Lafia Journal of Economics and Management Sciences: Volume 9, Issue 1; 2024
ISSN: 2550-732X
Published by Department of Economics, Federal University of Lafia, Nigeria

Do Foreign Portfolio Investment Inflows have Stabilizing Effects on the Recipient Economy? Evidence from Nigeria

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Abstract
In theory, Foreign Portfolio Investment (FPI) inflows can help stabilize the macroeconomy by increasing the host economy's foreign exchange reserves, which, in turn, stabilizes the currency and prevents the inflation surge associated with exchange rate depreciation. Based on this theoretical reasoning, the Central Bank of Nigeria (CBN), in the last decade, has encouraged FPI inflows through monetary policy tightening and other incentives, including allowing foreign portfolio investors to hold Open Market Operations (OMO) bills as a means of supporting reserves accretion to stabilize the Naira in the face of declining crude oil receipts. However, FPI is easily reversed, especially when spooked by any threat to economic stability thereby generating instability in the recipient economy. Against this backdrop, this study investigates the impact of money market - based FPI inflows on macroeconomic instability in Nigeria using a five-variable Structural Vector Autoregressive (SVAR) model with quarterly data spanning from 2010Q1 to 2021Q4. The key finding of the study is that net money market-based FPI inflows destabilized the macroeconomic environment of Nigeria due to a significant reversal of the short-term FPI inflows. Accordingly, the study recommends that the CBN should improve on the conduct and efficiency of its policy response to the developments in the global monetary policy stance to forestall short-term FPI inflow reversal and macroeconomic instability.

Keywords: Foreign Portfolio Investment, Macroeconomic Instability, Structural Vector Auto-regression
JEL Classification Codes: B22, C32, F21

1. Introduction

Foreign Portfolio Investment (FPI) is the acquisition of financial assets by foreign individuals or companies in a domestic capital or money market. It involves the holding of transferrable securities that are either issued or guaranteed by the government of the importing countries. The various forms

of FPI include investment in equity and debentures, bonds, promissory notes, and money market instruments. The money market instruments include treasury bills, commercial papers, bankers' acceptance, and negotiable deposits. Portfolio investors are entitled to dividends or interest rates and also gain from asset appreciation (Nwokoma, 2013).

In Nigeria, the trend in capital importation has shown that, prior to the full implementation of the capital account liberalization policy and the internationalization of the Nigeria's capital market, the bulk of capital imported into the country was in the form of Foreign Direct Investment (FDI), which fortunately, have had the effect of promoting growth and enhancing employment and revenue generation in the country (Central Bank of Nigeria [CBN], 2022; Oyegoke & Aras, 2021; Olaniyan, Efuntade, Olusegun, & Dada, 2020; Osabohien, Awolola, Matthew, Itua, & Elomien, 2020).

However, over the last decade, the inflow of FDI in Nigeria has significantly declined due to several reasons, among which include insecurity, economic instability and uncertainty (Olasehinde, 2022). On that account, coupled with the increasing size of the country's imports, the monetary authority had since shifted its focus to FPI inflows, particularly the money market related inflows as alternative means of boosting the nation's foreign reserve, stabilizing the exchange rate and reducing inflationary pressure associated with exchange rate depreciation in the face of declining crude oil receipts. Official record of capital flows to the country reveals that quarterly FPI influx averagely accounts for 60.31 per cent of the capital imported into the country over the period 2010Q1-2021Q4, and specifically for the money market FPI inflows, the share of the investment to the total capital inflows rose from 7.08 per cent in 2010Q1 to 69.81 per cent in 2019Q1 (CBN, 2022).

To encourage more of these portfolio inflows, the CBN recently adopted a strategy of allowing foreign investors to buy Open Market Operation (OMO) bills, which often have higher yields and guarantee free repatriation of principal and profits at the official foreign exchange rate. Besides, the apex bank consistently tightens its monetary policy stance to induce more short-term FPI inflows through the Investors and Exporters (I & E) window. However, the potential problem with short term FPI inflows is the tendency to reverse when spooked by any threat to economic stability as experienced during the 2007/2008 Global Financial Crisis (GFC). Foreign portfolio investment reversal in Nigeria may partly respond to the poor macroeconomic investment atmosphere in the country besides changes in the global factors as hypothesized by the theoretical portfolio balance model of Fernandez-Arias and Montiel (1995).

A survey of the literature on foreign investment-related studies reveals that little empirical attention has been given to investigate the impact of the

volatile money market FPI inflows on macroeconomic instability in Nigeria. Empirical studies like Ifeakachukwu and Ditimi (2014); Nwinee and Olulu-Briggs (2016); and Okafor (2016) investigated the macroeconomic impact of the aggregate FPI inflows in Nigeria by focusing on some specific indicators of macroeconomic instability viz: exchange rate, interest rate, and inflation rate. A common limitation of these studies is that they overlooked the outflow side of the investment and its net macroeconomic impact. In addition, they provided only partial information on the benefits and costs of FPI inflows in the country because each focused on a single indicator of macroeconomic instability.

In order to close the existing literature gap, this study examines the effects of net money market FPI inflows on the country's macroeconomy by using a constructed composite index of macroeconomic instability. To achieve this objective, we employed the Structural VAR model developed to use economic theories and stylized facts to capture the contemporaneous and dynamic relationships among macroeconomic variables. The study is organized as follows: Section 1 contains the introduction; Section 2 presents literature review; Section 3 deals with the methodology; Section 4 presents the results and discussion; and Section 5 concludes the study.

2. Literature Review

Using the IS-LM-BOP framework, the Mundell-Fleming model predicts that, macroeconomic policy choices in open economies are constrained by the trilemma; that an economy cannot simultaneously maintain a fixed exchange rate, free capital mobility and an independent monetary policy. The argument of the Mundell-Fleming framework is that, while it is justifiable for monetary authorities particularly in emerging and developing economies to pursue the objective of exchange rate stability with some interventions, the capital account openness policy does not support monetary policy independence because it allows for free flow of capital which equates domestic and global interest rates (Jume, 2020).

Hence, in the developing economy of Nigeria, if the CBN chooses exchange rate stability and monetary policy independence to ensure stable macroeconomic condition, it must control capital inflows, particularly portfolio inflows because the investment is likely to flow out of the economy due to threat to economic stability, or when the yield in the domestic economy is relatively lower relative to that of the rest of the world, and this may generate domestic macroeconomic instability by depreciating the exchange rate and triggering inflationary pressure. Also, at the point of the receipt, if the excess liquidity created by the investment inflows is not fully sterilized by the monetary authority, it can induce inflationary pressure, appreciate the real

effective exchange rate and deteriorate the country's terms of trade thereby generating instability in the domestic economy.

A scrutiny of empirical literature related to FPI and macroeconomic instability nexus reveals that foreign portfolio investment and capital inflows in general exert dissimilar impacts on some macroeconomic instability indicators across various economies. Ifeakachukwu and Ditimi (2014), for instance, employ Granger causality test and error correction modelling techniques to investigate the causal relationship between capital inflows disaggregated into FDI and FPI and real exchange rate in Nigeria using annual data for the period 1986 to 2011. The causality test result reveals no evidence of a causal link between capital inflows (FDI and FPI) and real exchange rate in Nigeria over the period covered by the study. The co-integration result, however, reports that FPI depreciates the real exchange rate in the long-run. The study recommends for the formulation of appropriate policies to encourage more inflow of foreign capital in a prudent manner.

Rafi and Ramachandran (2018) examine the impact of capital flows on exchange rate volatility in ten emerging economies for the period 1997Q1 to 2017Q1 using Panel Vector Auto-regressive model. The result of the impulse response shows that shock to FPI inflows appreciates the exchange rate in emerging economies while outflow of the investment creates uncertainty in the foreign exchange market and increase exchange rate volatility. The study recommends that emerging economies should control the flow of short-term capital to tame exchange rate volatility.

Banerjee (2020) investigates the relationship between capital inflows and the exchange rate indices in India over the period 2000Q2 through 2018Q3 using Granger causality test. The study reports that FPI inflows do not granger cause nominal exchange rate but both FDI and FPI inflows granger cause export and real effective exchange rate. The study recommends that capital inflows in India need to be monitored by authorities to avoid real exchange rate appreciation, which reduces trade competitiveness.

Gautam, Chadha, and Malik (2020) examine the association between real effective exchange rate and foreign investments namely FDI, FPI, and other investments from 1994Q1 to 2019Q2 using causality test and Auto-regressive Distributed Lag (ARDL) bound co-integration approach. Further, trade openness, government spending, and foreign exchange reserves were used as control variables in the model estimation. The result from the estimation proves that FPI, trade openness, and reserve position appreciate the real effective exchange rate in the BRICS countries. The study recommends for increased liberalization policies to encourage more foreign investments in the BRICS countries. Also, policy makers should initiate and implement

policies in foreign exchange management which can control trade liberalization and foreign investments effectively.

Ejaz and Azam (2024) employ the Generalized Method of Moments (GMM) to investigate the impact of capital flows on exchange rate in developing economies using a panel data set of 82 countries for the period 2001 through 2020. The key finding of the study indicates that currency appreciation is associated with more inflows of capital. The study recommends that the government should provide the needed infrastructural facilities to encourage both foreign and domestic investment in developing countries.

As for the impact of the FPI inflows on the monetary condition of the host economy, Nwinee and Olulu-Briggs (2016) study the dynamics among capital inflows, interest rate, real effective exchange rate, and inflation in Nigeria using co-integration and Granger causality test. The co-integration test proves the existence of long-run association among the variables, while the Granger causality test shows that FPI does not influence interest rates in Nigeria.

Okafor (2016) employs a simple ordinary least squares method and Granger causality test to investigate the impact of foreign investments (FDI and FPI) on domestic inflation in Nigeria over the period 1987-2012. The study reports that both FDI and FPI do not influence domestic price significantly in Nigeria. Thus, the study recommends the need to employ various means of encouraging foreign investments in Nigeria.

Rashid and Husain (2013), on the other hand, apply a linear and non-linear causality test to investigate the impact of foreign capital inflows on the domestic price level, monetary expansion, and exchange rate volatility for Pakistan from 1990 to 2012. The causality test reveals the inflationary impact of capital inflows, and hence the study recommends the need to manage the capital inflows prudently to avoid inflationary pressure and exchange rate volatility.

Haiyue (2013) examines the impact of capital inflows on inflation in China for the period 1997 to 2010 using Vector Error Correction Model (VECM) and Granger causality test. The result of the estimations reveals that FDI and FPI influence the consumer price index in the country. The study concludes that it is imperative for the relevant authorities to note that capital inflows have a certain influence on the domestic price level.

Mohamed, Fayed, and Hassouba (2023) investigate the impact of FPI on macroeconomic stability (proxied by inflation) in Egypt for the period spanning from 1993 to 2020. The study employs VAR, causality test, and ARDL bound test to examine both the short-run and long-run relationship between the variables. The findings of the study reveal that FPI compounds inflation in both the short-run and long-run, thereby impacting the

macroeconomic stability of the Egyptian economy. The study recommends for optimizing the inflationary targeting policy to cope with FPI flows volatility.

As highlighted in the introductory section, previous studies on the effects of FPI on macroeconomic instability largely focused on a single indicator of macroeconomic instability and overlooked the outflow side of the FPI. Accordingly, this study seeks to examine the impact of net money market FPI inflows on macroeconomic instability in Nigeria using a constructed composite index of macroeconomic instability to fill this gap.

3. Methodology

3.1 Model Specification

To capture the impact of money market FPI inflows on macroeconomic instability in Nigeria, this study used a 5-variable SVAR model consisting of net money market FPI inflows (NMMI), macroeconomic instability index (a proxy for macroeconomic instability/stability), crude oil price (OP), US 3-month treasury bills rates (USR), and US industrial production index (USQ). Crude oil price was included in the model to capture the effect of oil proceeds in stabilizing the Nigerian economy. Also, following Çulha (2006), US treasury bill rates and industrial production index were included in the model as proxies for global determinants of portfolio investment to determine the extent to which portfolio flows to Nigeria respond to changes in the global determinants of FPI flows.

Structural VAR was developed to study the contemporaneous and dynamic relationships among macroeconomic variables, which are broadly consistent with economic theories and stylized observed facts. The approach involves the use of theories rather than a recursive method to impose restrictions on the structural parameters and derive the variance-covariance matrix of the reduced-form VAR model that can be used to recover structural innovations having theoretical interpretations (Enders, 2004).

The starting point of our estimation is to specify a multivariate SVAR of order P lags as:

$$AX_t = C + A_i X_{t-1} + - - - - - A_p X_{t-p} + \varepsilon_t - - - - - - - - - - (1)$$

Where X_t is the vector of the endogenous variables [ΔOP, ΔUSR, ΔUSQ, ΔNMMI, ΔMII], C is a 5x1 vector of the constant terms, A is a 5x5 vector matrix describing the variables' contemporaneous relationships, A_i is a 5x5 matrix of the parameters and ε_t is the vector of the structural innovations $[\varepsilon_t^{op}, \varepsilon_t^{usr}, \varepsilon_t^{usq}, \varepsilon_t^{nmmii}, \varepsilon_t^{mii}]$ where $\epsilon(\varepsilon) \sim (0, 1_n)$.

By multiplying equation (1) by A^-, and ignoring the constant term, we obtained a reduced-form VAR model as:

$$X_t = \delta_1 x_{t-1} + - - \delta_p X_{t-p} + e_t - - - - - - - - - - - - - - - - - (2)$$

Where $\delta_1 = A^{-}A_i$ and the reduced-form shock $e_t = A^{-}\varepsilon_t$. Thus, the solution for our structural innovations is expressed as:

$$\begin{bmatrix} e_{opt} \\ e_{usrt} \\ e_{usqt} \\ e_{nmmit} \\ e_{miit} \end{bmatrix} = \begin{bmatrix} 1 & \theta_1 & \theta_2 & \theta_3 & \theta_4 \\ \psi_1 & 1 & \theta_5 & \theta_6 & \theta_7 \\ \psi_2 & \psi_3 & 1 & \theta_8 & \theta_9 \\ \psi_4 & \psi_5 & \psi_6 & 1 & \theta_{10} \\ \psi_7 & \psi_8 & \psi_9 & \psi_{10} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{opt} \\ \varepsilon_{usrt} \\ \varepsilon_{usqt} \\ \varepsilon_{nmmit} \\ \varepsilon_{miit} \end{bmatrix} ---------(3)$$

Where:

$$A^{-1} = \begin{bmatrix} 1 & \theta_1 & \theta_2 & \theta_3 & \theta_4 \\ \psi_1 & 1 & \theta_5 & \theta_6 & \theta_7 \\ \psi_2 & \psi_3 & 1 & \theta_8 & \theta_9 \\ \psi_4 & \psi_5 & \psi_6 & 1 & \theta_{10} \\ \psi_7 & \psi_8 & \psi_9 & \psi_{10} & 1 \end{bmatrix} ----------(4)$$

To determine the impact of net money market FPI inflows on macroeconomic instability, we need to estimate the effect of exogenous shock on the FPI inflows, e_{nmmit}, on the shocks, e_{miit}, by estimating (3). Unfortunately, the effect cannot be estimated because the observed innovation e_{nmmit} depends not only on the shock to the portfolio inflows but also on the shocks to the rest of the variables in the system. As a result, at least ten ($\frac{5^2-5}{2}$) additional restrictions need to be imposed on matrix A^{-1} to extract ε_{nmmit} from other shocks.

Because of the weaknesses of the recursive method, this study used theories to impose contemporaneous structural restrictions on matrix A^{-1} so that the derived innovations will have economic meaning.

3.2 Identification and Restrictions

For the first restriction, we assume that crude oil price does not contemporaneously react to innovations in the rest of the variables. This restriction is based on the theoretical model of Huang and Feng (2007) who stated that crude oil price follows a stochastic AR(1) process expressed as $OP_t = OP_{t-1} + \varepsilon_t$. This restriction yields $\theta_1 = \theta_2 = \theta_3 = \theta_4 = 0$.

To impose restrictions on the second row, we follow Çulha (2006), who assumed that, in the initial period, US 3-month treasury bill rates are not affected by shock to US output. This assumption is acceptable under US monetary policy practice in which the Federal Reserve adopts inflation targeting framework in setting the federal fund rates upon which other short-term interest rates are determined. In addition, we also assume that it does not contemporaneously react to innovations in OP, NMMI, and MII. Nigeria is a small open economy whose fundamentals cannot influence the US treasury bill rates. This assumption leads to restrictions $\psi_1 = \theta_5 = \theta_6 = \theta_7 = 0$.

The restriction on the third row is that OP and USR affect USQ contemporaneously while NMMI and MII do not. Treasury bills are less risky financial instruments and therefore increase in their rates may reduce loanable funds available for real economic activities. Crude oil prices on the other hand, can affect the aggregate output of the US economy through two major channels. First, as an oil-importing economy, an abrupt increase in oil prices is assumed to exert a negative impact on the economy's aggregate output as it increases the cost of production (Rotemberg & Wooldford, 1996). The second channel is that, following a sudden increase in the oil price, resources may relocate from industries that consume more energy to industries that consume less energy (Herrera, Karaki, & Rangaraju, 2019).

The restriction on the fourth equation is that FPI inflows in the Nigeria's money market are assumed to respond contemporaneously to innovations in all the variables in the model except MII. It is a well-known fact that the stability of the Nigerian economy is highly adjudged by the stability of crude oil price for oil stands to be the major source of revenue and foreign exchange to the economy. Hence, foreign investment in Nigeria responds to oil price shocks. Secondly, a rise in US 3-month treasury bill rates holding Nigeria's cost of borrowing constant will decrease portfolio flows to Nigeria in line with the theory of capital mobility and the Mundell-Fleming framework. Thirdly, US industrial production growth implies an increase in the funds available for investment abroad which may have a positive effect on portfolio flows to Nigeria. Nevertheless, in line with Taylor's rule, an increase in the US industrial production may trigger inflationary pressure and this may give rise to the expectation of interest rate increase thereby causing capital reversal to the US (Çulha, 2006).

As for the instantaneous impact of macroeconomic instability on money market FPI inflows, though theory hypothesized that foreign portfolio investment is driven by global fundamentals and the fundamentals of the recipient economy such as growth rate, inflation, interest rate, exchange rate, and fiscal soundness indicators, the reality in Nigeria is that foreign portfolio investors in the money market are motivated by the apex bank's monetary policy tightening stance and the preferential treatment given to them in the market. Therefore, money market FPI inflows may respond to MII in the lag periods but not contemporaneously. This assumption yields the restriction$\theta_{10} = 0$.

Lastly, we also assume that macroeconomic instability in Nigeria contemporaneously responds to innovations in all the variables in the model. Oil price shock can affect Nigeria's macroeconomy directly or indirectly via portfolio inflows. Similarly, the economy can as well be affected by shocks to US output and interest rates through trade and financial linkages.

Finally, the identified system is stated as:

$$\begin{bmatrix} e_{opt} \\ e_{usrt} \\ e_{usqt} \\ e_{nmmit} \\ e_{miit} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ \psi_2 & \psi_3 & 1 & 0 & 0 \\ \psi_4 & \psi_5 & \psi_6 & 1 & 0 \\ \psi_7 & \psi_8 & \psi_9 & \psi_{10} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{opt} \\ \varepsilon_{usrt} \\ \varepsilon_{usqt} \\ \varepsilon_{nmmit} \\ \varepsilon_{miit} \end{bmatrix} - - - - - - - - - - (5)$$

3.3 Macroeconomic Instability Index (MII)

This study constructed the macroeconomic index for the Nigerian economy by adapting the empirical model of Sameti, Isfahani, and Haghighi (2012) which used the inflation rate, fiscal deficit to GDP ratio, real exchange rate and terms of trade to compute the MII for Iran. We modified Sameti *et al.* (2012) model to better serve the focus of this study on the short to medium-term nominal instability of the exchange rate. Hence, the real exchange rate and terms of trade were substituted with the nominal exchange rate.

Thus, the MII model for this study is specified as:

$$MII_t = \alpha\left(\frac{INF_t - MinINF}{MaxINF - MinINF}\right) + \beta\left(\frac{EX_t - MinEX}{MaxEX - MinEX}\right) + \gamma\left(\frac{FD_t - MinFD}{MaxFD - MinFD}\right) - - - - - - - - - - - - - (6)$$

Where MII_t , INF_t , EX_t, *and* FD_t represent macroeconomic instability index, inflation, nominal exchange rate, and fiscal deficit to GDP, respectively, and α , β , γ denotes the weights of the variables.

As the first step to computing the index, we standardized the sub-indices using their standard deviations to make their values unit-free and hence, comparable. In the second step, the standardized values were normalized on a scale of 0 to 1 where instability for each indicator is low as the index approaches 0 but high as it approaches 1. In the last step, the weights,$\alpha, \beta,$ *and* γ were determined using principal factor analysis in such a way that their sum equals to 1.

3.4 Data and Data Sources

The study utilized quarterly published data; the data on the components of the above-specified index were sourced from the CBN statistical bulletin (2022). Similarly, data on net money market FPI inflows and crude oil price were also sourced from the CBN statistical bulletin (2022) while data on US 3-month treasury bill rates and US output were sourced from the Federal Reserve statistical bulletin (2022).

4. Results and Discussion

4.1 Constructed Macroeconomic Instability Index (MII)

As indicated above, the weights of inflation, exchange rate, and fiscal balance in the MII are determined using principal factor analysis. The result of the analysis is presented below.

Table 1: Summary of the Principal Factor Analysis Result

Variable	Factor Loadings (Score)	Weights
INF	0.6510	0.283
EXR	0.8793	0.383
FBG	0.7682	0.334
TOTAL	2.29851	1
Eigen Value of the factor	1.78699	
KMO	0.6231	

Source: Author's Estimation

Table 1 shows that the weight for each of the variables was its proportionate share of its factor loading in the total factor loading (normalized). This results in $\alpha = 0.283$, $\beta = 0.383$, $\gamma = 0.334$, and their sum equals to 1. It is also essential to note that fiscal balance was computed such that positive values indicate deficits while negative entries signify surpluses. Furthermore, for the nominal exchange rate, direct quoted rates were used (Naira/USD), and this implies that higher and lower values indicate depreciation and appreciation, respectively. Finally, the correlation coefficient between the constructed index and economic growth is -0.61. This is consistent with Amoo, Achua, Audu, and Hamma (2017) and Sameti *et al.* (2012) who provide empirical evidence that macroeconomic instability is negatively associated with growth using their respective MII indices.

4.2 Unit Root Test

Table 2: Unit Root Test Result

Level			First Difference		Comment
Variable	ADF	PP	ADF	PP	
LMII	-3.0297	-3.0297	-9.4216***	-9.5739***	I(1)
NMMI	-6.2326***	-19.2526***	-5.0096***	-35.2620***	I(0)
LOP	-2.0042	-2.1686	-6.7404***	-6.7404***	I(1)
USR	-1.9932	-2.0665	-8.3144***	-8.2356***	I(1)
LUSQ	-3.3772	-3.2610	-9.4588***	-9.6691	I(1)

Note: For LMII, LOP, USR, and LUSQ, the line plots of the series indicate that trend and intercept should be included at levels while for their first differences, line graphs indicate that only intercepts can be included; for NMMI, the plots of the series suggest that only constant term should be included at levels while neither trend nor constant term should be included in the test equations for their first differences; ** and *** indicate rejection of unit root at 5% and 1% respectively.
Source: Author's Estimation

The result of the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) unit root tests reported in Table 2 reveals that net money market FPI inflows (NMMI) have no unit root while the rest of the variables become stationary after first difference according to both test statistics.

4.3 VAR Estimation and Diagnostic Checks

Prior to the VAR estimation, the series were transformed accordingly as follows: MII, OP, and USQ series were transformed by taking the first difference of their natural logarithms; USR series were transformed by taking their first difference while NMMI series were transformed by using the multiplicative inverse of their respective standard deviations. It is imperative to note that the NMMI series are highly volatile and contain negative values. Unfortunately, log of negative numbers is not defined among the set of real numbers. Also, direct application of the original series poses optimization problem. This necessitates the application of inverse transformation on these series to reduce their sizes and volatilities thereby making them compatible with the rest of the transformed series. Moreover, the overall transformation of the series is informed by the need to estimate a stable VAR model.

Given the smaller number of observations in our dataset, we strive to achieve parsimony in our estimation by following the lag length selection process used by Yu, Hardle, Borke, and Benschop (2023). We start by fitting the least order VAR suggested by the information criteria, and subsequently, we check for the presence of serial autocorrelation. If at least one of the tests provides evidence of no serial autocorrelation, we proceed to estimate the model at that lag order. However, if all the tests report the presence of serial autocorrelation, we add one more lag and repeat the foregoing process till we estimate a VAR model of order P whose residuals are serially uncorrelated at order P.

Table 3: VAR Orders Suggested by Different Information Criteria

Optimum Lag Length				
LR	FPE	AIC	SC	HQ
4	1	1	1	1

Source: Author's Estimation

Table 3 reports that FPE, AIC, SC, and HQ suggest 1 lag while LR considers 4 lags as optimum for the model. We therefore proceed with the estimation of the first-order unrestricted VAR model.

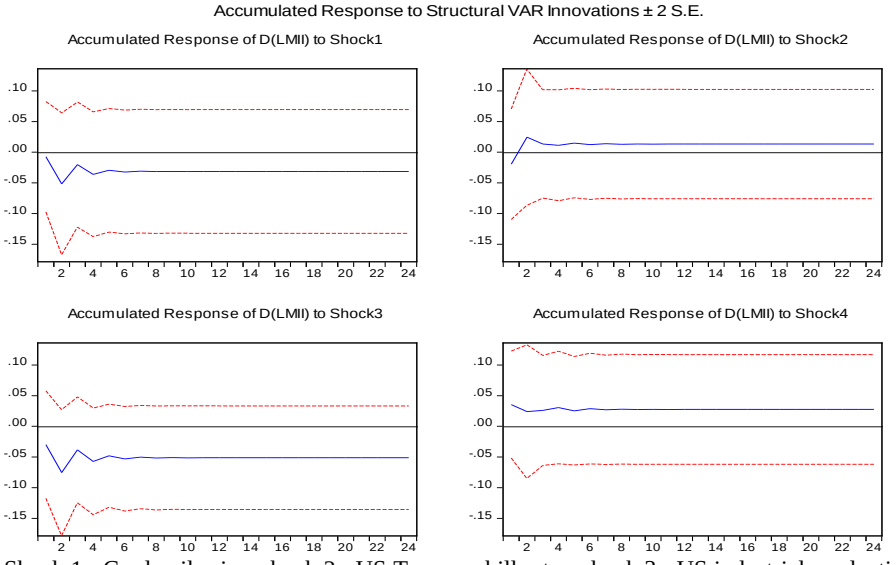
Table 4: Serial Autocorrelation Test and Model Selection

VAR Order	PT (asymptotic)	PT (adjusted)	BG
1	34.89333*	36.36959*	32.35196*

Note: ** indicates the acceptance of the null hypothesis at 5%
Source: Author's Estimation

After estimating the first-order unrestricted VAR form of the model and subjecting its residuals to serial correlation tests, all the tests provide evidence of no serial correlation as shown in Table 4. Also, evidence from the diagnostic checks of the model proves that all the roots of its characteristic polynomials lie within the unit circle implying the stability of the VAR model.

4.4 Accumulated Impulse Response of Macroeconomic Instability to Structural Shocks



Shock 1= Crude oil price, shock 2= US Treasury bill rates, shock 3= US industrial production index, shock 4= Net Money market FPI inflows

Figure I: Accumulated Impulse Responses of Macroeconomic Instability to Structural Shocks

Source: Author's Estimation

Figure 1 depicts the accumulated impulse responses of macroeconomic instability to structural shocks to crude oil price, US treasury bill rates, US industrial production index, and net money market FPI inflows in Nigeria. It can be observed from the four impulse responses in the figure that while the macroeconomic instability index (proxy for macroeconomic instability) responds negatively to positive shocks to crude oil price and US

industrial production index, its response to positive shocks to US treasury bill rates and net money market FPI flows to Nigeria is positive. This implies that crude oil price increase and global boom reduce macroeconomic instability in Nigeria whereas, hike in the US rates and increase in money market FPI flows to Nigeria generates macroeconomic instability in the country.

4.5 Dynamic Elasticity of Macroeconomic Instability

Dynamic elasticity is calculated as a ratio of impulse response, which traces the dynamic impact of a system of shocks to a variable in the system, to its standard deviation. Therefore, the dynamic elasticity of macroeconomic instability to net money market FPI inflows shock can be expressed as:

$$EMII_t = \frac{\%\Delta MII_t}{\%\Delta NMMI_0} \quad \text{---------- (7)}$$

Where $EMII_t$ is the elasticity of macroeconomic instability at time t; $\%\Delta MII_t$ is the percentage change in MII between 0, when the initial NMMI shock hits, and t; and $\%\Delta NMMI_0$ is the percentage change in NMMI at time 0. The percentage change in MII is given by the impulse response while the percentage change in NMMI is its standard deviation (Sanusi, 2010).

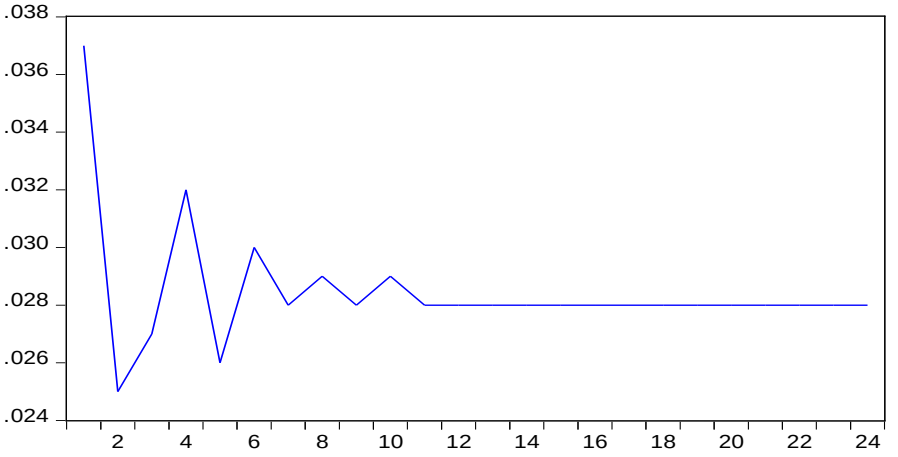


Figure 2: Dynamic Elasticity of Macroeconomic Instability to Net Foreign Portfolio Investment Inflows in the Money Market for the Period
Source: Author's Estimation

Figure 2 indicates that the elasticity of macroeconomic instability to net FPI inflows in the money market is positive and the impact of the shock is fully absorbed after the 11th quarter.

Table 5: Dynamic Elasticity of Macroeconomic Instability in Nigeria

	Shocks to:				
Quarters after Shock	**DLOIL**	**DUSR**	**DLUSQ**	**NMMI**	**DLMII**
1	-0.038	-4.665	-1.590	0.037	1.000
4	-0.186	2.679	-3.058	0.032	0.739
11	-0.162	3.182	-2.725	0.028	0.752
24	-0.162	3.169	-2.73	0.028	0.752
Structural S.D.	0.194	0.004	0.019	0.972	0.294

Source: Author's Estimation

Table 5 reports the magnitudes of dynamic elasticity of macroeconomic instability in Nigeria to percentage increase in crude oil price, US treasury bill rates, US industrial production index, and net money market FPI inflows. As for the elasticity of the variable of interest of this study (net money market FPI inflows), the penultimate column of the table reports a full impact elasticity of 0.028 implying that after 11 quarters following a one per cent increase in the net money market FPI inflows, macroeconomic instability index rises by 0.028 per cent. Hence, net FPI inflows in the money market destabilize the macroeconomic environment of Nigeria.

4.6 Discussion of Findings

The Mundell-Fleming framework argues that monetary authority in an open economy striving to ensure stable macroeconomic conditions (stable exchange rate, low and stable prices, high growth, among others) through foreign exchange intervention and the use of monetary policy tools must control capital inflows particularly foreign portfolio investment because holders of these assets are in search of yield, and therefore, have the incentive to repatriate their capital when the returns in the rest of the world are relatively higher, and this action has serious repercussions on the host economy. Besides, increase in the quantum of the inflows induces excessive monetary expansion which triggers inflation and real exchange rate appreciation in the recipient economy.

However, in Nigeria, the apex bank had fully deregulated the country's capital account and also strives to ensure stable macroeconomic environment by intervening in the foreign exchange market and maintaining an independent monetary policy committee, which is contrary to the postulation of the Mundell-Fleming framework. We observe from the SVAR result presented in this study that, with capital account deregulation policy in Nigeria, money market FPI inflows tend to generate macroeconomic instability by depreciating the exchange rate and triggering inflationary

pressure as postulated by the Mundell-Fleming framework. However, since empirical works on the impact of FPI inflows on a composite index of macroeconomic instability are not readily available in the literature, this finding cannot have direct empirical support or objection from other studies. Nonetheless, from indicator-specific studies, we can infer that the finding corroborates the findings of Rashid and Hussain (2013); Haique (2013); and Mohammed, Fayed, and Hassouba (2023) that report the inflationary effect of FPI and other forms of capital inflows but contradicts the findings reported by Ejaz and Azam (2024) that FPI and other forms of capital inflows appreciate the exchange rate.

We attributed this finding to the frequent reversal of the short-term FPI inflows in the Nigeria's money market in response to the yield in the rest of the world. As a result, the CBN reacts to increase in the global FPI determinants by tightening its monetary policy stance and increasing the rates of the open market operation (OMO) bills held by foreign investors. Nonetheless, this policy action of the apex bank does not reduce money market FPI reversal significantly as net FPI inflows in the market are 72 per cent lower than the inflows during the period under review.

5. Conclusion and Recommendations

This study employed SVAR to assess the macroeconomic impact of money market FPI inflows in Nigeria following the full implementation of the capital account liberalization policy in 2005 using Mundell-Fleming framework, which argues that a small open economy that pursues the goals of exchange rate stability and monetary policy independence to ensure stable macroeconomic condition must control capital inflows. We first computed a composite index to serve as a proxy for macroeconomic instability using three macroeconomic indicators viz: headline inflation, nominal exchange rate, and fiscal balance to GDP ratio. Subsequently, the dynamic elasticity of the composite index to changes in the net money market FPI inflows was estimated after incorporating crude oil price and global determinants of FPI flows as control variables in the SVAR model. The result of the estimated model covering the period 2010Q1 through 2021Q4 suggests that FPI inflows in the money market generate macroeconomic instability, which is consistent with the Mundell-Fleming framework.

We conclude that the instability generated by the money market FPI inflows can be attributed to the huge reversal of the short-term instruments. Therefore, during the period under review, the policy reaction of the CBN to the development in the global money market is ineffective in retaining FPI inflows in the domestic money market. This finding implies that the CBN policy that encouraged money market FPI inflows could destabilize the

macroeconomic environment of the country by depleting the foreign reserves that were initially accumulated and depreciating the exchange rate thereby compounding inflation, among others at the verge of money market FPI reversal.

Hence, the study recommends that Nigeria's apex bank should improve on the conduct and efficiency of its policy response to the developments in the global monetary policy stance to forestall short-term FPI inflow reversal and macroeconomic instability. This could be achieved by taking an appropriate policy stance given any increase in the global money market rate.

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