

Foreign Private Capital, Economic Growth and Macroeconomic Indicators in Nigeria: An Empirical Framework

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Abstract

The understanding of the determinants of capital flows and the major challenges its sudden surge and flight might pose is central to assessing its macroeconomic impact in an economy. Most developing and transition countries are attracting large inflows of foreign capital that could spur economic growth or have destabilizing effect on their economies if not well managed and streamlined. This however, has aroused concern over their potential effects on macroeconomic stability, competitiveness of the export sector, and external viability. The study examines the relationship existing among foreign private capital components (Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI), economic growth (GDP) and some macroeconomic indicators; interest rate (INTR) and inflation rate (INF) as well as policy implications therefrom, using time series data from 1986-2008. A nonrestrictive Vector Autoregressive (VAR) model was developed, while restriction is imposed to identify the orthogonal (structural) components of the error terms - Structural Vector Autoregressive (SVAR). Analysis indicates that the response of the GDP to shocks from the NDI is not contemporaneous and this is applicable to the other variables. It is somewhat sluggish but returns faster to equilibrium compared to the response from the NNPI. Restricting the recursive Cholesky structural decomposition of the IRF, both in the short-run and long-run, the result indicates that the NNPI impacts on the GDP at the short-run, while the NDI does not. Also, the INTR was shown to impact on the NNPI in the short-run. Furthermore, in the long-run, the GDP responds more to the impact of the NNPI compared to the NDI, while the NDI responds to INTR, the NNPI does the same to INF. Policy frameworks on Foreign Private Investment should be encouraged for the promotion of economic development in Nigeria. Consequently, it is recommended that government should not discourage the flow of those foreign private capitals but be more vigilant about the nature and sources of the flows. This is very important in order to forestall their potential adverse impacts on key macroeconomic variables as well as economic growth in a situation of their sudden surge or flight.

Keywords: foreign private investment, Foreign Direct Investment, economic growth

JEL Classification: F21, F36, O47

1. Introduction

After political independence in the 1960s, African countries were very sceptical about the virtues of free trade and investment. Consequently, in the 1970s and 1980s several countries in the region imposed trade restrictions and capital controls as part of a policy of import-substitution industrialization aimed at protecting domestic industries and conserving scarce foreign exchange reserves. However, there is now a substantial evidence that this inward-looking development strategy discouraged trade as well as foreign direct investment (FDI) and had negative effects on economic growth and living conditions in the region (Rodrik, 1998). In most developing countries, the pursuit of economic growth has been always at the front burner of economic policy. This, however, is often hindered by the non availability of resources that would drive this process of achieving the required economic growth. The need for foreign capital flows arises when the desired investment exceeded the actual savings, and also due to investments with long gestation periods that generate non-monetary returns, growing government expenditure that are not tax-financed; and when actual savings are lower than potential savings due to repressed financial markets and even capital flight (Essien, & Onwioduokit, 1999). The emergence of integrated financial markets and high capital mobility made possible by the increasing globalization of world

economies have predisposed economies, especially emerging ones to the volatility of capital flows, sudden and spontaneous (Herd behavior), loss of market confidence, which often times result in severe financial crises.

Though foreign private capital is made up of Foreign Direct Investment and Foreign Portfolio Investment, Foreign Direct Investment is often preferred as a means of growing the economy. This is because FDI disseminates advanced technological and entrepreneur managerial practices through the host country and thereby exhibits greater positive externalities compared with Foreign Portfolio investment which may not involve positive transfers, just being a change in ownership. In addition, available data suggest that FDI flows tend to be more stable compared to Foreign Portfolio Investment (Lipsey, 1999). This is because of the liquidity of Foreign Portfolio Investment and the short time horizon associated with such investments. Also, FDI inflows can be less affected by change in national exchange rates as compared to Foreign Portfolio Investment. However, a balanced combination of the two, taking into consideration the unique characteristics of the recipient economy will bring about the required effects on the economy. Foreign Capital flows are of different kinds and what drives the motive behind them is different. It can be grouped into five categories: Foreign Direct Investment (FDI); Portfolio investment in stocks and bonds; international bank lending; and in some countries that still qualify for concessional loans and grants (Agosin, 2006). The benefit of FDI is aptly captured by Sadik & Bolbol (2001), its inflows are the least volatile of capital flows, and more importantly, can have direct and indirect effects on economic growth. The stability of FDI stems from the fact that direct investors have a longer-term view of the market, thus making them more resistant to herd behaviour, and from the sheer difficulty of liquidating assets at short notices. Conversely, Siegel (1998) was of the opinion that short-term investments, that are, easily liquidated and speculative threaten the stability of real economies, especially in the developing world, and force fiscal policy to be keeping financial markets happy rather than on raising standards of living.

In Nigeria, Foreign Direct Investment (FDI) and Portfolio investment in stocks, bonds and equities constitute the major bulk of foreign private capital flows. While portfolio investment has been a notable feature of developed economies, it is becoming a very important component of the Balance of Payments (BOP) of many emerging economies, such as China, Hong Kong, India, Singapore Taiwan, Brazil and South Africa etc. Recently, portfolio investment has gained prominence in Nigeria. Until the mid-1980s, Nigeria did not record any figure on portfolio investment (inflow or outflow) in her BOP accounts. This was attributable to the non-internationalization of the country's money and capital markets as well as the non-disclosure of information on the portfolio investments of Nigerian investors in foreign capital/money markets (CBN 1997:151). With the introduction of various structural reforms: internationalization of domestic money and capital markets; repealing of the Exchange Control Act of 1962; Nigerian Enterprise Promotion (Issue of Non-Voting Equity Shares) Act of 1987 and enactment of the Nigerian Investment Promotion Commission Decree No. 16 of 1995; Foreign Exchange (Monitoring and Miscellaneous Provisions) Decree 17 of 1995; Company and Allied Matters Act 1990; and financial sector reforms aimed at promoting private sector led-growth and ensuring macroeconomic stability, Nigeria has started attracting substantial volume of foreign capital flows. For example, the Net Portfolio Investment (NPI) and Net Direct Investment (NDI) were mere ₦151.6 million and ₦735.8 million in 1986 and these rose to ₦51,079.13 billion and ₦115,952.2 million in 2000, respectively. By 2006, the NPI and NDI have gone up to ₦117,218.85 million and ₦573,835.05 million, respectively, indicating growth rates of 77,221 and 77,888 percent compared to 1986. Between 2007 and 2008, the NPI and NDI moved from ₦609,342.81 million and ₦759,380.40 to ₦350,919.40 million and ₦802,612.70, respectively. The sudden decline in the NPI from ₦609,342.81 million to ₦350,919.40 million between 2007 and 2008 could be attributed to capital flight, owing to the influence of the recent Global Financial and Economic Crises (GFEC).

Nigeria is one of the few countries that have benefited from the foreign inflow to Africa. Nigeria's share of inflow to Africa averaged around 10%, from 24.19% in 1990 to a low level of 5.88% in 2001 up to 11.65% in 2002 (CBN, 2004). The nominal FPI inflow ranged from N128.6 million in 1970 to N434.1 million in 1985 and N115.952 billion in 2000. This was an increase in real terms from the decline of the 1980s. Foreign inflows form a small percentage of the nation's gross domestic product (GDP), however, making up 2.47% in 1970, -0.81% in 1980, 6.24% in 1989 and 3.93% in 2002. (CBN, 2006).

There is no gaining saying that some developing and transition countries are attracting large inflows of foreign capital that could spur economic growth or have destabilizing effect on their economies, if not well managed. The destabilizing effect of foreign private capital flows has aroused concern over their potential effects on macroeconomic stability, the competitiveness of the export sector, and external viability. The most serious risks are that they fuel inflation and drive the real effective exchange rate to unsustainably high levels. The turmoil associated with massive foreign private capital movement has raised lots of issues on whether these flows are harmful or not. Consequently, the question, therefore, is whether foreign private capital flows affect economic

growth and some macroeconomic stability in Nigeria. The study examines the relationship among some components of the foreign private capital (Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI), economic growth, interest rate and inflation. Apart, from the introduction section, the rest of the paper is divided into five sections. Section 2 presents the theoretical framework and review of relevant literature, while section 3 reviews policy reforms, capital flows and macroeconomic development in Nigeria. Section 4 presents method of analysis and model specification, while section 5, focuses on the empirical result and analysis. Finally, section 6 is conclusion and policy recommendation.

2. Theoretical Framework and Literature Review

2.1 Theoretical Framework

In economics growth literature, the earliest model for determining the foreign capital-growth nexus was based on the pioneering works of the post-Keynesian growth models for closed economies as designed by Harrod (1939) and Domar (1946). The duo tried to identify the pre-conditions, which were needed in order to enable an industrialized economy, in this case of the U.S., to reach steady-state equilibrium of growth. In the early 1960s, the Harrod-Domar approaches, however, was adapted to open economies in the so-called Third World (Little, 1960; Chenery & Bruno, 1962; McKinnon, 1964; Chenery & Strout, 1966). The models assumed that there is an excess supply of labour, and growth is only constrained by the availability and productivity of capital. Three gaps were identified as constituting constraints to growth, and these gaps were needed to be filled by foreign capital to enable investment. The three gaps are: savings gap; trade balance gap (foreign exchange); and fiscal gap. Theoretically, the rationale for the relationship between capital flows and the savings–investment gap can be explained within the framework of a simple Keynesian macroeconomic model of an open economy or national income identities, where; $GDP(Y) = Consumption(C) + Investment(I) + Government(G)$ and Net Exports $(X-M)$.

Therefore;

$$Y = C + I + G + (X-M) \quad (a)$$

Also,

$$GDP(Y) = C + S + T \quad (b)$$

Where;

C = Consumption

S = Saving

T = Tax

From (a) and (b)

$$C + I + G + (X-M) = C + S + T \quad (c)$$

$$(X-M) = C + S + T - C - I - G \quad (d)$$

$$(X-M) = S - I + T - G \quad (e) \text{ (Note 1)}$$

$$(X-M) = (S + T - G) - I \quad (f)$$

$$FCR = (X-M) = (S + T - G) - I \quad (g)$$

In (f), the gap between aggregate domestic saving (private and public) and domestic investment (private and public) is equal to the gap between exports and imports. Two-gap model postulates that if the foreign exchange gap $(X - M)$ required in achieving a target rate of growth is greater than the domestic savings–investment gap, foreign aid is needed to fill the foreign exchange gap. Similarly, foreign aid is needed to fill the savings–investment gap if it is the larger of the two gaps (Note 2). The foreign capital requirement (FCR) in the economy could be expressed in terms of the gap between aggregate domestic saving (private and public) and domestic investment and the gap between exports and imports.

2.2 Literature Review

The most and strategic factor influencing economic growth in any country is investment. It is characterized as the main key to increased level of productivity. A strong correlation between investment and economic growth has been revealed by both theoretical and empirical studies by development economists in both developing and developed economics of the world. Capital flows has potential effects on macroeconomic stability, monetary and exchange rate management, competitiveness of the export sector and external viability. This is because no matter the nature of capital flows (flows over a medium-to-long-term), they are expected to influence the monetary

aggregates, especially the economy's net foreign assets (NFA), inflation, real effective exchange rate, aggregate output (GDP) and possibly the domestic interest rates. Fernandez-Arias and Montiel (2002) explained that surge in capital flows and its sustainability posed the possibility of macroeconomic distortions, arising from internal imbalances accentuated by distortions in the domestic financial sector, the real economy or from inadequate macroeconomic policy framework. Chakraborty (2001) explained the effects of inflows of private foreign capital on foreign currency assets, wholesale price index, money supply, real and nominal effective exchange rates and exports in India, using quarterly data for the period 1993-99. The Granger Causality test shows unidirectional causality from private capital flows to nominal effective exchange rates - both trade-based and export based, which raises concern about the RBI strategy in the foreign exchange market.

In a related study, Kohli (2003) empirically examined how capital flows affect a range of economic variables such as exchange rates, interest rates, foreign exchange reserves, domestic monetary condition and financial system in India during the period, 1986-2001, and concludes that the inflows of foreign capital have a significant impact on domestic money supply and stock market growth, liquidity and volatility. Froot and Ramadorai (2002) concluded that investor flows are important for understanding deviations of exchange rates from fundamentals, but not for understanding long-run currency values. Using daily, weekly and monthly data for 17 OECD countries, Hau and Rey (2002) noted that equity flows have become increasingly important over time and correlate strongly with exchange rates. Pavlova and Rigobon (2003) also estimated OLS regressions to show that demand shocks, associated with increased equity returns and capital inflows, correlate strongly with nominal exchange rates.

Also, the nature and source of capital flows helps in determining its impact on economic growth. Ironically, empirical evidence had established that they are not randomly available globally (Aremu, 2003). One of the fundamental issues of capital flows is the high risk of volatility, especially, Foreign Portfolio Investment (FPI) (short-term flows) that could be reversed at short notice, and probably leading to financial crisis (Obadan, 2004). The dangers of sudden capital flight are that they may create challenges for monetary policy and inflation management as well as foreign exchange rate stability and export competitiveness, especially, in countries with weak financial sectors and inappropriate macroeconomic policies. Conversely, Sadik and Bolbol (2001) argues that FDI is the least volatile of capital flows, and more important, can have direct and indirect effects on economic growth. The stability of FDI stems from the fact that direct investors have a longer-term view of the market, thus making them more resistant to herd behaviour, and from the sheer difficulty of liquidating assets at short notices.

3. Policy Reforms, Capital Flows and Macroeconomic Development in Nigeria

3.1 Policy Reforms

The federal government indigenization policy of the 1970s contributed in scuttling the growth of foreign capital flows in Nigeria. Prior to the promulgation of the Nigerian Enterprises Promotion (NEP) Act of 1972, there were some laws (e.g. Exchange Control Act of 1962, Section 7 of the Act, stipulates that "nobody within Nigeria could make any payment to anybody outside Nigeria or make such payment on behalf of anybody resident outside Nigeria without the permission of the Minister of Finance", Companies Act of 1968, Banking Act of 1969, Petroleum Act of 1969, Patents and Design Act of 1970 and Copy Rights Act of 1970) laid the relevant legal framework for the eventual take-off of the indigenization policy.

However, different policy reforms led to the change in the investment climate in Nigeria for both domestic and foreign investors. The abrogation of the Nigerian Enterprises Promotion Decree 1989 and the Exchange Control Act of 1962 as well as their subsequent replacements with Nigerian Investment Promotion Council Decree No 16 of 1995 and Foreign Exchange (Monitoring and Miscellaneous Provisions) Decree 17 of 1995, publication of Industrial Policy for Nigeria in January, 1989 provided foreign investors with enormous opportunity to participate in the economy. The Company and Allied Matters Act 1990 and Nigerian Investment Promotion Commission (NIPC) decree No. 16 of 1995 represented an institutional framework for the formation, management and winding-up of companies as well as registration of business names and incorporated trusteeship in Nigeria, while NIPC is to encourage, promote and co-ordinate investment in the country. The Foreign Exchange (Monitoring and Miscellaneous Provision Provisions) Decree 17 of 1995 was enacted to liberalize transactions involving foreign exchange, thereby; allowing for free flow of foreign capital. In addition, there was the establishment of Investment and Securities Act (ISA) of 1999 to further deregulate and enhance the development of the Nigerian capital market for greater inflow of foreign capitals. Apart from the law reforms, there are also the economic and financial sector policy reforms designed to reduce barriers, increase banking

capital base and attract investment as well as tax holidays, easing of import and customs controls, infrastructure investment, and labour law reform.

3.1.1 Capital Flows

Nigeria's foreign private capital flows involve mostly the Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI). The Foreign Portfolio Investment is a recent development in Nigeria and this was initially attributed to the non-internationalization of the country's money and capital markets as well as the non-disclosure of information on the portfolio investments of Nigerian investors in the foreign capital/money markets (CBN 1997:151).

Onosode, (1997) stated that between July 1995 and July 1996, about US\$6.0 million FPI was made in the Nigerian capital market through the Nigerian Stock Exchange (NSE) for the first time since 1962, while for the whole of 1996, foreign investment through the Nigerian Stock Exchange totaled US\$32.99 million; for 1995, it was US\$1.14 million (Obadan, 2004). In terms of net investment, the NPI in Nigeria was ₦151.6 million in 1986, and it rose to ₦51,079.13 million in 2000. By 2005, there was a tremendous increase in the NPI in Nigeria. It increased from ₦23,541.00 million in 2004 to ₦393,336.41 million in 2005, (indicating growth rate of 1,565 per cent). It, however, dropped to ₦294,956.59 million in 2006. In 2007, the NPI increased to ₦609,342.81 million before declining to ₦350,919.40 in 2008. The sudden drop in the NPI level in 2008 could be attributed to the capital flight witnessed in the country at the heat of the GFC. Similarly, the NDI was ₦735.8 million in 1986 and rose to ₦115,952.16 million in 2000. Furthermore, it increased from ₦654,193.18 million in 2005 to ₦1,779,594.79 million in 2006, indicating a growth rate of 172 per cent. In 2007, it dropped to ₦759,380.40 million but rose to ₦802,615.70 million in 2008 (Figure 1).

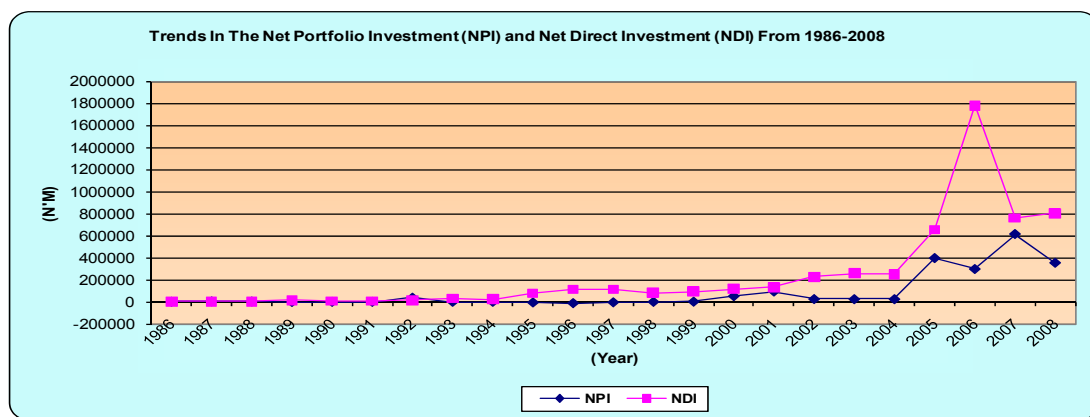


Figure 1.

Source: CBN Annual Reports and Statement of Account of Various Years

Within the same period, while the economy was experiencing huge inflows of FDI, it also witnessed some outflows. Between 1986-2008, the inflow of FDI was ₦4,024.00 million in 1986, while the outflow was ₦1,524.40 million, resulting in a net flow of ₦2,499.60 million. In 2000, ₦16,453.60 million was FDI inflow compared to ₦13,106.60 million outflow. In 2007, the FDI inflow and outflow were ₦54,254.20 million and ₦328.80 million, respectively, while the net flow was ₦53,924.80 million. However, the inflow and outflow dropped to ₦37,977.70 million and ₦4,362.50 million in 2008, resulting in a net flow of ₦33,615.20 million. Averagely, the annual FDI inflow and outflow in the economy for the period under review was ₦18,755.49 million and ₦4,090.89 million, respectively, thereby, resulting in a net flow of ₦14,518.59 million. Achieving a positive net foreign investment is important in influencing the overall position of a country's external sector (Figure 2).

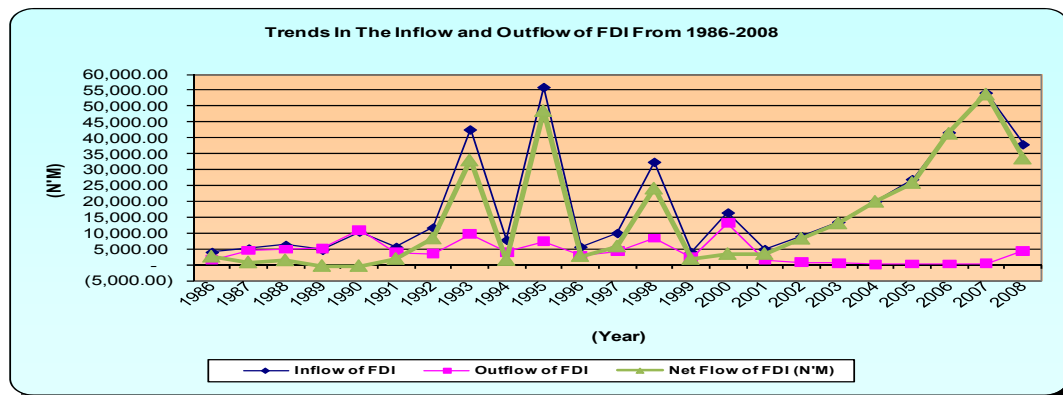


Figure 2.

Source: CBN Annual Reports and Statement of Account of Various Years

3.1.2 Macroeconomic Development

Review of the macroeconomic environment indicated that from the introduction of Structural Adjustment Programme (SAP) in 1986 through 1996, the average annual real GDP growth was 3.6 per cent. Between 1986 and 1996, the fiscal balance (FB)/GDP ratio improved from -11.9 to -0.45 per cent, while inflation rate worsened from 5.4 to 29.3 per cent. During the period, the current account balance (CAB)/GDP ratio declined from 11.6 to 8.9 per cent, while the stock of external reserves grew from US\$2.84 billion to US\$4.5 billion by end-December 1996. By 1995, the federal government abandoned the SAP and moved to a partial or guided deregulation of the economy. Comparatively, the average annual real GDP growth improved to 7.4 per cent from 3.6 per cent between 1997-2007 and 1986-1996, respectively, while it was 6.7 per cent in 2008. Meanwhile, the period 1999-2008, witnessed a stable democratic polity and this no doubt, would have influenced some of the improved developments in the macroeconomic aggregates. For example, the real GDP grew from mere 0.42 to 6.7 per cent between 1999 and 2008, while the fiscal balance (FB)/GDP ratio dropped from -8.93 to -0.20 per cent during the same period. Furthermore, the stock of external reserves grew from US\$5.42 billion to US\$53.0 billion between 1999 and 2008, while the current account balance (CAB)/GDP ratio increased from 1.5 to 17.4 per cent, respectively. Notwithstanding, the inflation rate soared from 6.6 to 15.1 per cent during the period.

4. Method of Analysis and Model Specification

4.1 Data

The series used in the analysis are annual observation expressed in natural logarithms and percentages with sample period, from 1986 to 2008. The reason for the choice of the period is apparently due to dearth of data as data on net portfolio investment started appearing on the Nigeria's Balance of Payment (BOP) table from 1986. The data source is from the various issues of the Central Bank of Nigeria Annual Reports and Statement of Account as well as the Statistical Bulletin, which includes nominal Gross Domestic Product (GDP), Net Direct Investment (NDI), Net Portfolio Investment (NNPI), Domestic Interest Rate (proxied by Nigeria Treasury Bills rate for three months) and Inflation rate (Headline Year-on-Year).

4.2 Model Specification

Our reduced form model is an unrestricted VAR as this is a good approximation for the dynamic process of any vector of time series. For the VAR estimation, we assume a simple model for the Nigerian economy with at least five endogenous variables: nominal Gross Domestic Product (GDP), Net Direct Investment (NDI), Net Portfolio Investment (NNPI), Domestic Interest Rate and Inflation rate of the form;

$$U(VAR) = (GDP, NDI, NNPI, INTR, INF) \quad (1)$$

VAR allows for the interpretation of any variable as a possible endogen and explains the variation through previous personal values and those of the model. The goal of a VAR analysis is to determine the interrelationships among the variables, not the parameter estimates, as it is the case in this paper. The mathematical representation of a VAR is:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \epsilon_t \quad (2)(\text{Note 3}).$$

Adapting equ. (2) in the following VAR model form: $U(\text{VAR}) = (\text{GDP}, \text{NDI}, \text{NNPI}, \text{INTR}, \text{INF})$, let a constant be the only exogenous variable. With two lagged values of the endogenous variables in the VAR, it may be written as:

$$\text{gdp}_t = a_{11}\text{gdp}_{t-1} + a_{12}\text{ndi}_{t-1} + a_{13}\text{nnpi}_{t-1} + a_{14}\text{intr}_{t-1} + a_{15}\text{inf}_{t-1} + b_{11}\text{gdp}_{t-2} + b_{12}\text{ndi}_{t-2} + b_{13}\text{nnpi}_{t-2} + b_{14}\text{intr}_{t-2} + b_{15}\text{inf}_{t-2} + c_1 + \epsilon_{1t} \quad (3)$$

$$\text{ndi}_t = a_{21}\text{gdp}_{t-1} + a_{22}\text{ndi}_{t-1} + a_{23}\text{nnpi}_{t-1} + a_{24}\text{intr}_{t-1} + a_{25}\text{inf}_{t-1} + b_{21}\text{gdp}_{t-2} + b_{22}\text{ndi}_{t-2} + b_{23}\text{nnpi}_{t-2} + b_{24}\text{intr}_{t-2} + b_{25}\text{inf}_{t-2} + c_2 + \epsilon_{2t} \quad (4)$$

$$\text{nnpi}_t = a_{31}\text{gdp}_{t-1} + a_{32}\text{ndi}_{t-1} + a_{33}\text{nnpi}_{t-1} + a_{34}\text{intr}_{t-1} + a_{35}\text{inf}_{t-1} + b_{31}\text{gdp}_{t-2} + b_{32}\text{ndi}_{t-2} + b_{33}\text{nnpi}_{t-2} + b_{34}\text{intr}_{t-2} + b_{35}\text{inf}_{t-2} + c_3 + \epsilon_{3t} \quad (5)$$

$$\text{intr}_t = a_{41}\text{gdp}_{t-1} + a_{42}\text{ndi}_{t-1} + a_{43}\text{nnpi}_{t-1} + a_{44}\text{intr}_{t-1} + a_{45}\text{inf}_{t-1} + b_{41}\text{gdp}_{t-2} + b_{42}\text{ndi}_{t-2} + b_{43}\text{nnpi}_{t-2} + b_{44}\text{intr}_{t-2} + b_{45}\text{inf}_{t-2} + c_4 + \epsilon_{4t} \quad (6)$$

$$\text{inf}_t = a_{51}\text{gdp}_{t-1} + a_{52}\text{ndi}_{t-1} + a_{53}\text{nnpi}_{t-1} + a_{54}\text{intr}_{t-1} + a_{55}\text{inf}_{t-1} + b_{51}\text{gdp}_{t-2} + b_{52}\text{ndi}_{t-2} + b_{53}\text{nnpi}_{t-2} + b_{54}\text{intr}_{t-2} + b_{55}\text{inf}_{t-2} + c_5 + \epsilon_{5t} \quad (7)$$

4.3 Estimation Techniques

The study takes cognizance of the challenges (non-stationarity/unit root) that may arise with econometric modeling, using time-series data. Results from a regression exercise involving non-stationary data is observed to be spurious (Granger and Newbold, 1974 and Granger, 1981). Therefore, the empirical analysis is carried out in the light of the recent developments in the time series analysis and this would check for the order of integration of these variables. Unrestricted VAR model is applied, while restriction is placed on the VAR-SVAR, non-recursive orthogonalization of the error terms for impulse response analysis, using a pattern matrix.

4.3.1 Unit Root Test for Stationarity of Series

This involves testing whether a stochastic process is stationary or non-stationary and the order of integration of the individual series under consideration. Currently, the most accepted method for the testing for unit root are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips (1987) and Phillips and Perron (1988). One advantage of ADF is that it corrects for higher order serial correlation by adding lagged difference term on the right hand side. It relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. The tests are conducted with and without a deterministic trend (t) for each of the series.

The general form of ADF test is estimated by the following regression:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{i=1}^n \alpha_i \Delta y_i + \epsilon_t \quad (8)$$

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{i=1}^n \alpha_i \Delta y_i + \delta_t + \epsilon_t \quad (9)$$

Where: y is a time series, t is a linear time trend, Δ is the first difference operator, α is a constant, n is the optimum number of lags in the dependent variable and ϵ is the random error term; and the Phillip-Perron (PP) is equation is thus:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{i=1}^n \alpha_i \Delta y_i + \delta_t + \epsilon_t \quad (10)$$

4.3.2 VAR Impulse Response Function (IRF)

Since the individual coefficients in the estimated VAR are often difficult to interpret, the IRF would be used (Gujarati, 2003). The IRF traces out the response of the dependent variables in the VAR system to shocks in the error term (eqns. 4 – 7).

4.3.3 VAR Identification

An identified VAR is a structural VAR (SVAR). The main purpose of SVAR estimation is to obtain non-recursive orthogonalization of the error terms for impulse response analysis. This alternative to the recursive Cholesky orthogonalization requires that enough restriction is imposed to identify the orthogonal (structural) components of the error terms. Let y_t be a k -element vector of the endogenous variables and let $\Sigma = E[\ell_t \ell_t']$

be the residual covariance matrix. Following Amisano and Giannini (1997), the class of SVAR models that EViews estimates may be written as:

$$Ae_t = Bu_t \quad (11)$$

Where e_t and u_t are vectors of length k . e_t is the observed (or reduced form) residuals, while u_t is the unobserved structural innovations. A and B are $k \times k$ matrices to be estimated. The structural innovations u_t is assumed to be orthonormal, i.e. its covariance matrix is an identity matrix $E[u_t u_t'] = I$. Thus, the assumption of orthonormal innovations u_t imposes the following identifying restrictions on A and B :

$$A \sum A' = B B' \quad (12)$$

Where both expressions on either side of equ(11) are symmetric, this imposes $k(k+1)/2$ restrictions on $2k^2$ unknown elements in A and B . Therefore, in order to identify A and B , we need at least $2k^2 - k(k+1)/2 = k(3k-1)/2$ additional restrictions.

4.3.4 Specifying the Identifying Restrictions

Estimating the orthogonal factorization matrices A and B requires provision of additional identifying restrictions of the form; $2k^2 - k(k+1)/2 = k(3k-1)/2$. We, therefore, distinguished two types of identifying restrictions: short-run and long-run. For either type, we applied the pattern matrices.

4.3.5 Short-run Restrictions by Pattern Matrices

The identifying restriction on the A and B matrices is done, using simple zero exclusion restrictions. In our case, we specify the restrictions by creating a named “pattern” matrix for A and B . Any elements of the matrix that you want to be estimated should be assigned a missing value “NA”. All non-missing values in the pattern matrix will be held fixed at the specified values. In our matrix A and B , we restricted A to be a lower triangular matrix with ones on the main diagonal and B to be a diagonal matrix.

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ \text{NA} & 1 & 0 & 0 & 0 \\ \text{NA} & \text{NA} & 1 & 0 & 0 \\ \text{NA} & \text{NA} & \text{NA} & 1 & 0 \\ \text{NA} & \text{NA} & \text{NA} & \text{NA} & 1 \end{pmatrix}$$

$$B = \begin{pmatrix} \text{NA} & 0 & 0 & 0 & 0 \\ 0 & \text{NA} & 0 & 0 & 0 \\ 0 & 0 & \text{NA} & 0 & 0 \\ 0 & 0 & 0 & \text{NA} & 0 \\ 0 & 0 & 0 & 0 & \text{NA} \end{pmatrix}$$

4.3.6 Long-run Restrictions by Pattern Matrices

Blanchard and Quah (1989) proposed an alternative identification method based on restrictions on the long-run properties of the impulse responses. The (accumulated) long-run response to structural innovations takes the form:

$$C = \delta_{\infty} A^{-1} B \quad (13)$$

Where $\delta_{\infty} = (I - A^{-1})^{-1}$ is the estimated accumulated responses to the reduced form (observed) shocks. Long-run identifying restrictions are specified in terms of the elements of this C matrix, typically in the form of zero restrictions. The restriction $C_{ij} = 0$ means that the (accumulated) response of the i -th variable to the j -th structural shock is zero in the long-run. It is important to note that the expression for the long-run response in eqn(11) involves the inverse of A . Since EViews currently requires all restrictions to be linear in the elements of A and B , specifying a long-run restriction, the matrix must be the identity matrix. Unrestricted elements in the

matrix should be assigned a missing value “NA”. For example, in our VAR model, we are restricting the long-run response of the other endogenous variable to the first structural shock on the gdp to be zero,

$$\mathbf{BB} = \begin{pmatrix} \text{NA} & \text{NA} & \text{NA} & \text{NA} & \text{NA} \\ 0 & \text{NA} & \text{NA} & \text{NA} & \text{NA} \\ 0 & \text{NA} & \text{NA} & \text{NA} & \text{NA} \\ 0 & 0 & 0 & \text{NA} & \text{NA} \\ 0 & 0 & 0 & 0 & \text{NA} \end{pmatrix}$$

5. Empirical Result and Analysis

The result of the unit root test shows that all the series were not stationary at level, thereby, indicating the presence of unit root. However, following the differencing of all the variables once, both the ADF and PP test suggested the absence of unit root (Appendices 1 & 2). We, therefore, conclude that the variables are stationary at first difference. This implies that the variables are integrated of order one, i.e. I(1). Following the above results, a VAR was conducted. A useful output from VAR is the impulse response function (IRF), which uses the Cholesky structural decomposition to explain the response of the variables to certain structural shocks. The response of the GDP to shocks from the NDI is not spontaneous (Note 4) and this is applicable to the other variables. It is somewhat sluggish but returns faster to the equilibrium compared to the response from the NNPI. Furthermore, the impact of the shock on the GDP from the NNPI is most lasting compared to the NDI. For example, after roughly nine (9) periods, the impact on the GDP is almost zero, suggesting that the NNPI does not affect output GDP in the long-run. In terms of response of the NNPI from the INTR shock, it responds quickly after the second (2) periods and until the later periods. However, this was not the case with the INF. On the other hand, the NDI responds to shock from INTR throughout the periods, except as it approaches the nine (9) periods, while the impact of shock from the INF was throughout the period. In order that the recursive Cholesky structural decomposition (Note 5) of the IRF is restricted, a zero restriction is placed on the VAR in both short-run and long-run. The results indicate that the NNPI impacts on the GDP at the short-run, while the NDI does not. Also, the INTR is shown to impact on the NNPI in the short-run. Furthermore, in the long-run, the GDP responds more to the impact of the NNPI compared to the NDI. While the NDI responds to the INTR, the NNPI does the same to the INF.

6. Conclusion and Recommendations

6.1 Conclusion

We attempt to offer evidence on the relationship between some components of the foreign private capital flows and some macroeconomic variables in Nigeria, using nominal Gross Domestic Product (GDP), Net Direct Investment (NDI), Net Portfolio Investment (NNPI), Domestic Interest Rate (INTR) and Inflation rate (INF). The series used in the analysis is tested for stationarity, using the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP). The result indicates that the variables are not stationary at level, though stationary at first difference. Consequently, A VAR model is developed and the result of the Impulse Response Function is conducted, using the Cholesky structural decomposition. The response of the GDP to shocks from NDI is not spontaneous and this is applicable to other variables. The GDP returns faster to equilibrium from the NDI shock compared to the response from the NNPI. In terms of response of the NNPI from the INTR shock, it responds quickly after the second (2) periods and until the later periods than the NDI. With zero restriction placed on the VAR in order to make the model non-recursive, the result of the short-run and long-run indicates that the NNPI impacts on the GDP at the short-run, while the NDI does not. Also, the INTR is shown to impact on the NNPI in the short-run. Furthermore, on the long-run, the GDP responds more to the impact of the NNPI compared to the NDI. While the NDI responds to INTR and the NNPI does the same to INF.

From the foregoing, it is evident that the GDP responds differently to shocks from the NDI and NNPI both in the short-run and long-run, while the NDI and NNPI reacts differently to INTR and INF. The implication of the findings is that in periods of foreign private capital surge or flight, the NNPI would have more devastating impact on the GDP and INF compared to the NDI. Thus, there is no gainsaying that a sudden increase in the outflow of capital, especially, the NNPI exerts a destabilizing effect on the domestic interest rate, exchange rates and country's reserve position. Such flight could lead to reduction in growth potentials, as a result of reduction in available resources to finance domestic investment.

6.2 Policy Recommendation

Nonetheless, experience of other developing countries give contradicting reports on the effect of Foreign Private Investment, the Nigerian case is a bit different in that Foreign Private Capital has a significant effect on economic growth rate of Nigeria. Capital flows are very important because of their potential effects on the macroeconomic stability, monetary and exchange rate management as well as competitiveness of the export sector and external viability of a country. This is because no matter the nature of capital flows (flows over a medium-to-long-term), they are expected to influence the monetary aggregates, especially, the economy's net foreign assets (NFA), inflation, real effective exchange rate, aggregate output (GDP) and possibly the domestic interest rates. Consequently, any policy recommendation on this should understand, the nature, what drives the capital flows and the impact of its sudden surge or reversal on economy. It is, however, recommended that since the NNPI is more fluid, and the GDP responds more to its impacts than the NDI, the NNPI inflows could be sterilized within a period, before the beneficiaries could be allowed access to it. This is, very important in order to forestall their potential adverse impacts on macroeconomic variables as well as the economic growth in a situation of their sudden surge or flight. Achieving this, could also require the gradual and sequential opening-up of the capital account of the Balance of Payment account as well as sound macroeconomic management.

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Notes

Note 1. $X - M$ = Trade Balance Gap, $S - I$ = Savings – Investment Gap, $T - G$ = Fiscal Gap, explained within a set of economic growth rate.

Note 2. It simply means that foreign capital is needed to relax the limits to growth.

Note 3. Where y_t is a k vector of endogenous variables, x_t is a d vector of exogenous variables, $A_1, \dots, A_p$ and B are matrices of coefficients to be estimated, and ϵ_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

Note 4. The spontaneity of the response of a particular variable to another could be affected by the nature of the time series data.

Note 5. The reason behind the placing of the restriction is to make it non-recursive.

Appendices

Appendix 1: Unit Root test for Stationarity at Levels

S/No	Variable	ADF (Intercept)	ADF (Trend and Intercept)	PP (Intercept)	PP (Trend and Intercept)
1	logngdp	-0.2336 (-3.6056)	-1.5824 (-4.2050)	-0.2479 (-3.6056)	-1.8238 (-4.2050)
2	logndi	-0.4016 (-3.6105)	-3.0232 (-4.2050)	-0.2003 (-3.6056)	-2.8405 (-4.2050)
3	lognnpi	-2.0290 (-3.7695)	-2.8073 (-4.4407)	-2.0290 (-3.7696)	-2.8073 (-4.4407)
4	intr	-2.7419 (-3.7696)	-3.2983 (-4.4407)	-2.7615 (-3.7696)	-3.2804 (-4.4407)
5	inf	-2.3604 (-3.7696)	-2.8830 (-4.5326)	-2.4081 (-3.7696)	-2.7987 (-4.4407)

Note: Significance at 1% level and * at 5% level. Figures within parenthesis indicate critical values. Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.

Source: Author's Estimation using Eviews 7.2.

Appendix 2: Unit Root Test for Stationary at First Difference

S/No.	Variable	ADF (Intercept)	ADF (Intercept and Trend)	PP (Intercept)	PP (Intercept and Trend)
1	loggdgdp	-7.3667 (-4.7880)	-7.3391 (-4.4679)	-7.99349 (-3.7880)	-8.7933 (-4.4679)
2	logndi	-4.0307 (-3.8085)	-4.2202* (-3.6584)	-11.8245 (-3.7880)	-19.2745 (-4.4679)
3	lognnpi	-6.3045 (-3.7880)	-6.2722 (-4.4679)	-7.0388 (-3.7880)	-8.5596 (-4.4679)
4	intr	-5.5981 (-3.7880)	-5.5872 (-4.4679)	-7.3598 (-3.7880)	-9.6966 (-4.4679)
5	inf	-4.2857 (-3.7880)	-4.2132* (-3.6450)	-4.8698 (-3.7880)	-4.7529 (-4.4679)

Note: Significance at 1% level and * at 5% level. Figures within parenthesis indicate critical values. Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.

Source: Author's Estimation using Eviews 7.2.

Appendix 3a: Short-Run Structural VAR**Short-Run Structural VAR Restriction Table**

Structural VAR Estimates

Date: 08/01/11 Time: 16:16

Sample (adjusted): 1989 2008

Included observations: 20 after adjustments

Estimation method: method of scoring (analytic derivatives)

Convergence achieved after 26 iterations

Structural VAR is just-identified

Model: $Ae = Bu$ where $E[uu'] = 1$

Restriction Type: short-run pattern matrix

A =	1	0	0	0	0
	C(1)	1	0	0	0
	C(2)	C(5)	1	0	0
	C(3)	C(6)	C(8)	1	0
	C(4)	C(7)	C(9)	C(10)	1
B = C(11)	0	0	0	0	0
	0	C(12)	0	0	0
	0	0	C(13)	0	0
	0	0	0	C(14)	0
	0	0	0	0	C(15)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.051641	0.265644	-0.194398	0.8459
C(2)	-0.804405	0.375268	-2.143549	0.0321
C(3)	4.717628	1.505853	3.132861	0.0017
C(4)	-18.73132	6.293048	-2.976509	0.0029
C(5)	0.066750	0.315585	0.211513	0.8325
C(6)	-0.804139	1.143237	-0.703388	0.4818
C(7)	-2.275301	3.961138	-0.574406	0.5657
C(8)	2.297082	0.809132	2.838945	0.0045
C(9)	4.444562	3.280368	1.354897	0.1755
C(10)	0.571389	0.765354	0.746568	0.4553
C(11)	0.561685	0.088810	6.324555	0.0000
C(12)	0.667279	0.105506	6.324555	0.0000
C(13)	0.941758	0.148905	6.324555	0.0000
C(14)	3.407797	0.538820	6.324555	0.0000
C(15)	11.66410	1.844255	6.324555	0.0000

Log likelihood	-194.7181			
Estimated A matrix:				
1.000000	0.000000	0.000000	0.000000	0.000000
-0.051641	1.000000	0.000000	0.000000	0.000000
-0.804405	0.066750	1.000000	0.000000	0.000000
4.717628	-0.804139	2.297082	1.000000	0.000000
-18.73132	-2.275301	4.444562	0.571389	1.000000
Estimated B matrix				
0.561685	0.000000	0.000000	0.000000	0.000000
0.000000	0.667279	0.000000	0.000000	0.000000
0.000000	0.000000	0.941758	0.000000	0.000000
0.000000	0.000000	0.000000	3.407797	0.000000
0.000000	0.000000	0.000000	0.000000	11.66410

Appendix 4b: Long-Run Structural VAR**Long-Run Structural VAR Restriction Table**

Structural VAR Estimates

Date: 08/01/11 Time: 16: 16

Sample3 (adjusted): 1989 2008

Included observations: 20 after adjustments

Estimation method: method of scoring (analytic derivatives)

Convergence achieved after 14 iterations

Structural VAR is just-identified

Model: $Ae = Bu$ where $E[uu'] = 1$

Restriction Type: long-run pattern matrix

Long-run response pattern:

C(1)	C(2)	C(4)	C(7)	C(11)
0	C(3)	C(5)	C(8)	C(12)
0	0	C(6)	C(9)	C(13)
0	0	0	C(10)	C(14)
0	0	0	0	C(15)

	Coefficient	Std. Error	z-Statistics	Prob.
C(1)	0.151902	0.024018	6.324555	0.0000
C(2)	0.043921	0.034669	1.266862	0.2052
C(3)	0.342377	0.054135	6.324555	0.0000
C(4)	-0.133132	0.041149	-3.235344	0.0012
C(5)	-0.280545	0.088480	-3.170711	0.0015
C(6)	0.948350	0.149947	6.324555	0.0000
C(7)	-0.084038	0.048093	-1.747416	0.0806
C(8)	-0.174524	0.102751	-1.698506	0.0894
C(9)	-0.192788	0.214237	-0.899884	0.3682
C(10)	3.062309	0.484194	6.324555	0.0000
C(11)	0.162643	0.056132	2.897513	0.0038
C(12)	0.086182	0.107261	0.803475	0.4217
C(13)	-0.584938	0.235331	-2.485600	0.0129
C(14)	0.194279	0.685442	0.283437	0.7768
C(15)	7.978983	1.261556	6.324555	0.0000

Log likelihood**-194.7181**

Estimated A matrix

1.000000	0.000000	0.000000	0.000000	0.000000
0.000000	1.000000	0.000000	0.000000	0.000000
0.000000	0.000000	1.000000	0.000000	0.000000
0.000000	0.000000	0.000000	1.000000	0.000000
0.000000	0.000000	0.000000	0.000000	1.000000

Estimated B matrix:

0.224783	-0.037172	-0.109086	-0.482095	0.138799
-0.019172	0.585936	-0.279818	-0.065178	-0.140954
0.371571	0.243448	0.740978	-0.573617	-0.125986
0.775070	0.605154	-1.498927	5.131527	0.741511
-2.700089	2.636308	-2.432885	-9.863231	12.12279