982.50	14.86	8.68
2003	7	1151015	20.55	7.49
2004	6.3	2083744.70	64.49	3.62
2005	7.1	9366392.90	18.46	2.54
2006	7.4	4195099.68	3.12	0.99
2007	7.2	4087447-94	3.08	0.85
2008	6.3	6497958.93	13.41	0.17
2009	5.9	8328565.78	3.30	0.17
2010	5.6	7840496.63	0.02	0.14
2011	5.8	10028988.81	0.02	0.16
2012	6.7	9332484.23	0.02	0.13
2013	2.9	9256676.80	0.02	0.13
2014	4.3	12456676.80	0.48	0.12
2015	3.7	10837380.83	90.37	0.10
2016	4.1	7858643.35	87.93	0.07
2017	3.4	5849388.73	185.34	0.07
2018	2.1	4377626.29	308.85	0.29
2019	2.4	4068332.47	354.86	0.71
2020	2.2	4321663.85	351.50	0.32
2021	2.6	5786729.88	427.45	0.38

Source: African statistic year book and CBN statistical bulletin

REGRESSION RESULTS

Dependent Variable: ACGSF
Method: Least Squares
Date: 08/26/23   Time: 22:55
Sample: 2000 2021
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3310739.	1393474.	2.375888	0.0282
@TREND	251131.0	111806.4	2.246124	0.0368

R-squared	0.209817	Mean dependent var		5989469.
Adjusted R-squared	0.168229	S.D. dependent var		3621502.
S.E. of regression	3302864.	Akaike info criterion		32.94887
Sum squared resid	2.07E+14	Schwarz criterion		33.04835
Log likelihood	-343.9631	Hannan-Quinn criter.		32.97046
F-statistic	5.045073	Durbin-Watson stat		0.606092
Prob(F-statistic)	0.036782			

Dependent Variable: DBLSE
Method: Least Squares
Date: 08/26/23   Time: 22:58
Sample: 2000 2021
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.377826	0.794196	6.771413	0.0000
@TREND	-0.335031	0.064738	-5.175185	0.0000

R-squared	0.572490	Mean dependent var		1.860000
Adjusted R-squared	0.551115	S.D. dependent var		2.875317
S.E. of regression	1.926431	Akaike info criterion		4.235723
Sum squared resid	74.22274	Schwarz criterion		4.334909
Log likelihood	-44.59296	Hannan-Quinn criter.		4.259088
F-statistic	26.78254	Durbin-Watson stat		0.354858
Prob(F-statistic)	0.000046			

Dependent Variable: DDRA
Method: Least Squares
Date: 08/26/23   Time: 23:00
Sample: 2000 2021
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-75.93352	39.41842	-1.926346	0.0684
@TREND	15.82765	3.213150	4.925899	0.0001

R-squared	0.548170	Mean dependent var	90.25682
Adjusted R-squared	0.525579	S.D. dependent var	138.8172
S.E. of regression	95.61483	Akaike info criterion	12.04504
Sum squared resid	182843.9	Schwarz criterion	12.14423
Log likelihood	-130.4955	Hannan-Quinn criter.	12.06841
F-statistic	24.26448	Durbin-Watson stat	0.205993
Prob(F-statistic)	0.000082		