

Impact of Capital Market Development on Foreign Portfolio Investment Volatility in Nigeria

Nwagboso Innocent Chidiebere² and Nwala Maurie Nneka²

Department of Banking and Finance, Nasarawa State University, Nigeria

¹deegboso@gmail.com; ²maurienwala@gmail.com

Abstract

It has become increasingly important for developing countries to ensure safety of investment and attractive returns for portfolio investors. This kind of investment is relatively liquid, depending on the volatility of the market invested in. However, in order to attract adequate foreign capital needed for investment, capital market development has been identified as one of the critical determinants of foreign portfolio investment therefore this study investigates the impact of capital market development on foreign portfolio investment volatility in Nigeria between 2007M1 and 2018M12. Techniques of analysis employed were Exponential generalized conditional heteroscedasticity (EGARCH) and Autoregressive distributive lag (ARDL) approach. The study revealed that stock market capitalization has no significant impact on foreign portfolio investment volatility in Nigeria. The implication of this result is that information asymmetries that exists within capital market operations, as well as the unpredictability of the activities of the Nigerian capital markets hugely contributes insignificantly to volatilities of foreign portfolio investment. However, it was discovered from the study that all share index has a significant impact on foreign portfolio investment volatility in Nigeria. The Stock market return was also found to have a significant impact on foreign portfolio investment volatility in Nigeria. The significant impact of the capital market development indicators (ASI and SMR) corroborates the fact that capital market development is an important determinant for the inflow of foreign portfolio investment into Nigerian economy. Based on these findings, the study recommends that government and capital market regulatory authorities need to develop and implement proper policies that will propel better performance of the capital market through stock market capitalization as it impacts the volatility of foreign portfolio investment in the Nigerian economy. There is also the need for capital market regulatory authorities to implement effective and efficient policies that ensures free flow of market information related to all share index and stock market value that exists within the floor of the capital market to prevent information asymmetries which could create volatility clustering in foreign portfolio investment in the country.

Keywords: Capital Market Development; Stock Market Capitalisation; All Share Index; Stock Market Value; Foreign Portfolio Investment Volatility.

Introduction

Foreign portfolio investment involves the purchase of shares in a foreign country where the investing party does not seek control over the investment. A portfolio investment typically takes the form of the purchase of equity or government debt in a foreign stock market, or loans made to a foreign company. Depending on the development of the capital market of recipient economy, portfolio investment offers liquidity and above par returns to foreign investors. Foreign portfolio investment comes with huge capital into the recipient country through the financial market. These funds are usually intermediated through the financial market to facilitate domestic investment in the host country (Akinmulegun, 2018).

Foreign portfolio investments are relatively unstable and can easily shift away. Since stock markets in emerging countries are relatively shallow, when the “hot money” leaves, domestic stock market turmoil and shock effects of the exits and divestments..... can ensue. However, foreign portfolio investment does not provide the investor with direct ownership of financial assets, and thus no direct management of a company. Portfolio investors however are more focused on the relative incremental return their investment yield while managing the volatilities and variabilities inherent with an emerging/frontier market lacking depth than managing the Portfolio Investment receiving firms abroad nor the effect of their investment decision on the recipient economy. Amidst these considerations there has also been competition among emerging markets to attract foreign portfolio investments, which has led to a situation in which in order to sustain inflows of portfolio investments, it has become increasingly important for developing countries to

ensure attractive returns for portfolio investors. Often this means offering increasing operational flexibility (Ozurumba, 2012).

Capital market development has therefore been identified as one of the key factors that influences the inflow of portfolio investment into an economy towards economic growth. The level of development of the host country's capital market through adequate stock market capitalization all share index and stock market value will go a long way in determining the quantum flow of portfolio investment into such a country. The all share index provides a composite picture of the financial health of listed equities; while the stock-market capitalization gauges the relative size of equity market in an economy. It helps promotes investment through the provision of long-term (working) capital which in turn raises output and growth (Ademu & Ezie, 2017)

In the past few decades however, foreign portfolio investment was not popular in Nigeria as evident by the available data showed that Nigeria has no record of portfolio investment, both inflow and outflow in her balance of payments account up to mid-1980s. The nil return on the inflow column of the account is attributable to the absence of foreign portfolio investors in the Nigerian economy (Ozurumba, 2012). CBN annual report on Foreign portfolio investment from 2000-2006 are 51,0791.1; 26,317.1; 24, 789.2; 23,555.5; 23,541.0; 375,858.9; 117,218.9 billion respectively. It however dropped from 118,478.9 billion in 2014 to 78,145.77 billion in 2017; thus, implying a fluctuation on Foreign portfolio investment in Nigeria (CBN, 2018). The figures and dates above suggest an overlap of distress periods. This foreign portfolio investment withdrawals and withholding reduces the prospects of foreign direct investment (FDI), and it affect investors' confidence and the relative economic health of the country. Thus, inspite of several government efforts aimed at enhancing stable flow of foreign portfolio investment within country, the economy still witnesses' wide fluctuations of foreign portfolio investments. This is the problem this study sought to investigate and the causative factors.

In addition, several literatures had concentrated on the relationship between foreign portfolio investment (with focus on foreign direct investment) and economic growth; with little efforts made at investigating the impact of capital market development on foreign portfolio investment volatility. With this, the need for empirical investigation to fill the gap cannot be overstressed. Thus, this study examines the impact of capital market development on foreign portfolio investment volatility in Nigeria.

In the light of this, the study attempts to answer the following questions:

- i. What is the impact of stock market capitalization on foreign portfolio investment volatility in Nigeria?
- ii. What impact does All Share Index has on foreign portfolio investment volatility in Nigeria?
- iii. How has stock market return impacted foreign portfolio investment volatility in Nigeria?

In-line with these research questions, the following hypotheses were raised:

H01: Stock market capitalization has no significant impact on foreign portfolio investment volatility in Nigeria.

H02: All Share Index has no significant impact on foreign portfolio investment volatility in Nigeria.

H03: Stock market values has no significant impact on foreign portfolio investment volatility in Nigeria.

Concept of Stock Market Value

Market value is the price an asset would fetch in the marketplace. Market value is commonly used to refer to the market capitalization of a publicly traded company, and is obtained by multiplying the number of its outstanding shares by the current share price (Ogbuagu, & Ewubare, 2014). The market value of stocks and futures are easily determined since their market price is available and publicly disseminated. One difficulty however in determining the actual market value of a company lies in the inability of estimating the value of illiquid assets such as real estate which is dependent on valuator's. Market values are dynamic in nature because they depend on a variety of factors, from physical operating conditions to economic climate to the dynamics of demand and supply. Market value can vacillate a great deal over periods of time and is largely

influenced by the business cycle. Market values plunge during the bear markets that accompany recessions and rise during the bull markets that happen during economic expansions.

Concept of Stock Market Capitalization

Market capitalization as the total market value of a company's outstanding shares. It is calculated by multiplying the company's share outstanding by the current market price of the share. According to Olson (2015) market capitalization is the price of a stock at any given time multiplied by the current number of shares outstanding. It is the cumulative valuation of the company based on its current share price and the sum of the outstanding stocks. There are various classifications for market capitalization. Olson (2015) identified large-cap companies as those with market capitalization that ranges from \$10 – 100 billion, mid-cap companies \$1 – \$10 billion, small cap companies as ranging from \$100 million - \$1 billion and micro-cap from \$10 million - \$100 million.

Market capitalization is one of the most essential features that enable investors determine the returns and the risk in the share. It also helps the investors choose the stock that can meet their risk and diversification criterion. Stock market capitalization enables investors to know the relative size of a company in relation to another. The downside of using the stock market capitalization metric by investors is that it does not put into consideration the debt profile of the company. Muhammad, Muhammad, Shamila, & Shujahat, (2017) submitted that capital market liberalizations have prompted a sensational growth in global flow. According to them, the world investment report of 2015 said the world foreign portfolio investment stock grew from \$106 billion to \$744 billion.

Concept of Foreign Portfolio Investment Volatility

Portfolio flows consists mainly of liquid assets such as bonds and equity investments which enables investors to dispose their assets more easily and quickly. Giray and Yaman (2010) explain that it is the primary reason why foreign portfolio investments are the hottest and volatile of the major foreign capital inflows. Alder and Mukharaev (2017) in his thesis on capital flows volatility and subsequent financial crises in the emerging economies, tried to find out if there exists a relationship between short term capital surges such as FPI, their volatility and economic disturbances in emerging economies. The research which reviewed secondary data from available journals using conceptual framework such as pull and push analysis of capital inflows, concluded that evidence exists to prove the relationship between the surge episodes of short-term capital inflows and macroeconomic imbalances that lead to financial vulnerabilities.

Kim and Signal (2000) stated that while foreign capital inflows bring in much needed foreign capital to supplement domestic finances to support growth and improve resilience, they expose the economic and financial systems to external shocks. An IMF research into the experiences of managing capital flows into emerging markets revealed that surges of short-term capital inflow such as FPI can lead to macroeconomic disturbances and that they carry risks of financial distress especially for emerging economies with underdeveloped or weak macroeconomic fundamentals (Alder & Mukharaev, 2010). Ostry, Zeshan, Mohammad, and Tanvir (2016) submitted that FPI are volatile in nature and neither do promote long term growth nor share risks with other trading partners. He argued that capital inflow such as FPI increases financial volatility while yielding no significant benefits to economic growth. United Nations Conference on Trade and Development staff paper of 1999 titled Comprehensive Study of the Interrelationship between Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) concluded that volatility of capital flow is marked by high frequency of reversibility of flows or by high variability in the volume of capital inflows. FPI is more volatile than other foreign inflows because investors only have passive investment that they can dissolve in a short time by selling off their investment in the financial market. Changes in market fundamentals, volatility of stock market, exchange rate and interest rate changes, international capital market liquidity etc., are some factors that induce volatility of foreign investment portfolio.

Empirical Review

Akinmulegun (2018) examined the effect of capital market development on foreign portfolio investment in Nigeria over the period 1985 to 2016. The study employed secondary data sourced from Central Bank of Nigeria Statistical Bulletin and publications of Nigeria Stock Exchange. In order to achieve the objective of the study, the researcher adopted Vector Error Correction Mechanism (VECM) to analyze the short run and long run dynamism of the variables while also focusing on the direction of causality between capital market development and foreign portfolio investment in Nigeria, using granger causality test. The Granger causality test revealed that there is no causality between capital market development and foreign portfolio investment in Nigeria. Result from the vector error correction model indicated that Market Capitalization (MCAP) has negative significant effect on foreign portfolio investment in Nigeria while All Share Index (ASI) has positive relationship with foreign portfolio investment. Therefore, the study concluded that capital market development has significant effect on foreign portfolio investment in Nigeria within the period examined. Muhammad, Muhammad, Shamila and Shujahat (2017) examined the impact of stock market performance on foreign portfolio investment in China. Using quarterly time series data from 2007 to 2015, the study adopted auto regressive distributed lag model. The results of the study showed that stock market performance has significant positive impact on foreign portfolio investment, whereas inflation was negatively associated with foreign portfolio investment. The study further revealed that historical events, such as Asian financial crisis of 2008 and the Shanghai composite Stock Index of 2015, significantly affected foreign portfolio investment in China.

Abel, Ebele and Ndi (2009) examined the relationship between Stock Market Development and Private Investment Growth in Nigeria between 1986 and 2008. Their study adopted Simple-structural Vector Autoregressive approach and ex post facto research design. Their findings showed that development in the Nigerian capital market has contributed to increased foreign portfolio investment volatility. In other words, capital market growth has induced increased inflow of foreign private investment of which portfolio investment is one. Osmond (2016) examined the effect of foreign portfolio investment on industrial growth in Nigeria from 1986 to 2013. Sourcing secondary data from the Central bank of Nigeria, the study employed Ordinary Least Square (OLS) estimation technique to establish the relationship among the included variables. The findings of the study revealed that there is statistically significant positive relationship among foreign portfolio investment, gross fixed capital formation, market capitalization and industrial growth in Nigeria. The study therefore recommended that market capitalization should be expanded in order to stimulate industrial productivity in Nigeria. Baghebo and Apere (2014) attempted to assess the impact of foreign portfolio investment (FPI) on capital market growth in Nigeria between 1986 and 2011. The study adopted three stage methodological processes to ensure proper estimation of the included variables. From the findings of the study, it was discovered that foreign portfolio investment, market capitalization and trade openness have positive long-run relationship with capital market growth in Nigeria within the period of study.

Neoclassical Financial Theory of Investment

The originality of neoclassical theory lies in its notion that innate human nature determines economic outcomes (Wolff & Resnick, 2012). According to this concept, human beings naturally possess the inherent rational and productive abilities to produce the maximum wealth possible in a society. Principally, the neoclassical hypothesis holds that the value of all goods, services, and resources is caused by the interaction between human beings, their wants and productive abilities. Another assumption of the neoclassical theory of investment is that optimal capital accumulation is determined by relative prices of factors of production (Alder & Mukharaev, 2017). This theory of investment explains the causes of fluctuations in investment which are responsible for occurrence of business cycles in a free market economy. Neoclassical theory, explained that competition leads to an efficient allocation of resources within an economy and that it is this resource allocation that establishes market equilibrium between supply and demand. As opposed to Keynesian economics, which states that savings determine investment and is primarily concerned with equilibrium in the market and growth at full employment rather than the underemployment of resources

Jorgenson's (1963) neoclassical model of investment tackles the problem that the accelerator models do not head on (Mohamed, 2015). The Jorgenson model of investment takes account of cost-related variables by making it the explicit basis of the neoclassical investment model optimization behaviour that links the desired level of capital stock to interest rates, taxes and outputs. Investment can be thought of as the optimal adjustment of capital stock in this model. The neoclassical theory assumes optimization behaviour on behalf of the investor. This theory of investment explicitly assumes profit/value maximization. Within this framework, investors achieve the optimal level of capital stock by maximizing discounted profits over infinite time periods. The Neoclassical financial theory of portfolio flows is one of the earliest explanations of foreign portfolio investment. The basis for this explanation lies in interest rate differentials between countries. According to this school of thought, investment moves in response to changes in interest rate differentials between countries, regions and multinational companies which are simply viewed as arbitrageur of capital from countries where its return is low to countries where it is high (Iwedi & Igbani, 2015). The standard neoclassical theory predicts that capital should flow from rich to poor countries (Alfaro, Kalemli-Ozcan & Volosovych, 2005). The assumption is that countries are producing the same goods with the same constant returns to scale production technology using capital and labor as factors of production, and differences in income per capita reflect differences in capital per capita. Thus, if capital were allowed to flow freely, new investments would occur only in the poorer economy, and this would continue to be true until the return to investments were equalized in all the countries. However, in reality, capital moves in both directions across countries. The inability of the model to explain the cross movement of capital between and across countries, is one of the reasons why this theory was disputed. Okoronkwo (2016) stated that contrary to the principle of neoclassical theory, capital flows from emerging markets (where returns are high) to developed markets (where returns are low).

Methodology

Research Design: The research design adopted for this study is the ex-post facto research design. Ex-post facto research design aids the test of hypotheses concerning cause-and-effect relationships; as well as combining theoretical consideration with empirical observation. Kerlinger and Howard (2013) noted that the use of this design allows for the testing of expected relationships between and among variables and the making of predictions regarding these relationships.

The data employed in this research work consist mainly of secondary (monthly) data which are relevant to the study and were obtained from Central Bank of Nigeria Annual Statistical Bulletin (2018) and World Development Indicators (WDI, 2019).

The mathematical relationship is implicitly specified as:

$$FPI = f(SMC, ASI, SMR) \text{-----} (1)$$

Where:

- FPI = Foreign Portfolio Investment
- ASI = All share index
- SMR = Stock market return
- SMC = Stock Market Capitalization

Expressing equation (1) in an explicit form, we have:

$$FPI = \beta_0 + \beta_1 SMC + \beta_2 ASI + \beta_3 SMR + \mu \text{----} (2)$$

The study employed ARCH modelling technique to generate the volatility series of the FPI. Testing for ARCH effects is to help find out if the series in question volatile; and the model for ARCH effects is given as:

$$R_t = \alpha + \delta_1 R_{t-1} + \varepsilon_t; \varepsilon_t \square IID(0, \sigma^2) \text{-----} (3)$$

Where:

R_t is the rate of return of series

ε_t is the heterosedastic error term which is independently distributed with a zero mean and a constant variance (σ^2)

Estimated residual is obtained from equation (3), then the squared of estimated residual is regressed on its lag as follows:

$$\varepsilon_t^2 = \gamma_0 + \gamma_1 \varepsilon_{t-1}^2 + v_t \text{-----(4)}$$

$H_0 : \gamma_1 = 0$, while $H_1 : \gamma_1 \neq 0$

The study however utilised the Exponential GARCH (EGARCH) model developed by Nelson (1991). The model captures asymmetric effects or leverage effects not accounted for in the ARCH and GARCH models. The EGARCH model exhibits better fit and accuracy in the estimation of volatility as compared to other types in the asymmetric GARCH family models (Sokpo, Iorember & Usar, 2017; Ladokhin, 2009).

The general specification of the EGARCH (p, q) model for FPI volatility in the variance equation is given as:

$$\ln FPI_t = \alpha + \sum_{i=1}^p \phi_i \ln FPI_{t-i} + \varepsilon_t \text{-----(5)}$$

$$\ln(\sigma_t^2) = \lambda_0 + \sum_{j=1}^q \lambda_1 \left| \sqrt{\frac{\varepsilon_{t-1}^2}{\sigma_{t-1}^2}} \right| + \sum_{j=1}^q \phi \sqrt{\frac{\varepsilon_{t-1}^2}{\sigma_{t-1}^2}} + \sum_{i=1}^p \theta \ln \sigma_{t-1}^2 \text{-----(6)}$$

λ_0 = is the constant term

λ_1 = is the effect of the conditional shock

θ = Measures the persistent of shocks

ε_t = The random error that is Gaussian in nature implying that the error term is dependent upon itself.

ϕ = The asymmetry effect parameter (If $\phi > 0$, positive shocks (good news) implying that positive shocks increase volatility more than negative shocks (if $\phi < 0$) of the same magnitude; while if $\phi = 0$, there is no asymmetric effect, meaning that the model is symmetric and thus reduces to GARCH (1,1). p is the number of ARCH terms, and q is the number of GARCH terms.

To capture the FPI volatility, the study re-specifies equation (2) as:

$$FPiV = \pi_0 + \pi_1 SMC + \pi_2 ASI + \pi_3 SMR + \varepsilon_t \text{-----(7)}$$

After generating the monthly series of foreign portfolio investment volatility using EGARCH approach, the study proceeds for the empirical analysis. The generated foreign portfolio investment volatility series was factored into the ARDL-ECM equations and estimated separately. The ARDL-ECM of equations (7) is given as:

$$\Delta FPIV_t = \vartheta_0 + \sum_{j=0}^a \vartheta_{1j} \Delta FPIV_{t-j} + \sum_{k=0}^b \vartheta_{2k} \Delta SMC_{t-k} + \sum_{l=0}^c \vartheta_{3l} \Delta ASI_{t-l} + \sum_{l=0}^d \vartheta_{4l} \Delta SMR_{t-l} + \vartheta_{ect} \varepsilon_{t-1} + \psi_t \text{---(8)}$$

Where: Δ is difference operator; ECM (-1) is one period lag of the residual; ψ_0 is the constant term; $\psi_1 - \psi_3$ are respective volatility parameters; and ξ_t is the error term.

Results and Discussions

Testing for ARCH Effects

The study first checked for possible presence of ARCH effect in order to ascertain whether it requires the ARCH estimation method instead of ordinary least square technique. The result of the ARCH test following the procedure of ARCH LM test is captured in Table 1:

Table 1: ARCH Test for Foreign Portfolio Investment

Heteroskedasticity Test: ARCH Test for FPI			
F-statistic	5.21411**	Prob. F(1,128)	0.0471
Obs*R-squared	5.21474**	Prob. Chi-Square(1)	0.0492

Note: ** denote significant at 5% level.

Source: Researcher's Computation Using Eviews-10 (2019)

The results from Table 1 showed that the Null hypotheses of no presence of ARCH effect was rejected at 5% level for as captured by the Obs*R-squared p-values which were found to be less than 0.05. This simply conveys that the variable has a time varying variance (heteroscedasticity) that depends on (conditional) lagged effects (autocorrelation).

E-GARCH Estimates

The presence of the ARCH effect further justified the use of the E-GARCH method for better results. In examining the determinants of FDI and FPI volatility, the Exponential Generalized Autoregressive Conditional Heteroscedasticity E-GARCH) volatility model introduced by Nelson (1991) was employed.

Table 2: EGARCH (1,1) model for the FPI

Dependent variable: LOG (FPI)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Mean Equation				
C	1.921371**	0.795134	2.416411	0.0157
LOG(FPI(-1))	0.887647*	0.040822	21.74445	0.0000
Variance Equation				
C	1.039765*	0.323965	3.209502	0.0013
RESID(-1)/@SQRT(GARCH(-1))	-0.625199*	0.145943	-4.283869	0.0000
EGARCH(-1)	0.12749	0.241838	0.52717	0.5981

Note: *, ** and *** denote significant at 1%, 5% and 10% level.

Source: Researcher's Computation Using Eviews-10 (2019)

From the results in Table 2, it could be observed that the constant coefficient in the mean equation which was found to be 1.039765 and it was found to be statistically significant. The mean equation also showed that the coefficient of the lagged variable for FPI had positive and significant impact on FPI. From the variance equation it could be seen that the time varying volatility has a constant value of 1.039745. The constant parameter estimates in the variance equation met the *a priori* expectations of been positive and statistically significant. The coefficient of the term RESID (-1)/@SQRT(GARCH (-1)) for the FPI model is negative and statistically significant. The significant level indicates the presence of asymmetric effect in the volatility series of FPI. The value of -0.625199 met the *a priori* expectation in which the coefficient value has to lie between 0 and 1, thus showing that model is not explosive. In addition, the coefficient of the term RESID (-1)/@SQRT(GARCH (-1)) is negative and statistically significant implying that negative shock (bad news) generate more volatility in FPI than positive shock (good news). The coefficient of 0.12749 in the EGARCH model, which is positive and insignificant indicates that positive shocks increases the volatility of FPI-model more than negative shocks of the same magnitude. The insignificant value further shows absence of volatility clustering.

Descriptive Statistics

The descriptive statistics gives the study a good idea of the patterns in the data used for the analysis.

Table 3: Descriptive Statistics Results

Statistic	SMC	SMR	ASI	FPIV
Mean	9066.330	13054.97	32597.22	0.193806
Std. Dev.	2516.458	8073.884	10654.46	1.858603
Skewness	0.138805	0.840551	1.084584	-1.03796
Kurtosis	1.989605	2.370025	3.473989	21.29076
Jarque-Bera	5.947313	17.45776	26.70391	1835.499
Probability	0.051116	0.000162	0.000002	0.000000
Observations	142	142	142	142

Source: Authors Computation, 2019 (Eviews-10)

From the descriptive statistics results in Table 3, it could be observed that among the stock market development variables, ASI has the highest mean value of 32597.22 billion. This was followed closely by SMR with a mean value of 13054.97; while SMC has a mean value of 9066.330 billion. With respect to foreign portfolio investment volatility has a mean value of 0.193806. The analysis was also fortified by the value of the skewness and kurtosis of all the variables involved in the model. Three variables, SMC, ASI and SMR were found to be positively skewed, while FPIV was found to be negatively skewed. Variables with value of kurtosis less than three are called platykurtic (fat or short-tailed), SMC, and SMR variables qualified for this during the study period. On the other hand, variables whose kurtosis value is greater than three are called leptokurtic (slim or long tailed); ASI and FPIV, variable qualified for this during the study period. Jarque-Bera test shows that SMC, SMR and FPIV are not normally distributed as their probability values were found to be less than 5%. However, only SMC was found to be normally distributed. In summary, the descriptive statistics revealed that on the average, the data sets are not normally distributed.

Unit Root Test Results

Time series data are generally characterized by stochastic trend which can be removed by differencing. Unit root test therefore is a test of stationarity or non-stationarity of series data used in the model. This is to find out if the relationship foreign portfolio investment volatility and capital market development in Nigeria are spurious or nonsensical. The null hypothesis is that the variables are non-stationary meaning that there is a presence of unit root. A variable is said to be non-stationary if its test statistics is less than its critical value at various levels of significance when considered in its absolute value. Thus, this study used or adopted Augmented Dickey-Fuller (ADF) Techniques to test and verify the unit root property of the series and stationarity of the model as captured in Table 4.

Table 4: Summary of Unit Root Test Results

Variable	Order of Integration	ADF Test Statistics	Critical ADF Test Statistics
SMC	I(1)	-9.887641	-4.030157*
SMR	I(1)	-8.156423	-4.031899*
ASI	I(1)	-10.31491	-4.030157*
FPIV	I(0)	-14.84043	-4.030157*

Note: MacKinnon critical values for the rejection of hypothesis of unit root are in parenthesis in Columns 1 and 2 and the tests include intercept with trend; * significant at 1%; Mackinnon critical

Source: Authors Computation, 2019 (Eviews-10)

From Table 4, it could be observed that FPIV variable was found to be stationary at levels, that is, they are integrated at order zero {I(0)} and at 1% level of significance. However, SMC, SMR and were all found to be stationary at first difference; that is integrated at order one and at 1% level of significance. At this order of integration, their ADF test statistics, -9.887641, -8.156423 and -10.31491 were greater than the critical test statistics of (-4.030157, -4.031899, and -4.030157 at 1% significant level respectively. Since all the

variables were found to be stationary at different orders, it was safe for the study to employ ARDL bound test approach to validate or test for the presence of Co-integration.

Optimal Lag Length Test

Appropriate lag length criteria was examined by the study and this was necessary in order to check the sufficient lags that was included in the ARDL; as much lags could lead to a waste of the degrees of freedom while too few lags could result to autocorrelation in the residuals as well as a potential misspecification of the equations. The results are presented in Table 4 where all the selection criterion (FPE, AIC, HQIC and SBIC) recommended four (4) lags.

Table 5: Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-784.581	NA	6.12e+13	48.79871	49.08160	52.12130
2	-652.779	2451.7345	4.20e+10	41.15717	43.13739	43.77735
3	-411.149	98.14358	5.64e+09	38.63095	42.30851	49.78272
4	-532.39	66.31662*	6.95e+08*	35.68205*	41.05694*	32.36540*

Note: * indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error; AIC: Akaike information criterion

SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

Source: Authors Computation, 2019 (Eviews-10)

Cointegration Results

It is important to ascertain if they have long-run associationship among the variables after conducting the stationarity test. Thus, to determine whether linear combination exists among our variables, bound test approach was employed. Pesaran and Shin (2001) showed that cointegrating systems can be estimated using bound test, with the advantage that the variables in the specified model can either be I(0) or I(1) or a combination of both; and without needing to pre-specify which are I(0) or I(1). Table 3, thus presents the bounds test co-integration results.

Table 6: Results of Cointegration Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.11519	10%	2.37	3.2
k	3	5%	2.79	3.67
		1%	3.65	4.66

Source: Authors Computation, 2019 (Eviews-10)

From Table 6, the calculated F-Statistic that the joint hypothesis that the lagged level variable of the coefficients is zero equals 5.11519. This figure is greater than the upper and lower bound of the critical values of the conventional level of 5%. This means that joint null hypothesis of all the lagged level variables of the coefficients being zero is rejected. This suggests that there is a cointegration between FPIV and capital market development (CMD) and hence there is a long run relationship.

Estimation of Results and Test of Hypotheses

Table 7: ARDL Regression Result

Dependent Variable: D(FPIV)

Variable	Coefficient	t-Statistic	Prob.*
C	5.094861	0.619694	0.5366
D(FPIV(-1))	-0.51123	-5.90275	0.0000
D(FPIV(-2))	-0.37056	-3.85272	0.0002
D(FPIV(-3))	-0.14615	-1.56016	0.1212
D(SMC)	-0.09642	-1.15516	0.2502
D(SMC(-1))	3.41786	2.07499	0.0400
D(ASI)	4.035585	1.185123	0.2382
D(ASI(-1))	-9.60400	-2.23597	0.0271
D(SMR)	5.390599	1.830288	0.0695
D(SMR(-1))	-3.63350	-4.98710	0.0000
ect(-1)	-0.12437	-8.11109	0.0000
R-squared	0.728512		
Adjusted R-squared	0.581298		
F-statistic	6.957935		
Prob(F-statistic)	0.000000		
Durbin-Watson stat	2.06028		

Source: Authors Computation, 2019 (Eviews-10)

As expected, the lagged error correction term (ect) is negative, less than unity and statistically significant at 5 percent. The coefficient of -0.12437 revealed that once there is disequilibrium in the system, it takes an average (high) speed of 12.437% to adjust itself back towards long-run equilibrium level.

The R^2 (R-square) value of 0.7285 shows that CMD variables have a very good impact on FPIV. It indicates that about 72.85 per cent of the variation in FPIV is explained by CMD variables, while the remaining unaccounted variation of 27.15 percent is captured by the error term.

The Durbin Watson (D.W) statistics of 2.06 as it is significantly within the bench mark of 2; thus, we can conclude that there is no auto- correlation or serial correlation in the model specification; hence the assumption of linearity between error term and independent variables is not violated.

Statistical Test of Hypotheses

The three hypotheses formulated in this study were tested using the Wald-F-statistics. The F-statistics is a test of the overall significance of the entire variables used in the regression model; it is used to denote whether the joint impact of the explanatory (exogenous/ independent variables) actually have a significant influence on the dependent variable.

Decision Rule: The decision rule for accepting or rejecting the null hypothesis for any of these tests will be based on the Probability Value (PV). If the PV is less than 5% or 0.05 (that is, if $PV < 0.05$), it implies that the regressor in question is statistically significant at 5% level; otherwise, it is not significant at that level.

Hypothesis One

(H₀₁): Stock market capitalization has no significant impact on foreign portfolio investment volatility in Nigeria.

Table 8: Results of Stock Market Capitalization and Foreign Portfolio Investment volatility in Nigeria

Test Statistic	Value	Df	Probability
F-statistic	2.474625	(2, 128)	0.0882
Chi-square	4.949250	2	0.0842

Source: Authors Computation, 2019 (Eviews-10)

The Wald-test in Table 8 indicated that the calculated F-value for Stock market capitalization is 2.474625 and its probability value is 0.0882. Since the probability value is greater than 0.05 at 5percent level of significance, it thus falls in the acceptance region and hence, the first null hypothesis (H_{01}) was accepted. The result thus shows that stock market capitalization has no significant impact on foreign portfolio investment volatility in Nigeria.

Hypothesis Two

(H_{02}): All Share Index has no significant impact on foreign portfolio investment volatility in Nigeria.

Table 9: Results of All Share Index and Foreign Portfolio Investment volatility in Nigeria

Test Statistic	Value	df	Probability
F-statistic	6.582439	(2, 128)	0.0495
Chi-square	7.164879	2	0.0456

Source: Authors Computation, 2019 (Eviews-10)

The Wald-test result in Table 9, indicated that the calculated F-value for All Share Index was found to be 6.582439 and its probability value is 0.0495. Since the probability value is less than 0.05 or 5percent level of significance, it fell in the rejection region and hence, we rejected the second null hypothesis (H_{02}) and conclude that All Share Index has a significant impact on foreign portfolio investment volatility in Nigeria.

Hypothesis Three

(H_{03}): Stock market value of stocks has no significant impact on foreign portfolio investment volatility in Nigeria.

Table 10: Results of Stock Market Return and Foreign Portfolio Investment volatility in Nigeria.

Test Statistic	Value	Df	Probability
F-statistic	13.66588	(2, 128)	0.0000
Chi-square	27.33176	2	0.0000

Source: Authors Computation, 2019 (Eviews-10)

The Wald-test result in Table 9, the indicate that the F-value for Stock market return was found to be 13.66588 and its associated probability value is 0.0000. Since the probability value is less than 0.05 or 5percent level of significance, it falls in the rejection region and hence, we reject the third null hypothesis (H_{03}). The conclusion here is that stock market return has a significant impact on foreign portfolio investment volatility in Nigeria.

Discussion of Findings

The study revealed that stock market capitalization has no significant impact on foreign portfolio investment volatility in Nigeria. The implication of this result is that information asymmetries that exists within capital market operations, as well as the unpredictability of the activities of the Nigerian capital markets hugely contributes insignificantly to volatilities of foreign portfolio investment. This result is contrary to the finding of Muhammad, Muhammad, Shamila and Shujahat (2017) on China, which

submitted that capital market development has significant positive impact on Foreign Portfolio Investment. However, findings from the study showed that all Share Index has a significant impact on foreign portfolio investment volatility in Nigeria. This means that an increased all share index due to listing of shares enhances the inflow of foreign portfolio investment in Nigeria. This is in agreement with Akinmulegun (2018) whose study showed that All Share Index (ASI) has positive relationship with foreign portfolio investment; and concluded that capital market development has significant effect on foreign portfolio investment in Nigeria. Lastly, the study revealed that stock market return has a significant impact on foreign portfolio investment volatility in Nigeria. This significant impact implies that increase in effective capital market activities has hugely impacted significantly on predictable foreign portfolio inflows within the period under review. This is in-line with the findings of Abel, Ebele and Ndi (2009), whose study showed that development in the Nigerian capital market has contributed to increased foreign portfolio investment. In other words, capital market development has induced increased inflow of foreign private investment of which portfolio investment is one. The significant impact of the capital market development indicators (ASI and SMR) corroborates the fact that capital market development is an important determinant for the inflow of foreign portfolio investment into Nigerian economy.

Conclusions

This study examined the impact of capital market development on foreign portfolio investment volatility in Nigeria between 2007 and 2018. It was found from the study that capital market development indicator included in this study, stock market capitalization (SMC), have an insignificant impact on foreign portfolio investment volatility in Nigeria. However, All Share Index (ASI) and stock market return (SMR) exhibited a positive and significant impact on foreign portfolio investment volatility. The study thus concludes that capital market development through ASI and SMR have significant impact on foreign portfolio investment volatility in Nigeria within the period under study.

Recommendations

Based on the findings from the study, the following recommendations were made:

1. Based on these findings, the study recommends that government and capital market regulatory authorities need to develop and implement proper policies that will propel better performance of the capital market through fiscal responses that makes the real sector attractive for investment thereby increasing listing on the exchange that drives up the All Share Index of the Market as it impacts the volatility of foreign portfolio investment in the Nigerian economy.
2. There is also the need for capital market regulatory authorities to implement effective and efficient policies that ensures free flow of market information related to all share index and stock market Returns that exists within the floor of the capital market to prevent information asymmetries which could create volatility clustering in foreign portfolio investment in the country.
3. There is also the need for the monetary authorities to take steps to mitigate the crowding out effect of government borrowings that tends to distort the delicate balance of money and capital market returns. Since it has been demonstrated that the SMR empirically impacts the net retention of FPIs in the market hence positively impacting on the economy, participating foreign investors in the capital market must by deliberate policy formulation and market conditioning encouraged to ensure net inflows even with the volatilities and sensitivities of the FPI.

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