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Effect of Selected Macroeconomic Variables on Private Investment in Nigeria (1986-2016)

Willy Ugwuanyi and Ngini Ifeoma Nwakaego Sandra

Department Of Banking And Finance, Faculty of Management Science, Enugu State Science And Technology (ESUT), Enugu, Nigeria.

ABSTRACT

The essence of this study is to examine the effect of selected macroeconomic variables on private investment in Nigeria. Ordinary Least Square method was adopted to analyse the time series properties of the variables under consideration using data set on private investment, exchange rate, and interest rate spanning from 1986-2016. The main objective of this paper is to identify and examine the effect of selected macroeconomic variables on private investment in Nigeria. The data source was from the CBN Statistical Bulletin (various issues), 2016. The finding shows that exchange rate has a significant effect on private investment in Nigeria, and that interest rate has a significant correlation with private investment in Nigeria. The outcome recorded from the study align with extant findings and evidence and they agree with the fact that investment is a function an aggregation of macroeconomic variables whose changes determine the increase or decrease that it experiences over time. Based on the findings, the researcher recommends that the governments ensure macroeconomic stability as this will positively drive the macroeconomic variables that elicit positive influences on private investment and that exchange rate and interest rate need to be consciously tailored towards driving investment. This is against the backdrop of the roles that investment plays in moving any economy to enhanced growth and productivity.

Keywords: Macroeconomics, variables, private, investment.

INTRODUCTION

Investment (public and private) contributes to the economic prosperity of a nation. Investment is the commitment of resources made with the hope of realizing benefits which are expected to occur over a reasonably long period of time. It is an economic activity where an individual, group or government buys assets with the hope of receiving adequate risk premium (returns) overtime. Investment in various sectors of the economy stimulate aggregate employment output, demand income which also increase the government revenue for the provision of basic industrial and agricultural inputs towards the growth and development of any economy. This entails that investment multiplier increase national income which in turn increases savings for investment, consumption and aggregate demand level. The effect will be the rising standard of living of the citizenry.

[1] observe that investment is the most strategic factor influencing growth in any country. It is characterized as the main key to increased level of productivity. A strong correlation between investment and economic growth has been revealed by both theoretical and empirical studies by development economists of the world [2]. Similarly, [3] noted that investment plays a very important and positive role for progress and prosperity of any country. Many countries rely on investment to solve their economic problem such as poverty, unemployment, etc. Development economics in offering insights into the determinants of growth affirmed that the importance and role of investment cannot

be overemphasized as it contributes meaningfully to economic growth [4].

Investment plays important role in functioning of an economy whether developed or underdeveloped. Economic growth of most economies is derived from investment in such economy. No wander investment is seeing as a propellant of economic growth. To this end, measures are taken by government of various countries of which Nigeria is not an exception to encourage investment so as to boost high productivity, innovation, employment level, standard of living, reduce poverty level and ultimately accelerate economic growth [5].

No doubt, there are so many factors (internal and external) that influence investment. This therefore means that for a developing country like Nigeria to attain the goal of economic growth, amongst other economic objectives, there is need to increase the tempo of investment that would lead to higher economic growth with much focus on such factors that determine investments within and outside the national economy.

Statement of the Problem

Investment is the mainstream of economic development of any nation. [6] observed that Nigeria has been classified as low savings and even lower investment economy. It is based on this fact that one of the principal objectives of the Nigeria government is fostering sustained economic growth through the promotion of enabling investment environment. Stimulation of sustained economic growth requires a balance between investment and such factors that affect investment.

In 1986, the structural Adjustment Programme (SAP) was put in place, with the objective among others of facilitating the development of the private sector, whose role could determine the level of economic growth of the Nigeria economy. However, the expected investment boom after the structural adjustment programme was not feasible and not much was recorded in terms of domestic investment.

According to [7], successive governments have implemented policies and strategies to raise the level of investment but these policies so far have been erratic. It has however, been found that a major problem is that government is so much concerned about policies to boost investment without much knowledge or investigations of the determinants of investment [8].

Despite policies made by the government of Nigeria at different times to tackle the problem, the menace still persists.

Decisions whether to invest or not are determined and/or constrained by numerous factors. These factors must be identified and importance of identified variables as policy instruments lies in the fact that they can be used judiciously to foster investments. An analysis of investment requires a simultaneous link to those factors and other unique variables that equally react to fluctuations. Attempts to analyze investment determinants and predict its behaviour in the Nigerian economy have achieved a disproportionate share of analysts' attention.

Decisions taken in respect of investment, whether rightly or wrongly have a lasting effect on the growth and development of an economy. To avoid the danger of faulty investment or investment decisions, it will be necessary to examine very carefully those factors or macroeconomic variables that determine investments in the Nigerian economy, with a view to knowing their effect.

It has also been observed that despite the importance accorded private investment as the prime mover of the economy, government interest and renewed effort in promoting it, after many years of economic adjustment and various economic reform programmes of successive governments, available relevant economic indicators show slow and minimal improvement in private investment in Nigeria.

It is on this note that this study revolves around how macroeconomic variables will aid private investment in Nigeria.

Objectives of the Study

The main objective of this paper is to examine the effect of selected macroeconomic variables on private investment in Nigeria from the period, 1986-2016. In this regard, the following specific objectives were stated, to:

i) Ascertain the effect of exchange rate movement on private investment.
ii) Examine the degree of linear association between interest rates and private investments in Nigeria.

Research Questions

The objectives are meant to provide answers to the under listed questions:

a) How has the exchange rate fluctuation affected the amount of private investment undertaken in the economy?
b) What effect does interest rate fluctuation have on private investment in the Nigerian economy?

Research Hypotheses

The research was based on the following hypotheses which were tested:

$H0_1$: Exchange rate fluctuation has no significant effect on private investment in Nigeria.

$H0_2$: There is no significant correlation between interest rate fluctuation and private investment in Nigeria.

METHODOLOGY

Research Design

In this study, *ex post facto* design was adopted in obtaining, analyzing and interpreting data relating to the objectives of this study. This design allows the researcher the privilege of observing variables over a long period of time and analyzing them for the purpose of making conclusions. More so, the *ex post facto* research design makes the data less susceptible to the manipulation of the researcher since the data is in public domain.

Nature and sources of data

All the data utilized are time series purely quantitative and secondarily sourced from the Statistical Bulletins of Central Bank of Nigeria covering the period under study.

They are time series data because they are data that have been collected over a period of time on one or more variables and are ordered in a given frequency that is annually (Brooks, 2008). The data is secondary because they were obtained from preexisting sources, are numerical and then quantitative.

Model specification

The Classical Linear Repression Model (CLRM) shall be employed for this study. The model, according to [9], [10] is expressed as follows:

$Y_1 = \alpha + \beta x_t + U_t$ _____ (Eq. 1)

Where:

Y = dependent variable (explained variable)

X = independent variable (explanatory variable)

α = Constant term (i.e. value of Y when X is zero)

β = Coefficient of the parameter estimates

U = error term (residual term)

t = denotes time underscoring the fact that the observations are time series.

This study follow the ARDL Model as developed and popularized by [11]. The technique has several advantages for which cause it is chosen for this work. Firstly, it is efficient in small samples and not restricted in terms of stationarity properties of the variables under study. The approach can allow for a combination of I(0) and I(1) variables.

The models for the ARDL estimation for the testing of the hypotheses are given as follows:

$y_t = \beta_0 + \beta_1 y_{t-1} + ...+ \beta_k y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + ... + \alpha_q x_{t-q} + \varepsilon_t$

where ε_t is a random "disturbance" term, X is the independent variable and Y is the dependent variable and because the Model is both autoregressive and lagged, the lags of the dependent and independent variables are represented in the model. The models for the respective hypothesis are given as follows:

Hypothesis I

$PINVST_t = \beta_0 + \beta_1 PINVST_{t-1} +....+ \beta_k PINVST_{t-p} + \alpha_0 EXR_t + \alpha_1 EXR_{t-1} + \alpha_3 INTR_{t-2} + \alpha_3 INTR_{t-2} .....+ \alpha_q x_{t-q} + \varepsilon_t$

Where:

PINVST = Private Investment (Dependent Variable)
INTR = Interest rate as moderating variable
EXR = Exchange Rate (Major exogenous variable)
ε_t = random or disturbance term.

Hypothesis II

This is tested using the bivariate correlational analysis which is a test for linear association. Interest rate fluctuation is the X with Private Investment as the Y.

Description of Variables

The variables of interest for this work are the Private Investment (PINVST), the Exchange Rate (EXR) and Interest Rate (INTR). While Private Investment served as the dependent variable (Y), Interest Rate and Exchange Rate are all proxies for macroeconomic variable and served as independent variables (X's).

Private Investment

[12] define private investment as investment which is made by privately owned firms on new buildings, plants and equipment that are used in the production of goods and services.

Private investment, from a macroeconomic standpoint, is the purchase of a capital asset that is expected to produce income, appreciate in value, or both generate income and appreciate in value. A capital asset is simply property that is not easily sold and is generally purchased to help an investor to generate a profit. Examples of capital assets include land, building, machinery and equipment. (http://study.com)

Exchange Rate

An exchange rate has a base currency and a counter currency. In a direct quotation, the foreign currency is the base currency and the domestic currency is the counter currency. In an indirect quotation, the domestic currency is the base currency and the foreign currency is the counter currency. Most exchange rates use the US dollar as the base currency and other currencies as the counter currency. A number that is used to calculate the difference in value between money from one country and money from another country or the ratio at which the principal unit of two currencies may be traded.

Interest Rate

This is the amount that a bank charges on the amount it lends. It is the rate at which commercial banks make funds available to people. Lending rates vary depending upon the nature of loans and advances. The rates also vary according to the purpose in view. For example, if loan is sanctioned for the purpose of activities for the development of backward areas, the rate of interest is relatively lower as against loans and advances for commercial/business purposes. Similarly, for smaller amounts of loan the rate is higher as compared to larger amounts. Again, lending rates for commercial durables, e.g. loans for purchase of two-wheelers, cars, refrigerators, etc are relatively higher than for commercial borrowings.

Method of Data Analysis

Regression Analysis

In this work, the Autoregressive Distributed Lag Model (ARDL) was used because it has some advantages over the ordinary least squares which includes;

1. Efficiency when small sample size is involved
2. Ideal for different stationarity properties such as I(0) and I(1).
3. The result is less exposed to autocorrelation.

The study employed the Eviews10 statistical package to analyze the collected data, test all the hypotheses at 0.05 level of significance, and valid conclusions were drawn representing the outcome of the research work.

Diagnostic/Standard Tests

These tests include;

Descriptive statistics such as the mean, median, mode, variance, standard deviation,

Skewness and kurtosis

Test for normality.

All these were done with the aim of showing the basic statistical properties of the series.

Test for Stationarity

The Augmented Dickey Fuller (ADF) Unit Root Test was employed to test for the presence or otherwise of the unit root. This is to ensure that non-spurious result is arrived at. More so, the unit root test were carried with provision for structural

breaks given that the stationarity of most economic variables are affected by the presence of structural breaks.

DATA PRESENTATION, ANALYSIS, INTERPRETATION.

Data Presentation

Table 1 Private Investment and Selected Macroeconomic Variables

Year	PINVST	INTR	EXR
1986	2.634045	2.302585	0.703394
1987	2.927453	2.545531	1.390759
1988	3.146305	2.545531	1.512200
1989	3.169686	2.917771	2.000344
1990	3.389462	2.917771	2.089860
1991	3.630721	2.740840	2.302085
1992	4.009513	2.862201	2.850614
1993	4.443004	3.258097	3.093362
1994	4.709260	2.602690	3.085852
1995	4.686658	2.602690	4.394731
1996	4.901564	2.602690	4.397565
1997	5.179815	2.602690	4.402434
1998	5.298667	2.602690	4.428519
1999	5.626433	2.890372	4.525508
2000	5.953737	2.639057	4.613154
2001	6.190418	3.020425	4.715826
2002	6.383659	2.803360	4.839117
2003	6.485764	2.708050	4.898122
2004	6.681507	2.708050	4.885604
2005	7.183081	2.564949	4.872151
2006	7.461433	2.302585	4.854212
2007	7.898615	2.251292	4.835337
2008	8.323164	2.277267	5.241009
2009	8.659302	1.791759	5.002143
2010	8.691862	1.832581	5.012620
2011	8.784455	2.484907	5.012293
2012	8.995029	2.484907	5.044006
2013	9.066022	2.484907	5.031810
2014	9.393348	2.564949	5.064302
2015	9.346455	2.397895	5.272743
2016	9.418998	2.639057	5.535324

Source: Central Bank Statistical Bulletin 2015 and 2016.

WHERE:

PINVST *= Private Investment*
INTR *= Interest Rate*
INFR *= Inflation Rate*
GEXP= *Government Expenditure*
EXR *= Exchange Rate*

To further bring to fore the basic statistical characteristics of the variables under study, the basic descriptive statistics following the form in table 2 below is presented.

Table 2 Basic Descriptive Statistics

Averages	PINVST	INTR	EXR
Mean	2651.603	13.64063	95.66968
Median	436.6200	13.50000	106.2513
Maximum	12320.23	26.00000	253.4900
Minimum	12.52000	6.000000	0.893800
Std. Dev.	3953.530	4.012550	68.45458
Skewness	1.382704	0.739370	0.061568
Kurtosis	3.512314	4.475972	2.173475
Jarque-Bera	10.54659	5.820221	0.931075
Probability	0.005127	0.054470	0.627798
Sum	84851.28	436.5000	3061.430
Sum Sq. Dev.	485.508	499.1172	145266.9
Observations	30	30	30

Source: Author's Computation (2019)

From the foregoing, we have the averages that show central tendency of the observations which include the mean, median as well as the sum of the observations. In addition, there are averages that measure of dispersion such as standard deviation and sum squared deviations are also presented for all the variables under study. Skewness and Kurtosis which are indicators of the degree of symmetry and peakedness respectively are as well reported.

Unit Root Test

The result of the unit root test was performed to ascertain the stationarity of the variables under study. This test followed the form propounded by [13] known as the Augmented Dickey-Fuller (ADF) test and decision was based on 5% level of significance.

Table 3 Summary of Unit Root Tests

Variable	ADF Statistic	Critical Values @ 5%	Probability Value	Inference
EXR	-7.71	-5.17	0.000	I(1)
PINVST	-29.41	-4.44	0.000	I(0)
INTR	-8.43	-5.18	0.000	I(1)

Source: Extract from Appendix One

Following the result in table 3 all the variables were not found to be stationary at levels. The rejection of the null hypothesis was based on the probability value of ADF-stat. being less than the 5% level of significance. Given that the variables are a combination of I(1) and I(0) This ARDL which accommodates a combination of I(1) and I(0) variables became our obvious choice. More so, the ARDL which is very robust even in the face of small sample size proves to show more power than other regression form in the face of autocorrelation [14].

Test of Hypotheses

The major econometric techniques for the test of the formulated hypotheses are the ARDL and the Correlation Matrix. While the ARDL estimates are presented in table 5 below, the correlation matrix is presented in table 6 below.

Table 5: Summary of the ARDL Estimates

R^2 = 99%, Adjusted R^2 = 99%, F-stat =999.34 (0.000), DW-Stat = 2.01

Dependent Variable: PINVST

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(PINVST(-3))	-1.112296	0.294751	-3.773684	0.0069
LOG(PINVST(-4))	0.546369	0.159184	3.432307	0.0110
INTR(-3)	0.031354	0.012203	2.569373	0.0370
LOG(EXR)	0.279713	0.093311	2.997659	0.0200
LOG(EXR(-1))	-0.484562	0.114228	-4.242077	0.0038
LOG(EXR(-2))	-0.325578	0.104210	-3.124262	0.0167
LOG(EXR(-3))	-0.349248	0.125501	-2.782832	0.0272
LOG(EXR(-4))	-0.264364	0.180364	-1.465719	0.1862
C	-2.922237	1.063125	-2.748724	0.0286

Source: Author's Computation (Extract from Appendix Two)

From the results in table 4.5, we find that the model has goodness of fit as both the R^2 and adjustedR^2 are 99% respectively; indicating that about 99% of the variation in the dependent variable is accounted for by both the contemporaneous and lagged values of the endogenous and the exogenous variables within the context of the formulated model [15]. The F-stat also indicates that the model is good enough for significant analyses given that the F-stat (999.34) with its associated probability value (0.0000) indicates that the overall regression is statistically significant. More so, the Durbin Stat of 2.01 indicates that the result is not auto correlated hence it is not spurious.

The ARDL estimate was used to test hypotheses 1 which is restated in null and alternate form thus:

H_{01}: Exchange rate fluctuation has no significant influence on the level of investment in Nigeria

H_{a1}: Exchange rate fluctuation has no significant influence on the level of investment in Nigeria

The decisions on the rejection of the null hypothesis in these circumstance is based on 0.05 level of significance

Test of Hypothesis One

Hypothesis two presents private investment as the dependent variable with exchange rate as the independent or explanatory variable. Controlling for all the other exogenous variables, a negative and significant relationship is found between private investments and first, second and third lags of exchange rate [16]. This implies that as exchange increases, over those lag, the propensity to invest on the part of private individuals drops by about 48%, 33% and 35% respectively. Significantly, the contemporaneous value of exchange rate positively and significantly affects private investment. This implies that the non-lagged value of exchange rate elicits 28% increase in private investment as a 1% increase in exchange rate occurs.

LOG(EXR)	***0.279713***	***0.093311***	***2.997659***	***0.0200***
LOG(EXR(-1))	*-0.484562*	*0.114228*	*4.242077*	*0.0038*
LOG(EXR(-2))	*-0.325578*	*0.104210*	*-3.124262*	*0.0167*
LOG(EXR(-3))	*-0.349248*	*0.125501*	*2.782832*	*0.0272*

Given that the Pvalue (0.0200) of the F-stat (2.99) is less than the set level of significance which is 0.05, we reject the null hypothesis and accept the alternate and conclude that exchange rate positively and significantly affects private investment.

Test of Hypothesis Two

This hypothesis is tested using the bivariate correlation matrix contained in table 6, the hypothesis is a test of linear association hence the suitability of correlational analyses for its test. The hypothesis which tries to underscore the significant effect of interest rate on investment even in line with extant literature is restated thus:

H_{04}: There is no significant correlation between interest rate and the level of investment in Nigeria

H_{a4}: There is a significant correlation between interest rate and the level of investment in Nigeria

Estimation results of the correlational analyses for testing hypothesis Two

Table 6 Correlation Matrix

Correlation t-statistic **Probability**	PINVST	INTR
INTR	-0.374847	1.000000
	-2.214593	-----
	0.0345	-----
EXT	0.763597	-0.356684
	6.477377	-2.091184
	0.0000	0.0451

Source: Author's Computation (2019)

From table 4.6, the correlation coefficient of private investment and interest investment is -38% with a corresponding t-stat of 2.2 and a probability value of (0.0345). This indicates that a negative linear association exists between interest rate and private investment. That any 1% increase in interest rate causes a 38% drop in private investment [17]. This is consistent with theory as capital accumulation and consumption tend to vary inversely with interest rate.

Given that the probability value (0.0345) of t-stat(2.2) is less than the chosen level of significance (0.05), we reject the null hypothesis in favour of the alternate hypothesis and conclude that interest rate significantly correlates with private investment [18].

DISCUSSION OF FINDINGS

This study examined the impact of selected macroeconomic variables on private investment in Nigeria in Nigeria from 1985 to 2016. Theoretical review and empirical analyses as well findings were made in line with the raised research questions as well as set and tested hypotheses. The findings made are discussed in line with the specific objectives of the study.

Objective One: To ascertain the effect of exchange rate on investment.

Hypothesis One presents private investment as the dependent variable with exchange rate as the independent or explanatory variable. Controlling for all the other exogenous variables, a negative and significant relationship is found between private investments and first, second and third lags of exchange rate. This implies that as exchange increases, over those lag, the propensity to invest on the part of private individuals drops by about 48%, 33% and 35% respectively. Significantly, the contemporaneous value of exchange rate positively and significantly affects private investment. This implies that the non-lagged value of

exchange rate elicits 28% increase in private investment as a 1% increase in exchange rate occurs.

Objective Two: To examine the degree of linear association between interest rates and investments in Nigeria.

From table 4.6, the correlation coefficient of private investment and interest investment is -38% with a corresponding t-stat of 2.2 and a probability value of (0.0345). This indicates that a negative linear association exists between interest rate and private investment. That any 1% increases in interest rate causes a 38% drop in private investment. This is consistent with theory as capital accumulation and consumption tend to vary inversely with interest rate.

SUMMARY

The findings from the specific objectives of this study are as follows:

1. That exchange rate has a significant effect on private investment in Nigeria.
2. That interest rate has a significant correlation with private investment in Nigeria.

CONCLUSION

This work was set out to investigate the effect of selected macroeconomic variables on private investment in Nigeria covering the period 1986 to 2016. This broad objective is divided into specific objectives which include to: (i) ascertain the effect of exchange rate on investment, and (ii) examine the degree of linear association between interest rates and investments in Nigeria. The outcome recorded from the study align with extant findings and evidence and they agree with the fact that investment is a function on aggregation of macroeconomic variables whose changes determine the increase or decrease that it experiences over time.

RECOMMENDATIONS

In line with the specific objectives of this study, we recommend as follows:

1. That the governments should ensure macroeconomic stability as this will positively drive the macroeconomic variables that elicit positive influences on private investment.
2. That exchange rate and interest rate need to be consciously tailored towards driving investment. This is against the backdrop of the roles that investment plays in moving any economy to enhanced growth and productivity.

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