

### **DETERMINANTS OF PRIVATE SECTOR GROWTH IN NIGERIA, 1981 - 2020**

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**Copyright** © 2022 The Author(s). This is an Open Access article distributed under the terms of Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0), which permits anyone to share, use, reproduce and redistribute in any medium, provided the original author and source are credited. **ABSTRACT:** This study examines and analyses the determinants of private sector growth in Nigeria. The dependent variable is Private Sector Growth (PSG) and the independent variables are Real Gross Domestic Product (RGDP), Interest Rate (INTR), Per Capita Income (PCI), Inflation Rate (INFR), Exchange Rate (EXR), Broad Money Supply (BMS). The data for the study were sourced from CBN Statistical Bulletin, 2019/2020 edition from 1981 to 2020. The study employed Cointegration and Error Correction Mechanism as the main analytical tool. It also applied the unit root test and results showed that the data were integrated at order one while the long-run relationship among the variables was confirmed using the Johansen (1988) cointegration test. Estimates of the Error Correction Model result showed that Interest Rate (INTR), Exchange Rate (EXR) have a negative significant relationship with the determinants of private sector growth in Nigeria, Broad Money Supply (BMS) has a negative significant relationship with the determinants of private sector growth in Nigeria. In conclusion from the above results, it was observed that the determinants of the private sector growth in Nigeria contributed to the improvement and enhancement of Interest Rate, Exchange Rate and Broad money Supply in Nigeria. It was recommended that interest rate, exchange rate and broad money supply have a significant positive and negative relationship between interest rate, exchange rate and broad money supply with the determinants of private sector growth in Nigeria base on this result: it is recommended that continued attraction of real sector development from private investors would boost economic growth in Nigeria. And also to develop human capital for Nigeria would be to put in place policies and infrastructures that could encourage private investment inflows.

**KEYWORDS:** Private Sector Growth, Unit root test, Johansen Cointegration test, Error Correction Model, Nigeria.



# INTRODUCTION

Private sector development involves the improvement of the investment climate which is crucial for sustaining and expanding businesses, stimulating economic growth and has been the backbone of most developed and developing economies. The private sector is recognized as a critical stakeholder and partner in economic development, by helping people escape poverty through the provision of jobs and income, as well as the availability of necessary goods and services needed to enhance people's standard of living (International Finance Corporation, 2011).

In addition, the rapid growth of the service economy has generated a lot of interest in the study of service. These service-related economic activities for the developed countries account for over 75% of their gross domestic product, as service orientation is also becoming increasingly evident in developing economies as well Masud et al (2018).

Also, investments are significant for the progress of a country and play a constructive part in economic growth. Many developing countries depend on investment to address economic problems such as financial imbalance, the balance of payment, debt, poverty, and unemployment. Investment can be defined as the expenditures on capital goods to increase the productive capacity, with the aim to produce more goods and services and get a better payoff in future (Kartikasari, 2017).

Banks as financial institutions play very important roles in the economic development and growth of any country. They channel scarce resources from the surplus economic units to the deficit economic units in an economy. They provide loans to deficit units in the form of short-term, medium-term and long-term credit. Bank credits, to a reasonable extent, exert reasonable influence on the pattern and trend of economic growth in Nigeria Gbenga et al (2019).

Ogbonna (2020), opined that Nigerian entrepreneurs under the auspices of the Business Founders Coalition appealed to the Nigerian President over what they considered hostile takeover bids of foreign private equity firms on their businesses there are some who come into Nigeria literally to hijack the indigenous-owned companies. This may be regarded as a consensus opinion held by local business operators about the negative effect of unchecked globalization on the local economy and of the need to protect domestic industries. Essentially, the group urges the government to put in place policies that do not allow a foreign investor to have controlling rights in a Nigerian business.

The specific objectives of the study are to determine how a real gross domestic product is related to private sector growth in Nigeria, ascertain the impact of interest rate on private sector growth in Nigeria, determine how per capita income relate to private sector growth in Nigeria, determine how the relationship between inflation rate and private sector growth in Nigeria, determine how the exchange rate is related to private sector growth in Nigeria, ascertain how broad money supply relates to private sector growth in Nigeria. The following hypotheses which are stated in the null form are tested in this research study:  $H_{01}$ : Real gross domestic product is not significantly related to private sector growth in Nigeria,  $H_{02}$ : Interest rate has no significant impact on private sector growth in Nigeria,  $H_{03}$ : Per capita income does not have a significant relationship with private sector growth in Nigeria,  $H_{04}$ : Inflation rate does not have a



significant relationship with private sector growth in Nigeria,  $H_{05}$ : Exchange rate is not significantly related to private sector growth in Nigeria,  $H_{06}$ : Broad money supply is not significantly related to private sector growth in Nigeria.

### LITERATURE REVIEW

#### **Theoretical Framework**

### **Basic Theories**

### A. Acceleration Theory on Private Sector Investment

The Keynesian accelerator model was postulated by Keynes (1936). In its simplest version propounded by Clark (1917), the model avers that there exists an optimum quantity of real capital for a given level of output. Thus, larger stocks of capital held by firms are necessitated by high demand. In this theory, net investment expenditures equal the change in the level of real capital and thus net investment is proportional to the expected change in output. Gross investment requires the incorporation of replacement capital or depreciation. The basic argument of the flexible-accelerator principle is that when the gap between the existing capital stock and the desired capital stock is substantial, the firms' rate of investment will be high. The hypothesis, as highlighted by Chirinko (1993); is that firms plan to close a fraction of the gap between the desired capital stock and actual capital stock in each period. Investment is determined from the difference between the desired level of capital and the capital that survives from the past. The capital that survives from the past is a constant proportion of past capital. The accelerator theory is based on an assumption of a stable (or fixed) capital to output ratio.

### **B.** Classical Theory on Private Sector Investment

Barro (1997), distinguishes the two ways in which private sector investment can be displaced as arising from a tax cut or an increase in government consumption spending. This induces increased public debt which he describes as; the decline in private investment that may result from a tax cut financed by a government budget deficit and the decrease in private consumption and investment that result from an increase in government consumption respectively.

In the classical frame, several other factors are seen to influence the behaviour of private sector investment; such as the public debt structure, its maturity and composition of ownership. Maana *et al.*, (2008) noted that the composition of public domestic debt portfolios influences how investment in the private sector can access credit.

Christensen (2005), argued that a narrow investor base consisting mainly of commercial banks increases the risk that as government securities are sold, private companies dependent mainly on commercial bank financing will lose out in the absence of non-bank investors, such as pension funds and retirement funds, to which the government could sell its debt without necessarily displacing private sector investment.



### C. Keynesian Theory on Private Sector Investment

Keynesians believe that governments are justified to stimulate economic growth through the use of deficit causing fiscal policy. They assume that the economy is not at full employment and that the interest rate sensitivity of investment is low. In such a situation, increased government spending causes  $\mathbf{a}$  minimal increase in the interest rate whilst increasing output and income. Furthermore, they argued government expenditure increases private investment due to the positive effect of government spending on the expectations of the investors. Their argument is based on the principle of the multiplier where a change in government spending induces a greater change in output.

### **D.** Neo-Classical Approach to Private Sector Development

Proponents of the neoclassical approach to the business enable the environment to assume that most factor markets work reasonably well without government intervention if property rights and competition are guaranteed. Such interventions are in most cases considered less efficient than market-based solutions, and it is stressed that many government interventions in fact hamper private sector development. Measures to improve the business enabling environment consequently focus on deregulation and the good functioning of markets, with only a limited role assigned to the public sector in a few areas where market failure is most obvious. Proponents of this approach do not take the characteristics and motives of the entrepreneur into account. Instead, the distinguishing attribute of informal firms is non-registration. It is assumed that the informal economy consists of enterprises that operate informally because the costs, time and effort of formal registration are too high (de Soto 1989; and Palmade & Anayiotos 2005).

### E. The Neo-Structuralist Approach to Private Sector Development

A proponent of the neo-structuralist interpretation, Chen (2004) distinguished a "structuralist" and a "dualist" school of thought. In the dualist version, formal and informal modes of production are largely unconnected, whereas in the structuralist version the informal economy is subordinated to large capitalist firms of the informal economy. Also, Tokman (1990) argued that the informal economy consists of marginal activities that provide income for the poor and a safety net when no formal employment opportunities are available. Viewed from this perspective, multiple deficiencies, beyond insecure property rights and red tape, hamper the development of informal enterprises. Among these deficiencies are lack of education and technical and management training and limited access to capital and markets. Most owners of informal micro-enterprises are necessity entrepreneurs who run their business as an activity of last resort in the absence of employment alternatives. The informal economy absorbs a segment of the labour force that is not easily employable in the modern economy. For example, people with low levels of education, handicapped, ill and elderly people, single mothers who need to care for their children during the day as well as temporarily unemployed persons. Opportunities for self-employment or the formation of micro-enterprises are largely restricted to activities with low entry barriers in terms of skills and capital (e.g. street trading, garment manufacture). Labour supply in these activities tends to be high, creating cutthroat competition with low returns and often decreasing productivity. The observation that the informal economy often grows during recessions suggests that it comprises a workforce with limited employability rather than being a seedbed for thriving future entrepreneurs.



# F. The Tobin q Theory

The q theory was postulated by Tobin & Brainard (1968), however, the use of the letter "q" did not materialise until Tobin's 1969 article "A general equilibrium approach to the monetary theory". Tobin hypothesised that the combined market value of all the companies on the stock market should be equal to their replacement costs. In the Tobin q theory of investment, the ratio of the market value of the existing capital stock to its replacement cost (the q ratio) is the main force driving investment (Chirinko, 1993; Ghura & Godwin, 2000). That is to say, enterprises will want to invest if the increase in the market value of an additional unit exceeds the replacement cost (Ajide & Lawanson, 2012).

# G. The Neoliberal Approach

The neoliberal approach, popularised by McKinnon (1973) and Shaw (1973) is another theory that attempts to explain investment behaviour. The theory posits that developing countries suffer from financial repression and if they were liberated from this problem, saving would be induced, and eventually, growth. Liberalisation is crucial in this theory. With liberalisation, both savings and loanable funds will increase, resulting in a more efficient allocation of funds with a potential contribution to higher economic growth. Unlike the neoclassical theory, in this theory investment is positively related to the real rate of interest. The reason for this is that a rise in interest rates increases the volume of financial savings through financial intermediaries and thereby raises investible funds, a phenomenon that McKinnon (1973) and Shaw (1973) referred to as the "conduit effect". Thus, while it may be true that demand for investment declines with the rise in the real rate of interest, realised investment actually increases because of the greater availability of funds. This conclusion applies only when the capital market is in disequilibrium with the demand for funds exceeding supply (Asante, 2000). Neoliberalists identify interest rates as the main determinant of investment. According to this theory interest rates have a positive effect on investment, however, this is in contrast with both the q theory and the neoclassical theory of investment that suggest a negative effect of interest rates on investment.

# **Empirical Literature Review**

Several studies have examined determinants of private sector growth in Nigeria in both developed and developing nations although only a few of them are done in Nigeria. However, some of these studies are presented here empirically to provide guides and directions to the model of this present study.

Manda (2019), assessed the impact of government borrowing on the private sector credit in Zimbabwe using monthly data from 2012 to 2018 using a multivariate regression model and an unrestricted Vector Auto-regression (VAR) confirms a negative but not significant relationship between credit to government and credit to the private sector, implying that credit to the government may not have crowded out private credit.

Nwakanma, et al. (2014), evaluated the nature of the long-run relationship existing between bank credits to the private sector and economic growth in Nigeria for the period of 1981-2011 by using ARDL and Granger causality techniques. The result indicated that there is a significant long-run relationship between bank credit to the private sector and economic growth but there is no significant causality in any direction.



Attefah and Enning (2016) looked into the determinants of private investment from 1980-2010 in the case of Ghana. The coefficients determined by the multiple regression model show that credit availability, government investment, the openness of the economy, external debt, democracy, and corporate tax significantly affect private investment. The study recommends that the crowding-out effect can be diminished by having a tighter fiscal policy.

Moshi and Kilindo, (2017), considered the effect of government policy on private investment over the 2000-2015 periods in Tanzania. Regression results from the ordinary least squares estimation technique among others showed that the real exchange rate had a negative and significant effect, indicating that devaluation reduced the profitability of private investment in the Tanzanian economy during the study period.

Abubakar et al (2019), used a Structural Vector Autoregressions (SVAR) and model to analyse the dynamics of government borrowing behaviour on the growth of the private sector in Nigeria provided evidence that government borrowing behaviour has the propensity of impacting negatively on the effectiveness of private sector growth in Nigeria.

Bonga and Nyoni (2017), systematically reviewed the determinants of private investment which has been significantly low for the past three decades in Zimbabwe. Their results showed that GDP and public investment are the most powerful factors that affect private investment in Zimbabwe. The study recommended that gross domestic product, public investment, interest rate and other macroeconomic indicators used in the study should be improved upon to have a productive effect on the private sector investment.

Oyedokun and Ajose (2018), examined and understood the vital link between domestic private businesses and Nigerian economic progress by employing the causality Granger test and Vector ECM model from 1980-2016. The outcome of their analysis revealed that a long run significant relationship exists with domestic private business granger causing the growth of the real GDP at all levels.

Oshikoya (1994), carried out a study on the macroeconomic determinants of private investment using a sample of seven African countries for the period 1970-1988. The results indicate that private investment is positively related to public sector investment and real interest rates for middle-income countries. For the low-income countries, the results showed a significantly negative relationship between private investment and inflation rate, but the negative relationship between private investment and the real exchange rate was rather insignificant. The result, however, shows that the availability of accessible domestic credit to the private sector has a positive and significant impact on the level of private investment activities in both low-income and high-income countries.

# METHODOLOGY

Annual Time Series Data covering the period of 1981 to 2020 which were obtained from the CBN Statistical Bulletin 2019 Edition Updated to 2020 were used in this study. Augmented Dickey-Fuller (ADF) unit root test was conducted and the result necessitated the test for the long-run relationship among the variables (co-integration) using the Johansen Cointegration test approach, as specified in Granger and Newbold (1977). The model coefficients were



estimated using the Error Correction Model technique and granger causality was adopted as well.

# **Theoretical Framework**

The study adopts the models in Oshikoya (1994); and Ghura and Godwin (2000) but with modifications due to the non-inclusion of some relevant explanatory variables based on the accelerator model. The explanatory variables in this study are Real Gross Domestic Product (RGDP), Interest Rate (INTR), Per Capita Income (PCI), Inflation Rate (INFR), Exchange Rate (EXR), Broad Money Supply (BMS), whereas the dependent variable is Private Sector Growth (PSG) were used in this study. The data used in the analysis is secondary annual time-series data of six variables which were obtained from the CBN Statistical Bulletin 2019 Edition Updated to 2020 the time period covered in this study is 39 years (1981 to 2020). Using Augmented Dickey-Fuller (ADF) unit root test was conducted and the result necessitated the test for the long-run relationship among the variables (co-integration) using the Johansen Cointegration test approach, as specified in Granger and Newbold (1977). The model coefficients were estimated using the Error Correction Model technique and granger causality was adopted as well.

# Model Specification

The model which hypothesised variations in private sector growth to be a function of the explanatory variables is algebraically specified. The model is specified based on acceleration theory.

# Model

# PSG = f(RGDP, INTR, PCI, INFR, EXR, BMS)(3.1)

The parameterized version of the private sector growth model is presented as

$$PSG_{t} = \beta_{0} + \beta_{1}RGDP_{t} + \beta_{2}INTR_{t} + \beta_{3}PCI_{t} + \beta_{4}INFR_{t} + \beta_{5}EXR_{t} + \beta_{6}BMS_{t} + \mu_{t})$$
(3.2)

Where the variables are as itemised above;  $\beta_0$  is the constant while  $\beta_1 \dots \beta_6$  are the coefficient of the parameters; t is a subscript denoting time. Based on a priori,  $\beta_1 > 0, \beta_2 < 0, \beta_3 > 0, \beta_4 < 0, \beta_5 < 0, \beta_6 > 0.$ 

# Variables in the model:

PSG means Private Sector Growth measured as (N' Billion)

RGDP means Real Gross Domestic Product measured as (N' Billion)

INTR means Interest Rate measured as (Rate)

PCI means Per Capital Income measured as ('000 Naira)

INFR means Inflation Rate measured as ( % )

EXR means Exchange Rate measured as (Naira to Dollar)

BMS means Broad Money Supply measured as (N' Billion)



The theoretical relationship between private sector growth and the real gross domestic product is found to be negative/positive and insignificant. while the relationship between private sector growth and interest rate is found to be negative and insignificant and significant. That of the relationship between private sector growth and per capita income is found to be negative/positive and insignificant. Also, the relationship between private sector growth and the inflation rate is found to be negative and insignificant. Then, the relationship between private sector growth and the exchange rate is found to be negative and insignificant/significant. As well, the relationship between private sector growth and broad money supply is found to be negative/positive and insignificant/significant.

### **Estimation Technique and Procedure**

# **Test for Unit Root:**

The presence of trends and unit-roots are detected from the slowly decaying autocorrelation function in a univariate process which indicates non-stationarity. Consider  $AR_{(p)}$  model so that

$$\begin{split} Y_t &= \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \ldots + \phi_p Y_{t-p} + \varepsilon_t \ which \ can \ be \ written \ as \\ \psi(L) y_t &= \varepsilon_t \end{split} \tag{3.3}$$

where  $\psi(L) = 1 - \phi_1 L - \phi_2 L^2 - \dots - \phi_2 L^2$  is a polynomial in lag L.

If the root of the characteristic equation  $\psi(L) = 0$  are all greater than unity in absolute term, then  $y_t$  is stationary, otherwise  $y_t$  is non-stationary.

### **Dickey-Fuller test:**

The Dickey-Fuller test affirms if  $\phi = 0$ . In this model of the data  $y_t = \beta_t + \phi y_{t-1} + e_t$ , which is written as  $\Delta y_t = y_t - y_{t-1} = \beta_t + \gamma y_{t-1} + e_t$ . It is written this way so we can perform a linear regression of  $\Delta y_t$  against t and  $y_{t-1}$  and test if  $\gamma$  is different from 0. If  $\gamma = 0$ , then we have a random walk process. If not and  $-1 < 1 + \gamma < 1$ , then we have a stationary process. Given the model

 $y_t = \beta y_{t-1} + \varepsilon_t \tag{3.4}$ 

Subtracting  $y_{t-1}$  from both sides, we have

$$y_{t} - y_{t-1} = \beta y_{t-1} - y_{t-1} + \varepsilon_{t}$$
$$\Rightarrow \Delta y_{t} = (\theta - 1) y_{t-1} + \varepsilon_{t}$$
$$= \delta y_{t-1} + \varepsilon_{t}$$
(3.5)

Testing for  $\theta = 1$  is equal to testing for  $\delta = 0$ 

The following regression equations and the associated error terms are considered for the unit root test:



$\Delta y_t = \delta y_{t-1} + \varepsilon_t$	(3.6)
$\Delta y_t = \beta_0 + \delta y_{t-1} + \varepsilon_t$	(3.7)
$\Delta y_t = \beta_0 + \delta y_{t-1} + \beta_1 t + \varepsilon_t$	(3.8)

### Augmented Dickey-Fuller (ADF) test:

The ADF test belongs to a category of tests called 'Unit Root Test', which is the proper method for testing the stationarity of a time series. The Augmented Dickey-Fuller test checks through these models:

$$\Delta y_{t} = (\rho - 1) y_{t-1} + \sum_{j=1}^{n} \beta_{j} \Delta y_{t-j} + \varepsilon_{t}$$
(3.9)

$$\Delta y_t = \alpha + (\rho - 1)y_{t-1} + \sum_{j=1}^n \beta_j \Delta y_{t-j} + \varepsilon_t$$
(4.0)

$$\Delta y_t = \alpha + \delta_t + (\rho - 1)y_{t-1} + \sum_{j=1}^n \beta_j \Delta y_{t-j} + \varepsilon_t \qquad (4.1)$$

#### Hypotheses Tests are specified as :

$$H_0: \rho = 1 \quad vs \quad H_1: \rho < 1$$
  

$$H_0: \alpha = 0 \quad vs \quad H_1: \alpha \neq 0$$
  

$$H_0: \gamma = 0 \quad vs \quad H_1: \gamma \neq 0$$

The test statistic is specified as:

$$T_{\rho} = \frac{\rho}{S.E.(\rho)} \square ADF(I,n,\alpha) \text{ is compared with the appropriate value of Dickey Fuller table}$$

The null hypothesis for the tests is that the data are non-stationary, and it is rejected for this test so we want a p-value of less than 0.05.

### **Co-integration**

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Co-integration studies the long-run equilibrium in multivariate non-stationary time series. A multivariate process that is non-stationary by differentiation and the resulting series can be modelled by univariate techniques. Even though it is possible to treat all processes in the same manner before carrying out further analysis, it is not so straightforward in a multivariate case. The modern approach is to have a stationary linear combination of non-stationary variables, and such variables are said to be co-integrated (Shittu and Yahaya, 2011).

The Co-integration technique analyses the joint movement of economic variables and their departure from equilibrium overtime. It expresses the relationship that exists between two non-stationary series for which the stochastic relationships are bounded. Its emphasis is on the following:



(a) It establishes a link between two non-stationary series by obtaining a linear combination that gives integration of order zero [I(0,1)].

(b) It helps to establish relationships among non-stationary series such that the relationship is reasonable, sensible and of statistical importance.

(c) It specifies the Error Correction Model (ECM).

The Co-integration test is performed in this study using Johansen methodology which offers two tests for testing the number of cointegrating relationships: the trace test and the eigenvalue test. The trace test tests the null hypothesis that there are at most r co-integrating relationships. That is, rejecting the null means that there are more than r co-integrating relationships. The test itself computes the trace statistic and compares it with critical values. Critical values have been computed by several different sources, including Johansen himself. The trace test rejects the null if the trace statistic exceeds the critical value.

The eigenvalue test tests the null hypothesis of r versus r + 1 co-integrating relationships. The test rejects the null hypothesis if the eigenvalue test statistic exceeds the respective critical value T.

Consider two economic series  $X_t$  and  $Y_t$  such that their co-movement is described as

$$\begin{aligned} Y_t &= \beta X_t = w_t & (4.2) \\ Y_t &= \alpha X_t = \varepsilon_t & (4.3) \\ where & w_t = w_{t-1} + \varepsilon_{1t} \\ & \varepsilon_t = \rho \varepsilon_{t-1} + \varepsilon_{1t} \end{aligned}$$

From equation (4.3),

$$X_t = \frac{\varepsilon_t - Y_t}{\alpha} \tag{4.4}$$

Substituting (4.4) in (4.3) to have

$$Y_{t} = w_{t} - \beta X_{t}$$

$$= w_{t} - \frac{\beta(\varepsilon_{t} - Y_{t})}{\alpha}$$

$$= \alpha Y_{t} = \alpha w_{t} - \beta \varepsilon_{t} + \beta Y_{t}$$

$$= Y_{t} = (\alpha - \beta) = \alpha w_{t} - \beta \varepsilon_{t}$$

$$= Y_{t} = \alpha (\alpha - \beta)^{-1} w_{t} - \beta (\alpha - 1)^{-1} \varepsilon_{t} \qquad (4.5)$$

Thus  $\{Y_t\}$  and  $\{X_t\}$  are linearly dependent on  $W_t$  and the cointegrating vector is  $(1; \alpha)$ , the long-run equilibrium.



### Johansen Procedure

Testing for cointegration in the multivariate case amounts to determining the rank of a series,  $\pi$ , where we effectively need to determine the number of non-zero eigenvalues in  $\pi$ . Johansen (1988) established a novel method for determining the number of eigenvalues in a maximum likelihood framework. It suggests that one should order the eigenvalues such that  $\lambda_1, \lambda_2, \dots, \lambda_n$  where  $\hat{\lambda}_1$  is the first eigenvalue. To test the null hypothesis that there are at most r co-integrating vectors that would then amount to testing,  $H_0: \hat{\lambda}_1 = 0$  for  $i = r + 1, \dots, n$ , where only the first r eigenvalues are non-zero. For instance, if n = 2 and r = 1 as in the first example, the first eigenvalue,  $\hat{\lambda}_1$  will be non-zero and the second  $\hat{\lambda}_2$  will be zero.

In the three variable cases, when n = 3 and r = 2, the first two eigenvalues are non-zero and the third,  $\hat{\lambda}_3$  is zero. By adding more variables, this pattern will continue until n = r. Therefore, when the series has rank zero, then there is no long-run relationship, so all the eigenvalues are equal to zero.

To calculate the estimate for the appropriate rank, we will describe two test statistics, which include the trace statistic and the maximum eigenvalue statistic. The trace statistic specifies the null of hypothesis, H<sub>0</sub>, for r cointegration relations as,

$$\lambda_{\text{trace}} = -T \sum_{i=r+1}^{n} \log \left( 1 - \hat{\lambda}_{i} \right), r = 0, 1, 2, \dots, n-1,$$
(4.6)

where the alternative hypothesis is that there are more than cointegration relationships. The maximum eigenvalue statistic for the null hypothesis of at most cointegration relationships is then computed as,

$$\lambda_{\max} = -T \sum_{i=r+1}^{n} \log \left( 1 - \lambda_{r+1}^{n} \right), r = 0, 1, 2, \dots, n-1$$
(4.7)

where the alternative hypothesis is that there are r+1 co-integration relationships.

For both tests, the asymptotic distribution is non-standard and depends upon the deterministic components (constant and trend), just as in the case of the univariate Dickey-Fuller test for unit roots. Tabulated critical values can be found in Johansen (1988) and Osterwald-Lenum (1992). In both cases, the calculated test statistics must be greater than tables to reject the null hypothesis.

### **Error Correction Model (ECM)**

Where a co-integrating relationship may be used to define an equilibrium relationship, the time paths of co-integrated variables are influenced by the extent of any deviation from the long-run equilibrium. If the variables are cointegrated, then they will return towards the equilibrium values, although they need not actually attain these values at a particular point in time. What is essential is that there is a force that will draw the variables towards the equilibrium values, so that the deviation from equilibrium is not permanent.



The deviation of a co-integrated variable from the path of equilibrium may be modelled with the aid of an error correction representation. Engle and Granger (1987) formalised the connection between this dynamic response to the errors and co-integration in the Engle-Granger representation theorem, which states that two variables are cointegrated if, and only if, there exists an error correction mechanism for one set of variables.

Consider  $X_1$  and  $X_2$  as share prices that are co-integrated. If it is assumed that the gap between the prices during the current period of time is relatively large when compared to the long-run equilibrium values. In this case, the low priced share  $X_2$  must rise relative to the high priced share  $X_1$ . This can be accomplished by either an increase in  $X_2$  or a decrease in  $X_1$ , an increase in  $X_1$  with a larger decrease in  $X_2$ , or a decrease in  $X_1$  with a smaller decrease in  $X_2$ .

The regression that describes the relative movements in the two prices could then take the form:

$$P_{1,t} = \beta_1 P_{2,t} + \mu_t \tag{4.8}$$

If the errors,  $\mu_t$ , are stationary then they may be described by the autoregression:

$$\mu_t = \phi \mu_{t-1} + \varepsilon_t \quad with \left| \phi_1 \right| < 1 \tag{4.9}$$

Hence after writing equation (4.9) as  $\mu_t = P_{1,t} - \beta_1 P_{2,t}$ , and substituting it in equation (5.0), we have

$$P_{1,t} - \beta_1 P_{2,t} = \phi_1 (P_{1,t-1} - \beta_1 P_{2,t-1}) + \varepsilon_t$$
  

$$P_{1,t} = \beta_1 P_{2,t} + \phi_1 (P_{1,t-1} - \beta_1 P_{2,t-1}) + \varepsilon_t$$
(5.1)

Adding and subtracting  $P_{1,t-1}$  and  $P_{2,t-1}$  on both sides, we have

$$\Delta P_{1,t} = -(1 - \phi_1)(P_{1,t-1} - \beta_1 P_{2,t-1}) + (\beta_1 \Delta P_{2,t-1}) + \varepsilon_{1,t}$$
  
=  $\alpha (P_{1,t-1} - \beta_1 P_{2,t-1}) + \varepsilon_{1,t}$  (5.2)

where  $\alpha = -(1-\phi_1)$ , while  $\beta_1 \Delta P_{2,t}$  is stationary and  $\varepsilon_{1,t} = (\beta_1 \Delta P_{2,t} + \varepsilon_{1,t})$ .

Thus large persistence in the autoregressive error would imply a slow speed of adjustment. This is an error correction mechanism (ECM), which describes the manner in which the variables return to equilibriums. Assuming the two share prices are CI (1,1), then their respective error mechanism is written as

$$\Delta P_1 = \alpha_1 (P_{2,t-1} - \beta_1 P_{1,t-1}) + \varepsilon_{1,t}$$
  

$$\Delta P_2 = \alpha_2 (P_{2,t-1} - \beta_1 P_{1,t-1}) + \varepsilon_{2,t}$$
(5.3)



### **RESULTS AND FINDINGS**

-2.938987

value:

Variables	ADF test statistic	ADF test statistic	Remark
	@ Levels	@ First Difference	
LNPSG	1.818943	-5.685654	I (1)
LNRGDP	-0.188491	-5.095387	I (1)
LNPCI	-1.103583	-3.983405	I (1)
LNINTR	-2.368060	-5.417515	I (1)
LNEXR	2.253783	-4.050592	I (1)
LNINFR	-1.489542	-4.006965	I (1)
LNBMS	-0.841495	3.067400	I (1)
5% Critical			

### Table 4.1: Results of ADF Unit root test of Stationarity

-2.941145

The unit root tests at significance level and at first difference are summarized in table 4.1 above. It can be seen that Private Sector Growth (PSG), Real Gross Domestic Product (RGDP), Per Capita Income (PCI), Interest Rate (INTR), Exchange Rate (EXR), Inflation Rate (INFR), and Broad Money Supply (BMS) are all stationary at the first difference and are therefore integrated of order I(1). Since none of the variables is integrated of order I(0), and since the order of integration of the variables is not of mixed order [i.e. not I(1) and I(0)], we test for the existence of a long-run relationship amongst the variables using the Johansen cointegration test.

### Table 4.2: Results of Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesised	Eigenvalue		0.05 Critical Value	
No. of CE(s)		Trace Statistic		Prob.**
None *	0.813845	178.0745	125.6154	0.0000
At most 1 *	0.683512	114.1899	95.75366	0.0015
At most 2 *	0.602622	70.47201	69.81889	0.0443
At most 3	0.379951	35.40302	47.85613	0.4269
At most 4	0.188018	17.24069	29.79707	0.6222
At most 5	0.138211	9.326154	15.49471	0.3361
At most 6	0.092154	3.673843	3.841466	0.0553

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

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Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesised	Eigenvalue	Max-Eigen	0.05 Critical	
No. of CE(s)		Statistic	Value	Prob.**
None *	0.813845	63.88459	46.23142	0.0003
At most 1 *	0.683512	43.71789	40.07757	0.0186
At most 2 *	0.602622	35.06898	33.87687	0.0359
At most 3	0.379951	18.16233	27.58434	0.4817
At most 4	0.188018	7.914540	21.13162	0.9088
At most 5	0.138211	5.652311	14.26460	0.6581
At most 6	0.092154	3.673843	3.841466	0.0553

# Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

# \* denotes rejection of the hypothesis at the 0.05 level

# \*\*MacKinnon-Haug-Michelis (1999) p-values

Table 4.2 above shows the cointegration test result. The Trace statistic and the Max-Eigen statistic both indicate 3 co-integrating equations at a 5% level. The existence of 3 co-integrating equations confirms that there is a long-run relationship amongst the variables. Therefore, this leads to the estimation of the model parameters using the Error Correction Model (ECM).

Error Correction Model					
Included observations: 37 after adjustments					
Variable	Coefficient	Std. Error	t - Statistic	Prob.	
С	-156.0153	1039.94	-0.15002	0.000000	
D(PSG)	-0.316801	0.26621	-1.19006	0.911080	
D(RGDP)	0.809397	0.61247	1.32152	0.094200	
D(INTR)	-0.115166	0.29366	-0.39218	0.000000	
D (PCI)	0.015536	0.33489	-0.04639	0.097000	
			-		
D(NFR)	-0.482010	0.16645	2.89585	0.477400	
D(EXR)	-0.071886	0.24785	-0.29004	0.000000	
D(BMS)	0.916628	0.41348	2.21688	0.044000	
ECM (-1)	-0.455574	0.18007	-2.52994	0.000000	
R-squared	0.397159	Mean dependent var		869.0672	
Adjusted R-					
squared	-0.033442	S.D. dependent var		3905.802	
F-statistic	0.922336	Akaike info criterion		19.70968	
Log-likelihood	-348.6290	Schwarz criterion		20.40629	

**Table 4.3: Error Correction Model Result** 



A cursory examination of the Error Correction Model estimates above shows that the short-run coefficients of Real Gross Domestic Product (RGDP), Per Capita Income (PCI), Broad Money Supply (BMS) are positive while Private Sector Growth (PSG), Interest Rate (INTR), Inflation Rate (INFR), Exchange Rate (EXR), are negative.

The determinants of the private sector growth in Nigeria of Private Sector Growth (PSG) means that for every unit increase in private sector growth in Nigeria on Private Sector Growth decreases by 0.316801units annually. This implies a direct relationship between determinants of the private sector growth in Nigeria and private sector growth for the period reviewed. However, this direct relationship was found to be insignificant.

The positive and significant coefficient of the determinants of the private sector growth in Nigeria of Real Gross Domestic Product (RGDP) means that for every unit increase in determinants of the private sector growth in Nigeria in Real Gross Domestic Product increases significantly by 0.809397 units annually. This shows that determinants of the private sector growth in Nigeria in Real Gross Domestic Product have not helped significantly to grow the economy in Nigeria.

Again, the coefficient of Exchange Rate shows that a unit decrease in the determinants of the private sector growth in Nigeria in Exchange Rate (EXR) decreases the private sector growth in Nigeria by 0.071886 units. This shows a direct relationship between determinants of private sector growth in Nigeria and the Exchange Rate in Nigeria. Moreover, this direct relationship was found to be significant in growing the economy in Nigeria.

Also, the positive and significant coefficient of the determinants of the private sector growth in Nigeria in Broad Money Supply (BMS) means that for every unit increase in the determinants of the private sector growth in Nigeria in Broad Money Supply in Nigeria increases significantly by 0.916628 units annually. This shows that determinants of the private sector growth in Nigeria in Broad Money Supply have helped significantly to grow the economy in Nigeria.

More so, the determinants of the private sector growth in Nigeria in Interest Rate (INTR) show a negative relationship with private sector growth in Nigeria decreasing it by 0.115166 units. Based on the result obtained, it means that the determination in Nigeria has done enough based on the private sector growth in Nigeria. However, it was found to be significant.

Moreover, the determinants of the private sector growth in Nigeria in Per Capita Income (PCI) show a positive relationship with private sector growth in Nigeria. Which increases by 0.015536 units. This shows that determination in Nigeria has not helped significantly to grow the private sector growth in Nigeria.

Furthermore, the determinants of the private sector growth in Nigeria in Inflation Rate (INFR) show a negative relationship with private sector growth in Nigeria decreasing it by 0.482010 units. Based on the result obtained, it means that the determination in Nigeria has not done enough based on the private sector growth in Nigeria.

The joint test of hypothesis revealed that the determinants of the private sector growth in Nigeria have a significant effect on the Nigerian economy of the private sector growth in Nigeria.



The result shows that the ECM (-1) is negative and significant. The Error Correction coefficient of 0.455574 is the speed of adjustment of the model from the short-run equilibrium to the long-run equilibrium. This implies that 45% of the error is corrected in each time period. The speed of adjustment implies that it will take some years to correct all errors/deviations and bring the economy of Nigeria back to equilibrium.

The adjusted coefficient of determination of 0.397159 implies that about 39% of the economy in Nigeria is accounted for by determinants of the private sector growth in Nigeria. This represents a good fit.

Null Hypothesis:	Obs	<b>F-Statistic</b>	Prob.
RGDP does not Granger Cause PSG	38	5.81608	0.0069
PSG does not Granger Cause RGDP		0.54185	0.5868
PCI does not Granger Cause PSG	38	2.11165	0.1371
PSG does not Granger Cause PCI		0.27097	0.7643
INTR does not Granger Cause PSG	38	0.61876	0.5447
PSG does not Granger Cause INTR		1.38394	0.2648
EXR does not Granger Cause PSG	38	3.74730	0.0342
PSG does not Granger Cause EXR		1.04368	0.3635
INF does not Granger Cause PSG	38	0.10494	0.9007
PSG does not Granger Cause INF		1.60996	0.2152
BMS does not Granger Cause PSG	38	3.44791	0.0437
PSG does not Granger Cause BMS		13.2719	6.E-05
PCI does not Granger Cause RGDP	38	11.3693	0.0002
RGDP does not Granger Cause PCI		0.08454	0.9191
INTR does not Granger Cause RGDP	38	0.57889	0.5661
RGDP does not Granger Cause INTR		1.91378	0.1635
EXR does not Granger Cause RGDP	38	2.38101	0.1082
RGDP does not Granger Cause EXR		4.51456	0.0185
INF does not Granger Cause RGDP	38	0.11633	0.8905
RGDP does not Granger Cause INF		3.78118	0.0332
BMS does not Granger Cause RGDP	38	1.13140	0.3348
RGDP does not Granger Cause BMS		12.7238	8.E-05

### Table 4.4: Granger-causality test Results



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INTR does not Granger Cause PCI	38	0.83140	0.4444
PCI does not Granger Cause INTR		0.90879	0.4129
EXR does not Granger Cause PCI	38	1.00422	0.3772
PCI does not Granger Cause EXR		2.84266	0.0726
C C			
INF does not Granger Cause PCI	38	0.35590	0.7032
PCI does not Granger Cause INF		1.36079	0.2705
6			
BMS does not Granger Cause PCI	38	0.26403	0.7696
PCI does not Granger Cause BMS		0.84261	0.4396
EXR does not Granger Cause INTR	38	0.97715	0.3870
INTR does not Granger Cause EXR		0.34334	0.7119
		0.0.000	007117
INF does not Granger Cause INTR	38	0.03689	0.9638
INTR does not Granger Cause INF		0.74531	0.4824
6			
BMS does not Granger Cause INTR	38	0.51947	0.5996
INTR does not Granger Cause BMS		0.37339	0.6913
INF does not Granger Cause EXR	38	0.16373	0.8497
EXR does not Granger Cause INF		0.52523	0.5963
C			
BMS does not Granger Cause EXR	38	4.80851	0.0147
EXR does not Granger Cause BMS		6.25799	0.0050
<u> </u>			
BMS does not Granger Cause INF	38	1.01012	0.3752
INF does not Granger Cause BMS		0.61265	0.5480

Table 4.4 contains the results of Granger Causality tests. The essence of this test is to establish a causal relationship among Real Gross Domestic Product (RGDP), Per Capita Income (PCI), Interest Rate (INTR), Exchange Rate (EXR), Inflation Rate (INFR), and Broad Money Supply (BMS) and the growth of Nigerian economy. This test gives us the direction of causality among these variables. There are usually two outcomes of this test, unidirectional or bidirectional relationship. In this study, it was observed that there was a bidirectional relationship among the variables as well unidirectional relationship existed, that is, real GDP causes PSG, EXR causes PSG, Broad Money Supply causes PSG, Private Sector Growth causes BMS, PCI causes RGDP, RGDP causes EXR, RGDP causes INF, RGDP causes BMS, BMS causes EXR, EXR causes BMS.



# CONCLUSION

The study concludes based on the empirical findings that the determinants of the private sector growth in Nigeria contributed to the improvement and enhancement of Interest Rate, Exchange Rate and Broad money Supply in Nigeria. Even though Private Sector Growth, Real Gross Domestic Product, Per Capita Income, Inflation Rate have contributed positively to the development of private sector growth in Nigeria, it has not significantly affected the generality of the people in terms of economic growth and development based on private sector growth in Nigeria.

### **Policy Recommendations**

In the light of the empirical findings, the study recommends as follows:

(A). The study finds a significant negative relationship between interest rate and exchange rate; it shows that continued attraction of real sector development from private investors would boost economic growth in Nigeria. It is recommended that one way to develop human capital for Nigeria would be to put in place policies and infrastructures that could encourage private investment inflows.

(B). However, the study finds a significant positive and negative relationship between interest rate, exchange rate and broad money supply. As a result, these financial institutions have muscular apprehension on these private sector investors by boosting credit and availability of foreign exchange for those investors that require imported raw materials.

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