RESEARCH PAPER

## Short-Run and Long-Run Determinants of Foreign Portfolio Investment (FPI) in Nigeria from 1986 to 2015

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### ABSTRACT

*This study investigated the determinant of foreign portfolio investment (FPI) in Nigeria over the period 1986 to 2015 by using autoregressive distributed lag (ARDL) approach. ARDL result showed that only six of the explanatory variables are statistical significant in the long-run which are exchange rate, population, interest rate, gross domestic product, domestic money supply and market capitalization. Exchange rate and population exert a positive significant relation with foreign portfolio investment in Nigeria while interest rate, gross domestic product, domestic money supply and market capitalization exert a negative significant relation with foreign portfolio investment in Nigeria in the long-run. While in the short-run, four variables are statistically significant which are population, interest rate, gross domestic product and market capitalization. Population exert a positive significant relation with foreign portfolio investment inflow in Nigeria while interest rate, gross domestic product and market capitalization exert a negative significant relation with foreign portfolio investment inflow in Nigeria. The R- squared value of 0.80244 showed that 80.24% of the dependent variable is explained by the independent variable, while the value of the R- Bar-squared of 0.68171 showed that 68.17% of the dependents variable is determined by the independent variable. Also, the F-statistic of 8.1235 [P<.05] implied that the overall model is significant. The study recommended that monetary authority should decrease interest rate in order to encourage more inflow of foreign portfolio investment. Also, the authority should reduce the inflation, encourage trade degree of openness which will cause an increase in foreign portfolio investment. Since depreciation of exchange rate lead to increase in foreign portfolio investment inflow in Nigeria, the policy maker should pursue exchange rate depreciation for more inflow of foreign portfolio investment.*
*Key word: Foreign Portfolio Investment (FPI) Determinant and Autoregressive Distributed Lag (ARDL) Approach*

## INTRODUCTION

There is lots of argument in the literature on the determinant of foreign portfolio investment in the literature. Different works have used different variables like real exchange rate, trade degree of openness, inflation rate, growth rate of real GDP and market capitalization (Aziz *et al*, (2015) while the like of Chaudhry *et al*, (2014) added weighted average rate of return on deposit, growth rate of broad money and foreign direct investment. Also, Ahmad et al, (2015) included external debts and population growth. Most of these work were done in Asia while work done in Nigeria added institutional quality and gross capital flow (Ekeocha, (2008); Baghebo and Apere, (2014) and Nwinee and Olulu-Briggs, (2016). The literature on determinants of capital flows can

be summarized into two main sets, internal or endogenous factors, and external or exogenous factors. Advanced countries attract ample amount of capital because of their economic growth and stable financial system. While, interest rate, exchange rate, diversification opportunity, earning expectations, low taxes and changes in developed markets, are the factors mainly focused for developing countries. Most of the literature addressed the topic by taking sample of countries including developing and developed nations. Although, previous studies fairly contributed to enhance the understanding about the factors contributing towards growth of capital flows, but Nigeria countries, especially Nigeria, demand special focus. So it will be valuable to conduct a focused study for Nigeria**.**

Also, this paper will add some of the variables used outside the country and variables used in the Nigeria in other to make the model robust and also to see the impact of those factors that have not been used in Nigeria before on how they will affect the foreign portfolio investment and the variables are exchange rate, degree of openness, inflation rate, growth rate of real GDP and market capitalization, external debts and population growth. Lastly, it was also discovered that the past studies make used of ordinary least square, error correction model and vector autoregressive while this study will make used of auto regressive distributive lag (ARDL) approach to make this work different from the existing literature. The ARDL method which is also referred to as bound test produces reliable estimates for small sample size and provides a check for robustness of the results and for estimation of co-integrating relationship that has a combination of I(1) and I(0) but with no existence of I(2) since the stationarity test confirmed it

## LITERATURE REVIEW

Based on the evidence from developed countries, Ahmad, Draz and Yang (2015) discovered that external debts are the most significant determinant of FPI for China. Goel and Chaudhary, (2013) result indicated that portfolios that are internationally diversified do indeed prove to have lower volatility than portfolios of domestic stocks of the same size. Zafaranloo and Sapian, (2013) results showed that all co-integration tests bring evidence of no long run relationships among five Asian markets and the US market while short-run relationships exist between Malaysia, Indonesia, and Thailand with U.S market. This signified that there are some diversification benefits for US investors by investing into Asian emerging markets in long term horizon while Ahti and Mihailova, (2015) result indicated that characteristics that developed market fund managers look for when making the location decision include a stable currency, a positive political situation (could have varying meanings), large, liquid and undervalued stock markets, demographic drivers of structural growth and economic growth and development. Egly, Johnk and Liston, (2010) find that positive shocks to the stock market elicit an insignificant response to the net corporate bond inflow and a significant short term positive response to the net corporate stock inflow.

On the evidence from developing countries, Roy, (2007) find out that the foreign portfolio flows to India are driven primarily due to the capital gains motive and in the Indian case it is the change in stock prices and stock prices are causing the net foreign portfolio flows and not vice versa. Aziz, Anwar and Shawnawaz, (2015) result indicated that trade degree of openness, growth rate of real GDP and market capitalization have positive and significant relationship with foreign portfolio investment (FPI) in Pakistan, whereas, inflation rate have negative and significant relationship with foreign portfolio investment (FPI) in Pakistan. The variable of foreign exchange rate has positive but insignificant relationship with foreign portfolio investment (FPI) in Pakistan. Chaudhry, Farooq and Mushtaq, (2014) result indicated that FDI has negative impact on NPI while all other variables are positively related to NPI. Poshakwale and Thapa, (2007) result indicated that the mobility of foreign portfolio contains significant information in explaining the

short and long term co-movements of the Indian equity market with that of the US and the UK equity markets.

Based on the evidence in Nigeria, Baghebo and Apere, (2014) discovered that foreign portfolio investment; market capitalization and trade openness has a positive long-run relationship with real gross domestic product in Nigeria. Nwinee and Olulu-Briggs, (2016) result showed that interest rate affects foreign portfolio inflows, and an upsurge in foreign exchange is due to inflationary pressures which also affects interest rates. Chukwuemeka, Stella, Victor and Onyema, (2012) discovered that FPI has a positive long-run relationship with market capitalization, and trade openness in Nigeria. Igwemeka, Chijindu and Ogbodo, (2015) result of regression analyses revealed exchange rate follows FPI though not significantly while FDI has an insignificant inverse relationship with exchange rate. Anthony, and Joel, (2015) error correction model (ECM) indicated that short- run disequilibrium in investments can be corrected at the speed of 67% per annul. These simply show that there was a significant relationship between the selected macroeconomic variables and level of investment in Nigeria. Bada, (2016) findings revealed, among others, that there were increase in the foreign portfolio investment for a given period, followed by decline, as a result of massive capital outflow and divestment by the investors, caused by the global recession.

Furthermore, Okonkwo, (2016) findings revealed that there was statistically significant positive relationship existing among foreign portfolio investment, gross fixed capital formation, market capitalization and industrial growth proxies by industrial production index (IPI) in Nigeria. Makinde, (2015) result revealed that none of the selected factors have impacted positively on foreign portfolio investment in Nigeria except for market capitalization that was positive and statistically significant as well. Olufemi and Agnes, (2014) result revealed that there was a substantial feedback of 116% and 78% from previous disequilibria between long-run economic growth and foreign private investment respectively. Also a substantial proportion of capital inflow were not productively invested however the relatively small proportion (22%) of net capital inflows invested, contributed significantly to economic growth in the Nigerian economy. The political environment was found to be unfavorable and overwhelmed the positive impact of foreign private investment. Owo, (2013) find out that the rate of increase in the volume of FPCI is higher during the democracy era than the military era; also there is a remarkable increase in the percentage of capital inflows from the developed countries of United State of America and United Kingdom during the democracy era. Chukwuemeka, (2008) results illustrated that FPI is co-integrated with real rate of return on investments in the capital market, real interest rate, and investment implying that these variables are bound together in the long run. And that FPI was positively related to real rate of return on investments in the capital market, real interest rate, and investment. On the other hand it is negatively related to real exchange rate, market capitalization, trade degree of openness and institutional quality in Nigeria.

## THEORETICAL FRAMEWORK and METHODOLOGY

The theoretical framework for this study is based on the theory of portfolio investment by Hymer (1976). Foreign portfolio investors are attracted by the high interest rate because it reduces the borrowing cost; foreign portfolio investor will invest until the interest rate gets equal all over the world therefore it might be said that foreign portfolio investment is affected by domestic interest rate and not by domestic returns.

$$FPI= f(DINT.)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. \quad (3.1)$$
**(+)**

Portfolio investors also consider the host country exchange rate along with the interest rate. Devaluation of host country currency motivates the foreigners to invest due to higher return; the fluctuation in real exchange rate increases foreign investment volatility.

FPI = f(EXCH)..................................................................................... (3.2)
       **(+)**

Moreover, inflation also affects volatility in FPI. Volatility in FPI is enhanced by decrease in return and increase in inflation.

FPI = f(INF).......................................................................................... (3.3)
       **(+)**

Foreign portfolio investment is chosen on attention of regulators, policy makers and investors because it is challenging the monetary policy by affecting macroeconomic variables.

FPI = f(DMS)........................................................................................ (3.4)

Based on the theory of portfolio investment, the determinant of FPI are domestic interest rate, exchange rate, inflation rate and domestic money supply.

FPI = f(DINT, EXCH, INF & DMS)........................................................... (3.5)

Therefore, the determinant of FPI are domestic interest rate, exchange rate, inflation rate and domestic money supply. In order to make the model robust, other explanatory variables like degree of openness, gross domestic product, market capitalization, external debts and population growth will be added. Also the model for the determinant of foreign portfolio investment (FPI) in Nigeria will be specified as:

FPI = f(DINT, DOP, EXCH, INF, GDP, DMS, MC, ED & POP)................. (3.6)

Where FPI is foreign portfolio investment (using FPI inflow ₦'million); DINT is domestic interest rate (using %); DOP is degree of openness (using export plus import divided by GDP); EXCH is exchange rate (using nominal exchange rate); INF is inflation rate (using consumer's price index); GDP is gross domestic product (using nominal GDP); DMS is domestic money supply (using broad money supply in ₦'million); MC is market capitalization (using % of GDP); ED is external debts (using total external debts in ₦'million) and POP is population growth (using total population in year bases)

The others variables that was included is based on the work of past researchers who have make used of them (Chukwuemeka, 2008; Aziz, Anwar and Shawnawaz, 2015; Ahmad, Draz and Yang, 2015).

Thus, the linear regression model is given below.

$$FPI_t = \beta_0 + \beta_1 DINT + \beta_2 DOP + \beta_3 EXCH + \beta_4 INF + \beta_5 GDP + \beta_6 DMS + \beta_7 MC + \beta_8 ED$$

$$+ \beta_9 POP + \mu..................................................................(3.7)$$

In other to normalize the variables, both the explanatory and explained variable will be log.

$$LNFPI_t = \beta_0 + \beta_1 DINT + \beta_2 DOP + \beta_3 EXCH + \beta_4 INF + \beta_5 LNGDP + \beta_6 LNDMS + \beta_7 MC + \beta_8 LNED$$

$$+ \beta_9 LNPOP + \mu..................................................................(3.8)$$

The a priori expectation of the above is given below

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0, \beta_7 > 0, \beta_8 > 0, \beta_9 < 0$$

The study makes use of annual time series data ranging from 1986 to 2015. The data were sourced from World Development Indicator (WDI) (2016) and Central Bank of Nigeria statistical bulletin (CBN) (2015). This particular scope was chosen in order to ascertain the determinant of FPI in Nigeria during the period of military and civilian regimes.

The study makes use of the autoregressive distributed lag (ARDL) bounds testing procedure. The ARDL bounds testing procedure to co-integration examines the long-run equilibrium relationship between a dependent variable and a set of regressors in levels irrespective of the order of integration of the regressors: whether 1(0), 1(1) or mutually/fractionally co-integrated. As equation (3.8) stated the long-run relationship among $z_t$ variables, short-run dynamics can be incorporated using the ARDL method by expressing the two equations in error-correction modeling form

$$LNFPI_t = \sum_{K=1}^{n}\beta_1 DINT_{K-1} + \sum_{K=1}^{n}\beta_2 DOP_{K-1} + \sum_{K=1}^{n}\beta_3 EXCH_{K-1} + \sum_{K=1}^{n}\beta_4 INF_{K-1} + \sum_{K=1}^{n}\beta_5 LNGDP_{K-1} + \sum_{K=1}^{n}\beta_6 LNDMS_{K-1}$$

$$+ \sum_{K=1}^{n}\beta_7 MC_{K-1} + \sum_{K=1}^{n}\beta_8 LNED_{K-1} + \sum_{K=1}^{n}\beta_9 LNPOP_{K-1} + \lambda ECM_{t-1} + \lambda_1 DINT_{t-1} + \lambda_2 DOP_{t-1} + \lambda_3 EXCH_{t-1} + \lambda_4 INF_{t-1}$$

$$+ \lambda_5 LNGDP_{t-1} + \lambda_6 LNDMS_{t-1} + \lambda_7 MC_{t-1} + \lambda_8 LNED_{t-1} + \lambda_9 LNPOP_{t-1} + u_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.9)$$

Where: $n_1$, $n_2$, $n_3$, $n_4$, $n_5$ and $n_6$ denoted as ARDL ($n_1$, $n_2$, $n_3$, $n_4$, $n_5$, $n_6$) are lags on first difference of $z_t$ chosen on the basis of certain information criterion (SIC, AIC). The long-run effects normalized on $LNFPI_t$ are captured by the estimated $\lambda_1$, $\lambda_2$, $\lambda_3$, $\lambda_4$, $\lambda_5$, $\lambda_6$, $\lambda_7$, $\lambda_8$ and $\lambda_9$ coefficients. The short-run effects are reflected in statistically significant $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$, $\beta_6$, $\beta_7$, $\beta_8$ and $\beta_9$ coefficients. The error correction term is captured by a linear combination of the lagged level of all variables in $z_t$. Deterministic terms may be restricted or unrestricted (Pesaran *et al.,* 2001). To detect the presence of co-integration among $z_t$, a decision must be made whether lagged levels of $z_t$ should be retained or not. The idea is to test for the absence of the level relationship between import and their determinants by excluding lagged level $z_t$ variables in equations (3.9). This is an explicit test for co-integration among $z_t$ variables. Thus, a joint null hypothesis involving coefficients on lagged levels of $z_t$ i.e. $H_o$: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = \lambda_8 = \lambda_9 = 0$ against the alternative $H_1$: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq \lambda_8 \neq \lambda_9 \neq 0$; is tested using the Wald or F-test statistic with critical values provided by Pesaran *et al.,* (2001). The F-test has non-standard distribution.

Two asymptotic critical values are used to detect the presence of co-integration: one set corresponding to lower values purely for I(0) regressors and the other set for upper values purely for I(I) regressors while mutually co-integrated cases are also catered for by the bounds created by the two critical values. A conclusive decision about the null is made when the calculated F-statistic falls outside the critical value bounds. An inconclusive inference about the null exists when the calculated F-statistic falls within the critical value bounds. Thus, knowledge of the order of integration of the regressors in $z_t$ is required in order to further examine the relationship in the inconclusive case. Co-integration is confirmed among $z_t$ variables if the F-statistic exceeds the upper critical value while the null of no co-integration cannot be rejected if the F-statistic is sensitive to the lag length for each differenced variable in $z_t$. Once co-integration is established, estimates of the long-run coefficients can be obtained and the ECM associated with the long-run estimates can also be estimated. The optimal lag length for each of the first differenced $z_t$ variables is chosen based on the AIC and/or SBIC.

## FOREIGN PORTFOLIO INVESTMENT (FPI) IN NIGERIA

The inflow of portfolio investment into Nigeria may also have been limited by the infancy of Nigerian capital and money market. Although the markets have undergone considerable growth and development in recent years, they are not yet as huge, vibrant and sophisticated as their counterpart in the industrialized nations and as such, cannot compete favorably with them for investment funds. The advent of technology and globalization have overcome boundary barrier to global investment and as such, the well-developed capital and money markets in the world are attracting more foreign investment than the emerging markets. This has been one of the arguments against globalization. In 1986, the net portfolio investment (NPI) in Nigeria was ₦151.6 million. It rose to ₦51,079.13 million in 2000. By 2005, there was a tremendous increase in the NPI figure in Nigeria. It increased from ₦51, 079.13 million to ₦116,035.00 million from 2000 to 2005, a growth rate of 127.17 percent (CBN, 2016). It marked the period when the banks were statutorily mandated to share up their capital base from mere ₦2.0 billion to

₦25.0 billion. It rose to a record level of ₦332,254.80 million in 2007 before declining to ₦157,157.20 million in 2008 (Baghebo and Apere, 2014). Similarly, the FPI was ₦70,938.5 million in 2009 and rose to ₦556,585.1 million in 2010. It further increased from ₦556,585.10 million in 2010 to ₦792,360.20 million in 2011, indicating a growth rate of 42.36 percent. It, however, dropped to ₦2,687,233 billion in 2012 before falling to ₦2,130,180 billion in 2013. It also falls to 832,392 million before rising to 1,399,750 billion in 2015.

‒

**2016**
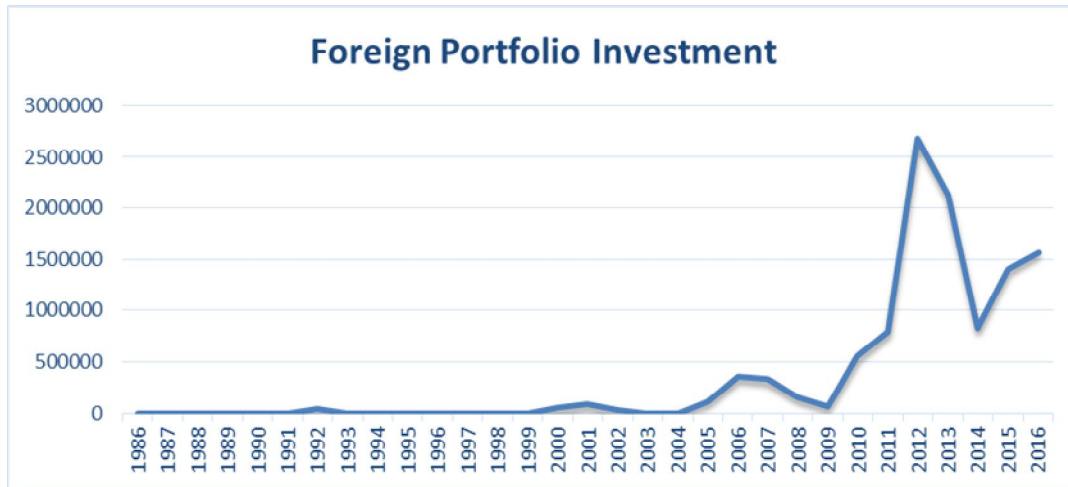


**Source:** CBN statistical bulletin, 2016

**Fig. 1:** Trends of Foreign Portfolio Investment (FPI) from 1986

## EMPIRICAL ANALYSIS

### PRELIMINARY ANALYSIS:

In other to know the methodologies that will be applied in this research work, preliminary analysis were carried out and this include summary statistics, correlation analysis, unit root and ARDL Bounds test for Co-integration.

**Table 1:** Summary Statistics Output

|  | LNFPI | DINT | DOP | EXCH | INF | LNGDP | LNDMS | MC | LNED | LNPOP |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mean** | 10.11 | 13.92 | 70.59 | 85.46 | 20.10 | 15.17 | 13.71 | 11.91 | 20.74 | 18.65 |
| **Mecdian** | 10.12 | 13.50 | 72.82 | 111.94 | 11.60 | 15.37 | 14.05 | 9.71 | 21.04 | 18.65 |
| **Maximum** | 14.80 | 26.00 | 97.30 | 164.21 | 72.80 | 17.19 | 16.22 | 51.87 | 22.85 | 18.98 |
| **Minimum** | 5.02 | 6.13 | 5.15 | 2.02 | 5.39 | 11.81 | 10.22 | 4.13 | 15.23 | 18.27 |
| **Std. Dev.** | 3.01 | 4.61 | 14.49 | 63.64 | 18.89 | 1.78 | 2.04 | 9.31 | 1.36 | 0.22 |
| **Skewness** | -0.07 | 0.73 | -2.86 | -0.19 | 1.53 | -0.49 | -0.35 | 2.66 | -2.28 | -0.07 |
| **Kurtosis** | 1.79 | 3.45 | 14.84 | 1.23 | 3.90 | 1.81 | 1.75 | 12.01 | 10.17 | 1.73 |
| **Jarque-Bera** | 1.93 | 3.01 | 223.46 | 4.23 | 13.13 | 3.08 | 2.63 | 141.47 | 93.23 | 2.12 |
| **Probability** | 0.38 | 0.22 | 0.00 | 0.12 | 0.00 | 0.21 | 0.27 | 0.00 | 0.00 | 0.35 |
| **Sum** | 313.53 | 431.45 | 2188.35 | 2649.28 | 623.22 | 470.34 | 425.06 | 369.24 | 643.03 | 578.14 |
| **Sum Sq. Dev.** | 272.51 | 638.34 | 6303.04 | 121504.2 | 10699.75 | 95.37 | 125.31 | 2600.81 | 55.28 | 1.51 |
| **Observations** | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |

**Source:** Author's Computation

This is use to know whether the variables are normally distributed or not through skewness, kurtosis and Jargue-Bera test. Descriptive statistics were performed to examine if the explanatory variables and the dependent variable exhibit time varying volatility and leptokurtosis characteristics. The variables of the study are examined because these variables determine the estimation technique for the study. The statistics of the variables

series are displayed in Table 1. The statistics show that the J-B value of 1.93 for foreign portfolio investment, 3.01 for domestic interest rate, 223.46 for degree of openness, 4.23 for exchange rate, 13.13 for inflation rate, 3.08 for gross domestic product, 2.63 for domestic money supply, 141.47 for market capitalization, 93.23 for external debts and 2.12 for population growth respectively deviated from normal distribution. Similarly, skewness and kurtosis represent the nature of departure from normality. Foreign portfolio investment, degree of openness, exchange rate, gross domestic product, domestic money supply, external debt and population are negatively skewed while domestic interest rate, inflation rate and market capitalization are positively skewed. The value for kurtosis distribution with a coefficient larger than 3 is said to be leptokurtic and one with a coefficient smaller than 3 is platykurtic. Therefore, interest rate, degree of openness, inflation rate, market capitalization and external debt are leptokurtic while foreign portfolios investment, exchange rate, gross domestic product, domestic money supply and population are platykurtic. The means of all the series exhibit positive average values and they all lies within their minimum and maximum but exchange rate has the highest mean while foreign portfolios investment has the lowest mean.

**Table 2:** Correlation Matrix

|        | LNFPI | DINT  | DOP   | EXCH  | INF   | LNGDP | LNDMS | MC    | LNED  | LNPOP |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| LNFPI  | 1     |       |       |       |       |       |       |       |       |       |
| DINT   | -0.29 | 1     |       |       |       |       |       |       |       |       |
| DOP    | -0.09 | 0.13  | 1     |       |       |       |       |       |       |       |
| EXCH   | 0.19  | -0.26 | -0.27 | 1     |       |       |       |       |       |       |
| INF    | -0.34 | 0.47  | 0.44  | -0.52 | 1     |       |       |       |       |       |
| LNGDP  | 0.18  | -0.18 | -0.25 | 0.49  | -0.44 | 1     |       |       |       |       |
| LNDMS  | 0.29  | -0.06 | -0.23 | 0.08  | -0.57 | 0.48  | 1     |       |       |       |
| MC     | 0.46  | -0.16 | 0.02  | 0.61  | -0.32 | 0.65  | 0.59  | 1     |       |       |
| LNED   | -0.08 | 0.22  | -0.03 | -0.04 | 0.04  | -0.02 | -0.16 | -0.18 | 1     |       |
| LNPOP  | 0.49  | -0.07 | -0.18 | 0.49  | -0.47 | 0.79  | 0.08  | 0.61  | -0.06 | 1     |

**Source:** Author's Computation

**Table 3:** Unit Root Test using both Augmented Dickey-Fuller (ADF)

| Variable | ADF | | | |
|----------|-----------------------------------|--------|-----------------------------------|--------|
|          | Coefficient (level) with its t-test | Remark | Coefficient ($1^{st}$ diff.) with its t-test | Remark |
| D(LNFPI) | -2.078330 [-3.670170] | - | -6.701533* [-3.689194] | I(1) |
| DINT | -2.647814*** [-2.621007] | I(0) | - | - |
| DOP | -4.388687* [-3.670170] | I(0) | - | - |
| D(EXCH) | -0.856389 [-2.963972] | - | -5.461465* [-3.679322] | I(1) |
| D(INF) | -2.596800 [-2.963972] | - | -6.684647* [-3.689194] | I(1) |
| D(LNGDP) | -2.477451 [-2.963972] | - | -4.071578* [-3.679322] | I(1) |
| D(LNDMS) | -1.662468 [-2.967767] | - | -6.160817* [-3.689194] | I(1) |
| D(MC) | -2.647160*** [-2.621007] | I(0) | - | - |
| D(LNED) | -4.184171* [-3.679322] | I(0) | - | - |
| LNPOP | -2.059627 [-2.963972] | - | -5.020687* [-3.689194] | I(1) |

**Source:** Author's Computation
**Note:** ***; ** & * represent 10%; 5% & 1% level of statistical significance.

In other to know that there is no multicolinearity among the explanatory variable, correlation analysis was carried out. Correlation also shows the degree of association among the variables. The results of the correlation matrix showed that none of the variables had perfect correlation coefficients. This was an indication that the model emanated from the set of the variables would not have any tendency for multicollinearity problem. Precisely, there was negative correlation between foreign portfolios investment and interest rate; foreign portfolios investment and degree of openness; foreign portfolios investment and inflation rate and foreign portfolios investment and external debt while there was a positive correlation between foreign portfolios investment and exchange rate; foreign portfolios investment and gross domestic product; foreign portfolios investment and domestic money supply and foreign portfolios investment and market capitalization.

The time series behaviour of each of the series is presented in Table 3, using the Augmented Dickey Fuller test (ADF) at both level and first difference of the series. The table reports that four of the time series data have t-values less ADF that is t* < ADF statistics indicating no unit root at level and they are domestic interest rate, degree of openness, market capitalization and external debt while the application of the differencing technique was used for the remaining variables. During the differencing, foreign portfolios investment, domestic interest rate, exchange rate, inflation rate, domestic money supply, gross domestic product and population variables became stationary at 1st difference as their t* < ADF statistics and hence the generation of first difference data for the analysis. Given that the ADF test statistic of the variables at first difference < critical values at 1%, we conclude that there is no unit root with the time series. Therefore, the time series are stationary at both the level and first difference.

**Table 4:** ARDL Bounds Test for Co-Integration

| Variables | F-Statistics | Co-integration |
|---|---|---|
| F(LNFPI/DINT, DOP, EXCH, INF, LNGDP, LNDMS, MC, LNED & LNPOP) | 7.8537* | Co-integration |
| Critical value | Lower Bound | Upper Bound |
| 1% | 5.018 | 6.610 |
| 5% | 3.548 | 4.803 |
| 10% | 2.933 | 4.020 |

**Source:** Author's Computation
**Note:** *** Statistical significance at 1% level; ** Statistical significance at 5% level; * Statistical significance at 10% level.

The lag length k=1 was selected based on the Schwarz criterion (SC). Critical values are obtained from Narayan (2005) case III for 31 observations. The number of regressors is 9. Therefore, the empirical findings lead to the conclusion that a long-run relationship between foreign portfolios investment, interest rate, degree of openness, inflation rate, market capitalization, external debt, exchange rate, gross domestic product, domestic money supply and population exists. Next step is to examine the marginal determinant of foreign portfolios investment in Nigeria.

**EMPIRICAL ANALYSIS AND DISCUSSION:**
The study adopted the Auto Regressive Distributive Lag (ARDL) to investigate the determinant of FPI in Nigeria. The ARDL method which is also referred to as bound test produces reliable estimates for small sample size and provides a check for robustness of the results and for estimation of co-integrating relationship that has a combination of I(1) and I(0) but with no existence of I(2) since the stationarity test confirmed it.

From the result of the long-run ARDL in Table 5, exchange rate and population exert a positive significant relation with foreign portfolio investment in Nigeria while interest rate, gross domestic product, domestic money supply and market capitalization exert a

negative significant relation with foreign portfolio investment in Nigeria in the long-run. Therefore, in the long run, as exchange rate change by 1 percent, the foreign portfolio investment will increase by 0.0553847%. This implied that if exchange rate depreciate, there will more of foreign portfolio investment inflow into Nigeria and therefore, depreciation of exchange rate (naira/dollar exchange rate) will encourage more of inflow of foreign portfolio investment into the country. In the same vein, for any increase in population, the foreign portfolio investment in Nigeria will increase by 3.1300%. The more the population, the more the foreign portfolio investment into the Nigeria.

**Table 5:** Estimated Long-Run Coefficients Using the ARDL Approach

| ARDL(0,1,0,1,0,0,1,0,0,0) selected based on Schwarz Bayesian Criterion | | |
|---|---|---|
| Dependent variable is DLNFPI | | |
| Regressor | Coefficient | T-Ratio [Prob] |
| DINT | -.47132 | -4.3408 [.000]* |
| DOP | .013055 | .74962 [.463] |
| EXCH | .055384 | 4.1991 [.001]* |
| INF | -.0052813 | -.29336 [.773] |
| LNGDP | -.76487 | -2.9060 [.021]** |
| LNDMS | -.53493 | -2.4009 [.008]* |
| MC | -.098541 | -3.0508 [.007]* |
| LNED | .028856 | .16196 [.873] |
| LNPOP | 1.6536 | 3.1300 [.006]* |

**Source:** Author's Computation
**Note:** *, ** and *** denote 1%, 5% and 10% level of significance respectively

The result also suggests that in the long-run, as interest rate increases, foreign portfolio investment will decrease by 0.47132%. If domestic interest rate increases, it will not encourage foreign portfolio investment into the country. According to portfolio investment theory, foreign portfolio investors are attracted by the high interest rate because it reduces the borrowing cost; foreign portfolio investor will invest until the interest rate gets equal all over the world therefore it might be said that foreign portfolio investment is affected by domestic interest rate. As the domestic interest rate falls, people will prefer to invest locally rather than investing in foreign investment and this will discourage foreign portfolio investment.

As gross domestic product increase by 1 percent, foreign portfolio investment will fall by 0.76487% in Nigeria. This is because as domestic interest rate falls which lead to domestic investment and investment is one of the component of gross domestic product, gross domestic product will increases and increase in gross domestic product will make foreign portfolio investment to fall. Also, as domestic money supply increases by 1 percent, foreign portfolio investment will fall by 0.53493% in Nigeria. This has to do with monetary transmission mechanism because has money supply increases, domestic interest rate will fall, fall in interest rate will encourage investor to invest locally leading to increase in domestic investment and thereby discourage foreign investment. In the long-run, instead of increase in domestic money supply should encourage inflow of foreign portfolio investment, but it discourage it.

The results further show that the variable of market capitalization has negative and significant relationship with inflows of foreign portfolio investment in Nigeria. Its value of coefficient is -0.098541, which means that if market capitalization would be increased by 1 percent, it will cause a decrease of 0.098541 percent in inflows of foreign portfolio investment in Nigeria. Market capitalization refers to the total market value of a company's outstanding shares. It is the value of a company that is traded on the stock market, calculated by multiplying the total number of shares by the present share price. It is used to determine a company's size because company size is a basic determinant of various characteristics in which investors are interested, including risk. Since the size of

the local firm (company) is large that is their market capitalization, people prefer to invest in the domestic company than foreign company and this discourages foreign portfolio investment.

**Table 6:** Error Correction Representation for the Selected ARDL Model

| Regressor | Coefficient | T-Ratio [Prob] |
|---|---|---|
| ARDL(0,1,0,1,0,0,1,0,0,0) selected based on Schwarz Bayesian Criterion | | |
| Dependent variable is DLNFPI | | |
| dDINT | -.14308 | -2.6917 [.006]* |
| dDOP | .013055 | .74962 [.462] |
| dEXCH | -.0012224 | -.066565 [.948] |
| dINF | .0052813 | .29336 [.772] |
| dLNGDP | -.76487 | -2.4643 [.009]* |
| dLNDMS | -.042155 | -.15738 [.877] |
| dMC | -.098541 | -3.0508 [.006]* |
| dLNED | .028856 | .16196 [.873] |
| dLNPOP | 1.6536 | 3.1300 [.005]* |
| ecm(-1) | -.71735 | -4.3766 [.000]* |
| R-Squared | .80244 | |
| R-Bar-Squared | .68171 | |
| F-Stat. | F(9,15) 8.1235 [.000] | |
| DW-statistic | 1.7103 | |

**Table 7:** Diagnostic Tests

| Test Statistics | LM Version | F Version |
|---|---|---|
| A:Serial Correlation | CHSQ(1) = .44795 [.503] | F(1, 17) = .25769 [.618] |
| B:Functional Form | CHSQ(1) = .99165 [.319] | F(1, 17) = .58114 [.456] |
| C:Normality | CHSQ(2) = .077336 [.962] | Not applicable |
| D:Heteroscedasticity | CHSQ(1) = 1.9109 [.167] | F(1, 28) = 1.9048 [.178] |

**Source:** Author's Computation

The Table 6 above presents the parsimonious result of the error correction model using the ARDL approach. The result shows an ECM value of -0.717353 which is otherwise referred to as the speed of adjustment. The speed of adjustment is significant at 1% percent level considering its standard error. Approximately 71.74% of disequilibrium from the previous year's shock converge back to the long-run equilibrium in the current year. Also, the ECM is correctly signed and statistically significant with the speed of convergence to equilibrium at 71.74% percent. That is 71.74 percent of the short-run inconsistencies are being corrected and incorporated into the long-run relationship. The implication is that the present value of foreign portfolio investment will adjust to changes in interest rate, degree of openness, inflation rate, market capitalization, external debt, exchange rate, gross domestic product, domestic money supply and population.

The result also shows that population exert a positive significant relation with foreign portfolio investment inflow in Nigeria while interest rate, gross domestic product and market capitalization exert a negative significant relation with foreign portfolio investment inflow in Nigeria. The results further show that the variable of population has positive and significant relationship with inflows of foreign portfolio investment in Nigeria. Its value of coefficient is 1.6536, which means that if population increases, it will cause an increase of 1.6536 percent in inflows of foreign portfolio investment in Nigeria.

The results further show that interest rate has negative and significant relationship with inflows of foreign portfolio investment in Nigeria. Its value of coefficient is -0.14308, which means that if interest rate would be decreased by 1 percent, it will cause an increase of 0.14308 percent in inflows of foreign portfolio investment in Nigeria. This was in line with the finding in the long-run when domestic interest rate exert a negative

significant impact on foreign portfolio investment because as the domestic interest rate falls, people place there invest in local company rather than foreign company and this will discourage foreign portfolio investment. The results further show that the variable of gross domestic product has negative and significant relationship with inflows of foreign portfolio investment in Nigeria.

Its value of coefficient is -0.76487, which means that if gross domestic product would be decreased by 1 percent, it will cause an increase of 0.76487 percent in inflows of foreign portfolio investment in Nigeria. Since people place their investment in domestic company, the local firm investment will increases and lead to increases in gross domestic product because investment is a component of gross domestic product, as gross domestic product increases, foreign portfolio investment will fall. The results further show that the variable of market capitalization has negative and significant relationship with inflows of foreign portfolio investment in Nigeria. Its value of coefficient is -0.098541, which means that if market capitalization would be decreased by 1 percent, it will cause an increase of 0.098541 percent in inflows of foreign portfolio investment in Nigeria. As it was earlier state that as market capitalization is the company's size and the company size is a basic determinant of various characteristics in which investors are interested, they will place their invest in the domestic company than foreign company and this discourage foreign portfolio investment.

The R- squared value of 0.80244 showed that 80.24% of the dependent variable is explained by the independent variable, while the value of the R- Bar-squared of 0.68171 showed that 68.17% of the dependents variable is determined by the independent variable. Also, the F-statistic of 8.1235 [P<.05] implied that the overall model is significant.

The diagnostic test in table 7 below shows that the serial correlation is insignificant in the LM version and also insignificant in the F version, so we can assume that there is no auto-correlation according to the LM and F version. Similarly the functional form is insignificant (no issue); normality is insignificant (no issue) and hetroskedasticity is insignificant (no issue). Hence there is no apparent issue with the model.

**CUSUM HYPOTHESIS TEST ANALYSIS:**
The CUSUM and CUSUMSQ hypothesis testing is important as we need to see if there is any recursive residuals because of structural break as ARDL is sensitive to it.
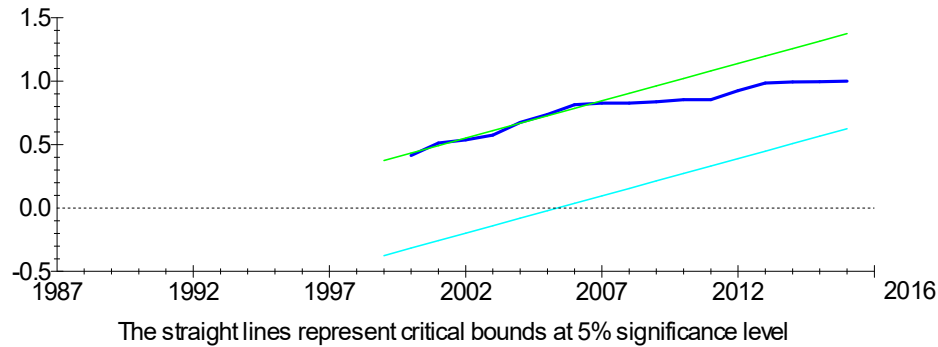
**Fig. 1:** CUSUM Hypothesis Test



Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
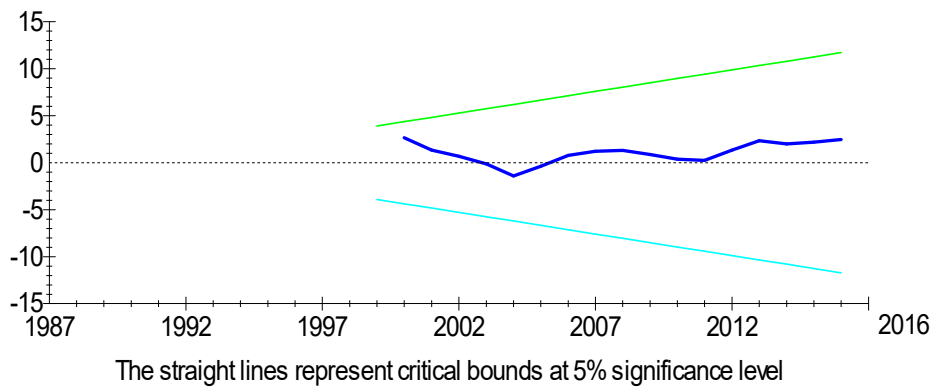
**Source:** Author's Computation

**Fig. 2:** CUSUMSQ Hypothesis Test

# Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

**Source:** Author's Computation

Since the line of CUSUM and CUSUMSQ test is within the sky blue and green lines, the model is stable and the model does not have any serial correlation. This means that there is no issue of recursive residuals in terms of mean (in first CUSUM chart) and in terms of variance (in second CUSUMSQ chart).

## CONCLUSION AND RECOMMENDATION

This study investigated the determinant of foreign portfolio investment (FPI) in Nigeria over the period 1986 to 2015 and the study concluded that exchange rate, population, interest rate, gross domestic product, domestic money supply and market capitalization are the variables that determine foreign portfolio investment in the long-run while population, interest rate, gross domestic product and market capitalization determine the foreign portfolio investment in the short-run in Nigeria.

Based on findings of this study the following policy recommendations are put forward:

1.  Since depreciation of exchange rate lead to increase in foreign portfolio investment inflow in Nigeria, the policy maker should pursue exchange rate depreciation for more inflow of foreign portfolio investment.
2.  The monetary authority should decrease interest rate in order to encourage more inflow of foreign portfolio investment.
3.  The authority should reduce the inflation, encourage trade degree of openness which will cause an increase in foreign portfolio investment.
4.  Government should provide the risk free environment to the foreign investor and local investors for getting more investment in order to attract the foreign investors which will cause an increase in foreign portfolio investment.

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