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Capital Inflows and Macroeconomic Dynamics in Nigeria: An Empirical Review

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Authors' contributions

Both the authors designed, analyzed and interpreted, and prepared the manuscript; and also read and approved the final manuscript.

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ABSTRACT

This study applied annual data of capital flows and macroeconomic variables in the Nigerian economic environment, for a period of twenty-nine (29) years. The data were collated from the Central Bank of Nigeria statistics database, and the E-views8 statistical software was used to run the analysis. Our empirical findings from the Unit root test gave evidence of the stationary nature of the variables in their first differences at 5 percent level of Significance. The Johansen co-integration test also show that a long run equilibrium link exist among the variables. Furthermore, the granger causality test indicate both uni-directional and bi-directional causation amongst the variables. Uni-directional causality exists from interest rate (logINT) to foreign portfolio investment (logFPI); and inflation rate (logINF) to foreign exchange rate (logFEXR). Bi-directional causality exists from logINF to logINT and logINT to logINF. This goes to show that Interest rate affects Foreign Portfolio Inflows, and an upsurge in Foreign Exchange is due to Inflationary pressures; which also affects Interest rates. The study recommends that the Central Bank of Nigeria should put in place specific and appropriate fiscal and monetary policies to curb the rising exchange rate that affects the productive sectors of the economy. From the analysis, a rise in foreign exchange rate affects capital flows negatively which is not good for an optimal stock market performance. If checks and balances are well structured, then fluctuations in inflation rate, interest rate and foreign

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exchange rate will be minimal. Secondly, the study proves that when interest rate is to be fixed for economic activities, it has a signaling effect and thus there are swings in both inflation and interest rates; as investors will start rebalancing their portfolios more frequently. Thus, the government can check this by making their institutions stronger.

Keywords: Foreign portfolio investment; inflation; interest rate; foreign exchange rate.

1. INTRODUCTION

The normal neo-classical philosophy of growth envisages that the inflow of resources starts from developed countries to developing countries [1]. In recent years, there has been an increase in the flow of international capital, due to some factors like economic integration, financial markets liberalization, and technological advancement. It is now obvious that given the vicious cycle of poverty, emerging economies like Nigeria can progress to steady state economic growth by relying significantly on inflow of foreign capital. Basically, foreign capital inflow refers to transfer of monetary capitals from one nation to another, thereby enhancing the growth of its economy as well as the development of the holding country. The host country is typically constrained by low domestic savings and investment [2]. Foreign capital inflows can be decomposed into authorized development assistant, trade credits and overseas private flows. Foreign private investment is the stock of physical assets and financial securities held in one country by investors of another country. While the former is called foreign direct investment, the latter is called foreign portfolio investment. FDI is usually seen as the international investment of multinational companies. Foreign funds inflows are predisposed to a collection of issues which comprises of the constancy or else of macroeconomic fluctuations, socio-political factors, exploitation and insecurity [3].

Generally, Nigeria as an emerging economy has benefitted from capital influxes. However, Nigeria's part in international inflows is infinitesimal when contrasted with the net private inflows for unindustrialized nations. In the 80's capital inflows took the shape of foreign direct investment and foreign portfolio investment. Though foreign portfolio investing is mostly obtainable in advanced markets, it is turning out to be a very significant constituent of the balance of payments of several promising countries for example Brazil, India, South Africa, China, Singapore, Hong Kong and Taiwan [4]. Lately portfolio investments have exhibited much

importance in the Nigerian economy. This is due to the globalization of the nation's moneys and capital clientele as well as the exposure of statistics on portfolio investment of Nigerian investment climate in foreign financial markets [5]. Although huge capital inflows may well stimulate economic growth; this could also bring forth destabilizing effects in the country, if not well managed. The undermining consequence of the foreign capital inflow has stimulated concern over their possible influences on macroeconomic stability, the attractiveness of the export section, and the feasibility of the external sector. The greatest critical chances are that they drive inflationary levels and the real effective exchange rate to untenably abnormal levels [6]. This is supported by [7,8,9,10].

An analysis of capital inflow into the country have further shown that merely some degree of multinationals or their affiliates have prompted foreign direct investments in the country. In addition to this drawback of inadequate influx of FDI is the incapability to preserve the FDI which has previously come into the country. This limited number which is a major source of capital inflow may possibly be hunt down to several dynamics comprising of insufficient physical and societal infrastructure, slippages in fiscal and monetary strategy, exchange rate variability, depleted level of domestic savings, low level of home-grown expertise, insistent inflationary pressures as well as an unpredictable government. For instance, prior to the consolidation reform in the banking sector, Nigerian banks were not considered very healthy to attract foreign portfolio investments as a result of poor rating. The capital market and other institutional policies also affect negatively the inflow of foreign portfolio investments [11]. This led to an insecure operating setting which can be ascribed to the reason Nigeria was not only inept to attract capital inflows. As such, notwithstanding the massive investment prospects in oil and gas, commerce, agriculture, industry, and infrastructure, not much foreign investment capital was drawn compared to other emerging countries and areas striving for international investment capital. It is on this platform that we intend to investigate the impact

of capital inflows on macroeconomic variables in Nigeria. Specifically, we want to examine the extent to which inflation rate, exchange rate, and interest rate have influenced foreign portfolio investments. The study contributes to knowledge by giving valuable information to policy makers and foreign investors who intend to invest in the Nigerian stock exchange; and to already existing investors on how to minimize their risk exposure. Additionally, it employed appropriate methodology and an up-to-date data from a reputable statistical database of the Central Bank of Nigeria for the period 1986-2014; to solve the problem of inconsistency and contradictions associated with previous studies on how portfolio inflows (short term and long term debt and equity securities) can be affected by basic macroeconomic fundamentals.

The remainder of this study will include the following: section 2 gives empirical literatures on how macroeconomic variables impact on capital inflows. Section 3 elaborates on sources of data and statistical techniques that will be used to analyze the data. Section 4 explains the empirical results and section 5 makes the conclusions and recommendations.

2. EMPIRICAL REVIEW OF MACRO-ECONOMIC VARIABLES ON CAPITAL INFLOWS

The relative importance of Capital inflows to an emerging economy like Nigeria has been credited to the effectual responsibility of the Nigerian capital market in 1993 which compelled the Federal government to internationalize the market in 1995, with the retraction of laws that inhibited foreign participation in the market. Following the annulment of the Exchange Control Act of 1962, non-nationals can now partake in the activities of the Nigerian capital market both as operatives and stockholders [12]. Therefore, from the time when the Nigerian stock exchange was internationalize, which is the position of the financial liberalization program of Nigeria, there has been improvement in the inflow of foreign portfolio investments into the Nigerian economy via the capital market. Before 1966, capital inflows to Nigerian were predominantly foreign direct investments, Official Development Assistance and bank loans. Nevertheless, from 1986 there was a modification in what constitutes private capital flows to Nigeria. Foreign portfolio investment seems to have seized the focus and its portion of private capital flows to Nigeria exhibits an increasing tendency even though at

the same time, official flows and bank loans have been sinking in actual terms. Accordingly, FPI (equity and bond) has improved histrionically over the previous twenty years that by the base of 2009-2010 it exceeded all other type of capital inflows into Nigeria. Institutional investors have not only enlarged their stock of companies registered on the stock market, but have also began to invest more in new emerging and developed markets [13].

There are a lot of empirical documentation with divergent views on how macroeconomic variables have impacted on capital inflows: Knill [14] examined the impact of foreign portfolio investments on undersized firms and observes that it assists in bridging the disparity between the amount of funding small corporations need and that which they will be able to access by means of the capital markets. Precisely, FPI is associated with an upsurge in the ability to originate publicly traded securities for small companies in all nations, irrespective of property rights development. Agarwal [15] explored the determining factors of foreign portfolio investment (FPI) and its influence on the national economy in six emerging Asian countries. The outcome of the regression shows that index of economic activity, real exchange rate, the share of domestic capital market in the world stock market capitalization and inflation rate are four statistically significant contributing factors of FPI. Concerning the influence of FPI on the national economies, it was found that the index of economic activities and inflation rate demonstrate a rising trend. Furthermore, uncertainty in portfolio flows has not improved overtime and the proportion of foreign debt and debt servicing to gross domestic product (GDP) has deteriorated. But the rule of thumb as regards the question of sustainability of FPI proposes that Indonesia and India have crossed the higher limits of allowable debt ratios. Rai and Bhanumurthy [16] investigated the determinants of foreign institutional investments in China, which have spanned almost US\$12 billion by the remainder of 2002. Taking into consideration the huge capacity of these flows and its effect on other national financial markets, identifying the behaviour of these flows happens to be extremely imperative at the time of liberalizing capital account. Employing monthly data in the study, they found that foreign inflows hinges on returns from the stock markets, ex-ante risk and inflation rate. In terms of significance, ex-ante risk and stock market returns set out to be the key determinants of FPI inflow. The analysis did

not observe any causality flowing from FPI inflow to stock returns as it was observed by certain studies. Reducing ex-ante risk and stabilizing the volatile stock market would aid in drawing more FPI inflow that has optimistic influence on the real economy. Kanayo and Emeka [17] examined the existing relationship between foreign private capital constituents such as foreign portfolio inflow (FPI), gross domestic product (GDP), foreign direct investment (FDI) and some macroeconomic variables like inflation rate, interest rate, as well as policy implications; using time series data from 1986-2008. The Structural Vector Autoregressive analysis and Vector Autoregressive model shows that the response of the GDP to shocks from the FDI is not concurrent and this is valid to other variables in the study. It is rather slow but reverts more rapidly to equilibrium when compared to the response from FPI. Constricting the Recursive Cholesky Structural decomposition of the IRF, both in the short and long run, the outcome signifies that the FPI does influence the GDP in the short run, while the FDI doesn't. Also, Interest rate was proven to impact on the FPI in the short-run. In the long-run, GDP exhibits more response to the impact of the FPI when put side by side the FDI while the FPI responds to Interest rate. Chukwuemeka [18] examined the determinants of foreign portfolio investment using time series data from 1986-2006. The result found that foreign portfolio investment is clearly linked to real rate of return on investment in the capital market, investment and real interest rate but adversely interrelated to institutional quality, real exchange rate, degree of trade openness and market capitalization in Nigeria. Karimo and Tobi [19] investigated macroeconomic uncertainty and foreign portfolio investment unpredictability in Nigeria using quarterly data from 1986-2011. The method utilized was LA-VAR Granger causality test and it was found that real gross domestic product, interest rate, inflation rate and real exchange rate were highly volatile and responded asymmetrically to information shocks. Onuorah and Eze [20] investigated the impact of macro-economic variables on foreign portfolio investments in Nigeria for the period 1980-2010. Time series data were obtained from the World Bank statistics databank. Employing the Phillip-Peron regression analysis at lag 3 the results exhibited a co-integrating relationship between the variables. Among the variables used for the study, money supply (MS) and GDP had an indirect relationship with FPI while inflation rate, exchange rate and Interest Rate, were clearly

linked to FPI. In addition, the Granger causality outcome shows that the macroeconomic variables do not granger cause FPI as they proved to be statistically insignificant. Also, no long run or short run relationship exists between interest rate, exchange rate, foreign portfolio investment, GDP, MS and inflation rate. The study recommended that outstanding macroeconomic policy implementation and domestic investments strategic blueprint should be made which will improve effective and optimum investments holding and supervision and at the same time giving significant consideration to the growth of infrastructures, and employment generation in the country. Anayochukwu [21] investigated the impact of stock returns on foreign portfolio investment in Nigeria using annual time series data. The result indicates that foreign portfolio investment has positive and significant impact on stock returns while the rate of inflation has positive but insignificant impact on stock market returns. The causality test shows that there is a uni-directional causality flowing from stock market returns to foreign portfolio investment in the Nigerian economy for the period under review. Waqasa et al. [22] examined the volatile nature of foreign portfolio investments due to macroeconomic factors in four South Asian countries like Sri Lanka, India, Pakistan and China; using end-of-the month data for the period 2000-2012. Employing the Garch (1, 1) model, they find that a significant relationship exist among the variables. According to them, when instability in international portfolio flows is few, it is as a result of upsurge in interest rate, foreign direct investment, currency devaluation, reduced inflation and rise in the growth rate of the GDP.

3. DATA AND METHODS

The aim of this study is to examine the impact of macroeconomic variables on capital inflows to the Nigerian economy. Specifically, it intends to examine how long term and short term debt and equity portfolio investments are being affected by macroeconomic indicators such as interest rate, inflation rate and foreign exchange rate. The statistics for this research paper are secondary in nature and are obtained from the Central Bank of Nigeria statistical periodical for the period 1986-2014; giving a total of 29 years. The technique used is the Ordinary Least Square estimation; and the E-views 8 statistical software [23] was employed to properly analyze our data. All the variables will be subjected to the ADF unit root test [24] in favor of stationarity of the series; as

well as the Johansen test for co-integration [25]. The co-integration check is done to establish whether a long run equilibrium correlation is present amongst the variables. In addition to this, a Granger test of causality [26] will be carried out to examine if macroeconomic variable causes capital inflows or vice versa. We also employed logarithms to the data because cyclical and curve linear relationships exist in variables. The logged data will allow for precision, robustness of estimates, goodness of estimates and a tolerable level of multicollinearity.

Table 1. Data for the variables of Foreign Portfolio Inflows (FPI), Foreign Exchange Rate (FEXR), Interest Rate (INT), and Inflation Rate (INF) in Nigeria for the period 1986-2014

Year	FPI	EXRT	INF	INT
1986	151.6	2.020575	5.39	10
1987	4353.1	4.017942	10.18	12.75
1988	2611.8	4.536733	54.47	12.75
1989	11618.8	7.391558	50.47	18.5
1990	435.2	8.037808	7.5	18.5
1991	592.9	9.909492	12.7	14.5
1992	36851	17.29843	44.81	17.5
1993	377	22.05106	57.17	26
1994	-203.5	21.8861	57.03	13.5
1995	-5785	21.8861	72.81	13.5
1996	-12055.2	21.8861	29.29	13.5
1997	4785.8	21.8861	10.67	13.5
1998	-637.5	21.8861	7.86	14.31
1999	1015.7	92.69335	6.62	18
2000	51079.1	102.1052	6.94	13.5
2001	92518.9	111.9433	18.87	14.31
2002	24789.2	120.9702	12.89	19
2003	2355.5	129.3565	14.03	15.75
2004	23541	133.5004	15.01	15
2005	116035	132.147	17.85	13.3
2006	360291.6	128.6516	8.24	12.25
2007	332547.8	125.8331	5.38	8.75
2008	157157.2	118.5669	11.6	9.81
2009	70938.5	148.8802	11.5	7.44
2010	556585.1	150.298	13.7	6.13
2011	792360.2	153.8616	10.8	9.19
2012	2687233	157.4994	12.2	12
2013	2130180	157.3112	8.5	12
2014	832392	158.5526	8.05	12.25

Source: CBN statistical bulletin [27]

Based on the objective of the study, the operational outline of our model is specified as:

$$\text{LogFPI}_t = f(\text{interest rate, exchange rate, inflation rate}) \quad (1)$$

The econometric form is specified as:

$$\text{LogFPI}_t = \alpha + \beta_1 \text{INT}_t + \beta_2 \text{REER}_t + \beta_3 \text{INF}_t + \mu_t \quad (2)$$

Where;

- LogFPI_t = Logarithm of foreign portfolio investment at time t
- INT_t = Interest rate at time t
- EXRT_t = Real effective exchange rate at time t
- INF_t = Inflation rate at time t
- α = The intercept
- β₁, β₂, β₃ = Parameter estimates
- μ_t = Uncorrelated stochastic error term at time t

1. **Foreign portfolio investment (FPI)** means investment made by foreign investors in another country's financial assets such as treasury bills, government bonds and stock of companies.
2. **Exchange rate** is the rate at which one country's currency is exchanged for another. An increase in exchange rate will make investors not to make portfolio investments because it will bring about reductions in profit. Thus there is an inverse relationship between FPI and Exchange rate.
3. **Interest rate** is the rate paid to lenders by borrowers of funds. When interest rate is high, more FPI's will be attracted to that country. Thus, investors are endeared to markets that offer high interest rate. This shows a positive and significant relationship between FPI's and Interest rates.
4. **Inflation rate.** Inflation is the general rise in price levels of goods and services. An increase in inflation undermines an investor's rate of return on his investment; and this deters him from making further investments. Thus, there is an inverse relationship between inflation and FPI.

4. RESULTS AND DISCUSSION

A pictorial plan of data is typically the principal stage in the examination of any time series [28]. Fig. 1 displays individual time plots of the variables of logFPI, INT, INF and EXRT; and this gives an insight on trend patterns during the sample period. From the graph LogFPI had negative but very high upward volatilities which are consistent with the flow of transactions in the Nigerian capital market. EXRT demonstrate a consistent growing trend with fairly less swings over the years, INT has large volatilities as well

as INF. These instabilities arise from the macroeconomic environment as a result of changes in government programs like inflation, interest rates, expenditures etc.

The Table 2 below shows a descriptive summary of the variables. The mean of logFPI, INT, INF and EXRT is 10.21134, 13.70655, 20.77690 and 79.54706. The low standard deviation of the series vis-à-vis their mean suggest that the series are clustered around the mean. LogFPI and INT have a very low standard deviation of 2.884732 and 3.999878 from its mean, thus, evidencing low volatility in the macroeconomic environment. The Jarque-Bera test is a goodness-of-fit test and shows that the p-values of the individual variables: 0.503727, 0.055682, and 0.146566 are insignificant at the 5% level. Accordingly, the series do follow a normal distribution, but INF is significant.

In Table 3, we present the Augmented Dickey Fuller Unit Root test to examine how the variables are integrated and if they are stationary. From the empirical analysis, we find that at the 5% level of significance, all the variables were stationary in their first difference. We therefore reject the null hypothesis that there exists a unit root.

In Table 4, the Johansen co-integration test indicates that there exist two (2) co-integrating equations at the 0.05 percent level of significance. This is because both the trace statistic and max-eigen statistic of the variables are clearly more than their 5 percent critical level. Hence, we can say that there is a very strong justification of a long run equilibrium relationship among the variables under study.

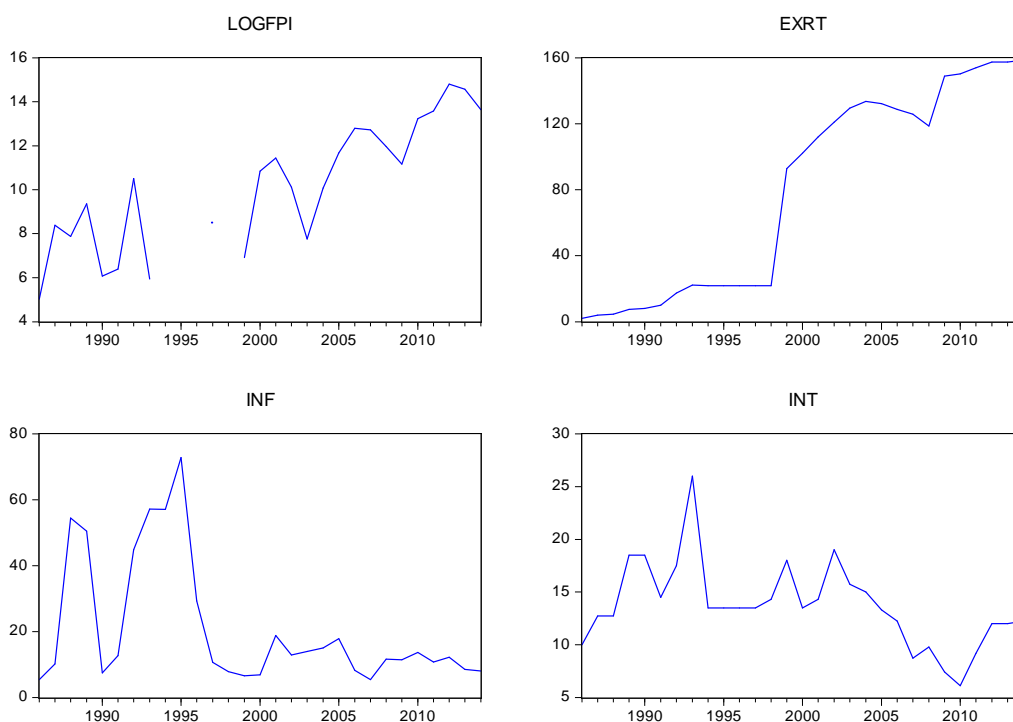


Fig. 1. Graphical analysis of the logFPI, INT, INF and EXRT
 Source: Author's E-views8 computation

Table 2. A descriptive analysis of the variables

	LOGFPI	INT	INF	EXRT
Mean	10.21134	13.70655	20.77690	79.54706
Std. Dev.	2.884732	3.999878	19.38167	62.01920
Jarque-Bera	1.371440	5.776189	10.18345	3.840562
Probability	0.503727	0.055682	0.006147	0.146566

Source: Author's E-views8 computation

Table 3. Unit root test of stationarity

Variables	ADF			Order of integration
	Critical values @5%	t- statistics	Prob.	
logFPI	3.144920	3.447119	0.0305	1(1)
INT	3.012363	3.949603	0.0070	1(1)
INF	2.998064	3.559713	0.0153	1(1)
EXRT	2.976263	5.003944	0.0004	1(1)

Source: Author's E-views8 computation

Table 4. Johansen test of cointegration

Variables	Max-eigen statistic	Trace statistic	0.05 critical values	P-values
LogFPI*	112.0479	146.6922	27.58434	0.0000
EXRT*	27.33271	34.64432	21.13162	0.0059
INF	6.439377	7.311614	14.26460	0.5575
INT	0.872237	0.872237	3.841466	0.3503

* denotes rejection of the hypothesis at the 0.05 level

Source: Author's E-views8 computation

In Table 5, the granger causality test indicate both uni-directional and bi-directional causality among the variables. Uni-directional causality exists from INT to logFPI; EXRT to INF; and INT to INF. Bi-directional causality exist between INF to logFPI and logFPI to INF. This goes to show that Interest rate affects Foreign Portfolio Inflows, and an upsurge in Foreign Exchange is due to Inflationary pressures; which is also affected by Interest rates. In addition, foreign portfolio investments have an inverse relationship with

inflation rate. For a proper investing climate, an investor takes into consideration the degree of inflation. This supports our apriori expectation that an increase in inflation undermines an investor's rate of return; and is consistent with the findings of [15] that inflation is a contributory factor to FPI as it demonstrates a rising trend. Also, [17] proved that interest rate impacted on FPI but in the short-run. However, [18,20] is of the opinion that exchange rate is interrelated with FPI; which contradicts our findings.

Table 5. Granger causality test

Pairwise granger causality tests

Date: 02/29/16 Time: 16:33

Sample: 1986 2014

Lags: 2

Null hypothesis:	Obs	F-statistic	Prob.
EXRT does not Granger Cause LOGFPI	20	3.63261	0.0517
LOGFPI does not Granger Cause EXRT		0.14403	0.8670
INF does not Granger Cause LOGFPI	20	3.72117	0.0487*
LOGFPI does not Granger Cause INF		12.2835	0.0007*
INT does not Granger Cause LOGFPI	20	10.2975	0.0015*
LOGFPI does not Granger Cause INT		1.95521	0.1760
INF does not Granger Cause EXRT	27	2.23232	0.1310
EXRT does not Granger Cause INF		3.76171	0.0393*
INT does not Granger Cause EXRT	27	0.23503	0.7925
EXRT does not Granger Cause INT		2.13197	0.1425
INT does not Granger Cause INF	27	3.60949	0.0441*
INF does not Granger Cause INT		2.20336	0.1342

*indicates significance @ the 0.05 level

Source: Author's E-views8 computation

5. CONCLUSION, RECOMMENDATION AND LIMITATIONS

This study applied annual data of capital flows and macroeconomic variables in the Nigerian economic environment, for a period of twenty-nine (29) years. The data were collated from the Central Bank of Nigeria statistical database, and the e-views8 statistical software was used to run the analysis. Our empirical findings from the unit root test gave evidence of the stationarity of the variables in their first differences at the 5 percent level of significance. The Johansen co-integration test also show that a long run equilibrium relationship exist among the variables. This is because both the trace statistic and max-eigen statistic of the variables are clearly more than their 5 percent critical level. Furthermore, the granger causality test indicate both uni-directional and bi-directional causality among the variables. Uni-directional causality exists from INT to logFPI; EXRT to INF; and INT to INF. Bi-directional causality exist between INF to logFPI and logFPI to INF. This goes to show that interest rate affects foreign portfolio inflows, and an upsurge in foreign exchange is due to inflationary pressures; which is also affected by interest rates. In addition, foreign portfolio investments have an inverse relationship with inflation rate. For a proper investing climate, an investor takes into consideration the degree of inflation. This supports our apriori expectation that an increase in inflation undermines an investor's rate of return. This finding is consistent.

The first major recommendation for this study is that the Central Bank of Nigeria should put in place specific and appropriate fiscal and monetary policies to curb the rising exchange rate that affects the productive sectors of the economy. From the analysis, a rise in foreign exchange rate affects capital flows negatively which is not good for an optimal stock market performance. If checks and balances are well structured, then fluctuations in inflation rate, interest rate and foreign exchange rate will be minimal. Secondly, the study proves that when interest rate is to be fixed for economic activities, it has a signaling effect and thus there are swings in both inflation and portfolio investments; as investors will start rebalancing their portfolios more frequently which in the long run will increase the rising effect of capital flight. Thus, the government can check this by making their institutions stronger.

The study is limited to secondary data and as such the validity and/or accuracy of the raw data used are not within this research control.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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