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Economic Growth, Capital Flows, Foreign Exchange Rate, Export and Trade Openness in Nigeria[1]

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ABSTRACT

Evidence abound that some transition and developing countries are attracting large inflows of foreign capital that could engender economic growth or have destabilizing effect on their economies if not well managed. This has undoubtedly aroused anxiety over its potential effects on economic growth, the competitiveness of the export and external sectors viability. The study examines the impact of capital flows (foreign direct investment), exchange rate, export and trade openness on economic growth in Nigeria as well as the causal long-run relationship among the variables, using time series data from 1970 – 2010. The unit root test confirmed the series to be stationary at I(1), while the Johansen cointegration test suggested the existence of at least one cointegration vector among the variables. Using Engle-Granger 2-Step procedure, it was observed that all the variables, except the fdi are statistically significant and impact on economic growth in the short-run dynamic equilibrium model. Exogeneity test confirmed that fdi has weak exogeneity with economic growth. In addition, the Pairwise Granger causality revealed the existence of uni-directional causality between economic growth and fdi, and uni-directional and bi-directional causality among some of the variables. Consequently, it is recommended that government should continue to pursue trade and foreign exchange policies that would ensure competitiveness and viability of the export sector as well as economic growth, while foreign direct investment should be encouraged amidst thriving business environment that would engender economic growth.

Keywords: *Economic Growth; Capital Flows; Export; and Foreign Exchange Rate*
JEL Classification: F43; E22; F13; and F31

(1.0) INTRODUCTION

The pursuit of economic growth has been at the front burner of economic policy of most developing countries. This, however, is often hindered by the non-availability of resources that would drive the process of achieving the required economic growth. The need for foreign capital flow arises when the desired investment exceeds 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).

Nigeria, like most developing countries has benefited immensely from capital flows. However, Nigeria's share in global flows is a miniscule when compared to the net private capital flows for developing countries worth US$491.0 billion in 2005 (World Bank, 2006). In the 1960s, and 70s, most capital flows to Nigeria were directed to governments in the form of overseas development assistance (ODA) or to the private sector through the banking system. This situation changed in the 1980s and capital flows took the form of foreign direct investment (FDI) and foreign portfolio investment (FPI). While portfolio investment has been a notable feature

[1] Views expressed in the paper are those of the authors and do not necessarily represent the Central Bank of Nigeria (CBN) position.

of developed economies, it is becoming a very important component of the balance of payments of many emerging economies, such as China, Hong Kong, India, Singapore, Taiwan, Brazil, South Africa etc. (Obadan, 2004). Recently, portfolio investment has gained prominence in Nigeria. Before the middle of 1980s, Nigeria did not record any figure on portfolio investment (inflow or outflow) in her balance of payment (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).On the other hand, FDI dominated Nigeria's capital flows and its benefits are aptly captured by Sadik and Bolbol (2001) in their study. They argued 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.

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 attracted substantial volume of foreign capital flows. For example, the FDI was ₦128.60 million (US$180.04 million) in 1970 and rose to ₦253.00 million (US$410.78 million) in 1975.By 1985, it has jumped to ₦434.10 million (US$485.68 million) and further ₦75,940.60 million (US$937.27 million) in 1995, a decade later. Between 2005 and 2010, FDI increased from ₦654,193.15 million (US$5,009.07 million) to ₦905,730.80 million (US$6,011.63 million), indicating a growth rate of 38.5 per cent. As the FDI was growing, the Gross Domestic Product (GDP) and export witnessed tremendous growth. The GDP grew by ₦5,281.10 million (US$7,393.39 million), ₦21,475.20 million (US$34,868.00 million), ₦67,908.60 million (US$75,977.40 million), ₦1,933,211.60 million (US$23,860.09 million), ₦14,572,239.10 million (US$111,577.80 million) and ₦29,108,670.82 million (US$193,203.72 million) for the period, 1970, 1975, 1985, 1995, 2005 and 2010, respectively. The export grew by ₦885.67 million (US$1,239.91 million), ₦4,925.50 million (US$7,997.24 million), ₦11,720.80 million (US$13,113.45 million), ₦950,661.40 million (US$11,733.26 million), ₦6,372,052.44 million (US$48,790.00 million) and ₦11,035,794.50 million (US$73,2248.16 million), respectively, during the same period. Meanwhile, the Nigerian naira exchange rate against the USA dollar fluctuated throughout the period.

Notwithstanding, large capital flows could spur economic growth or have destabilizing effect in the economy, if not well managed. The destabilizing effect of foreign capital inflow has aroused concern over their potential effects on macroeconomic stability, the competitiveness of the export sector, and external sector viability. The most serious risks are that they fuel inflation and drive the real effective exchange rate to unsustainably high levels. In view of the foregoing, the study examines the impact of capital flows (foreign direct investment), exchange rate, export and trade openness on economic growth in Nigeria and the long-run causal relationship existing among the variables. Following the introduction, section 2 presents the theoretical framework and review of relevant literature. Section 3 preview policy reforms, economic growth, capital flows and export in Nigeria. Section 4 presents method of analysis and model specification, while Section 5, focuses on the empirical result and analysis. Finally, section 6 concludes the paper.

(2.0) THEORETICAL FRAMEWORK AND EMPIRICAL LITERATURE REVIEW

(2.1) Theoretical Framework

In economic 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). They tried to identify the pre-conditions needed to enable an industrialized economy, in this case the U.S., to reach steady-state equilibrium of growth. In the early 1960s, the Harrod-Domar approaches, however, were adapted to open economies in the so-called Third World (Little, 1960; Chenery and Bruno, 1962; McKinnon, 1964; Chenery and 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;

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

Also,
GDP (Y) = C + S + T ---------- (b)

Where:
C = Consumption
S = Savings
T = Tax
FCR = Foreign Capital Requirement
From (a) and (b)
C + I + G + (X-M) = C + S + T ----------(c)
(X-M) = C + S + T – C – I – G ---------- (d)
(X-M) = S – I + T– G ---------- (e)[2]
(X-M) = (S + T – G) – I ---------- (f)
FCR = (X-M) = (S + T – G) – I ---------- (g)

In eqn. (f), the gap between aggregate domestic saving (private and public) and domestic investment is equal to the gap between exports and imports.The Two-gap model postulates that if the foreign exchange gap (X – M) required for 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[3].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-eqn. (f).

(2.2) Empirical Literature Review

There exist divergent scholarly opinions on the determinants of foreign capital flow in developing countries as well as its importance in enhancing economic growth. Some empirical studies of foreign capital flow to developing countries indicate that changes in output are the most important determinant of private foreign capital flows (Greene and Villanveva; 1991), while Serven and Solimano (1992), however, described the results as puzzling because a substantial amount of variation in output are mostly transitory and hence should not affect investment. Solimano (1992) undertakes an excellent review of other variables that influence foreign capital flows to include exchange rate, irreversibility of investment, uncertainty, and the role of credibility. He concludes that if the domestic private investment climate is not conducive, it becomes difficult to attract a substantial inflow of capital across the borders.

Essien and Onwioduokit (1999) in their study on foreign capital flow in Nigeria, using Cointegration technique, identified some variables that influence capital flow to include credit rating, debt service ratio, interest rates differentials, nominal exchange rate, and real income. Ayanwale, (2007) suggested that the determinants of FDI in Nigeria are market size, infrastructure development and stable macroeconomic policy. He posited that FDI contributes positively to economic growth in Nigeria, although the overall effect of FDI on economic growth may not be significant. Chakraborty (2001) explained the effects of inflows of private foreign capital on some major macroeconomic variables in India, using quarterly data for the period, 1993-1999. She analyses the effect of private foreign capital inflows and some macroeconomic variables; foreign currency assets, wholesale price index, money supply, real and nominal effective exchange rates and exports. She confirms the presence of long-run equilibrium relationships between some pairs of variables. 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.

Kang et al (2002) empirically analyzed the determinants of capital flows in Korea and captured cross-country variations in East Asia based on quarterly data from 1990-2001 and concludes that interest rate, inflation rate, real GDP growth and exchange rate volatility were statistically significant. In a related study, Kohli (2003) empirically examines 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, Rey (2002) noted that equity flows have become increasingly important over time and correlate strongly with

[2] X-M = Trade Balance Gap, S – I = Saving- Investment Gap, T – G= Fiscal Gap, explained within a set economic growth rate.
[3] It simply means that foreign capital is needed to relax the limits to growth

exchange rates (Hau and Rey, 2002). 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.

(3.0) POLICY REFORMS, ECONOMIC GROWTH, CAPITAL FLOWS AND EXPORT IN NIGERIA

(3.1) Policy Reforms

The Federal Government of Nigeria's indigenization policy of the 1960s and 70s affected the growth of foreign capital flows into Nigeria. As observed by Anyanwu (1998), changes in domestic investment, change in domestic output or market size, indigenization policy, and change in openness of the economy as the major determinants of FDI. He further noted that the abrogation of the indigenization policy in 1995 encouraged FDI inflow into Nigeria and that effort must be made to raise the nation's economic growth so as to be able to attract more FDI. 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 enormous impetus 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. Adducing to this, Jerome and Ogunkola (2004) noted that while the FDI regime in Nigeria was generally improving, some serious deficiencies remain. These deficiencies are mainly in the area of the corporate environment (such as corporate law, bankruptcy, labour law, etc.) and institutional uncertainty, as well as the rule of law.

(3.2) Economic Growth, Capital Flows and Export in Nigeria

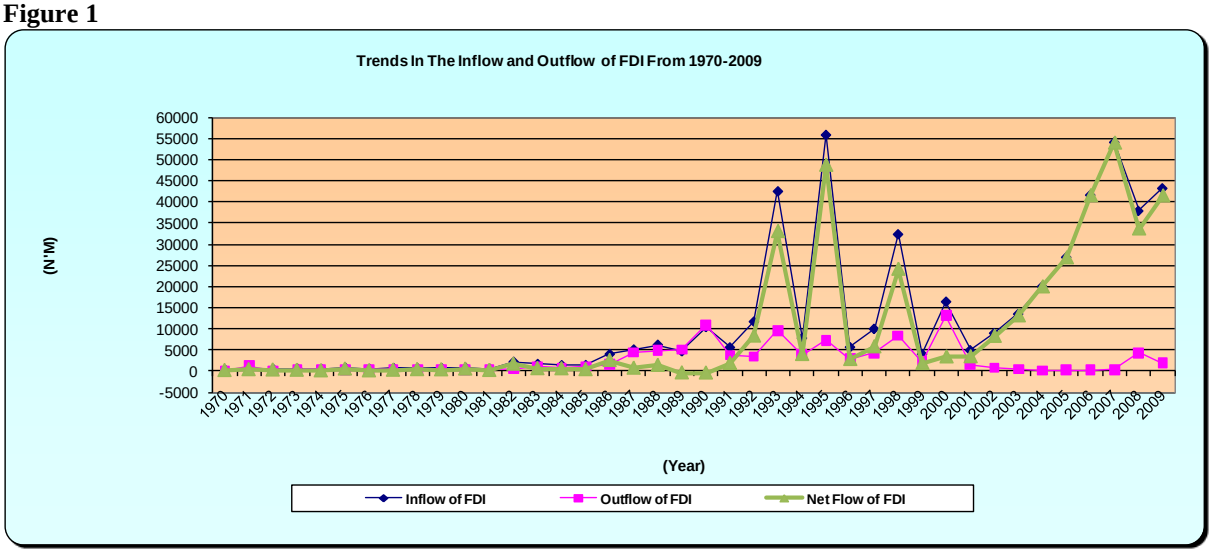
The Nigerian economy has been growing tremendously, especially after the discovery of crude oil and its subsequent dominance from the 1970s. The economy grew by -29.59, 70.68, 9.52, 2.16, 6.51 and 8.4 per cent for the period, 1970, 1975, 1985, 1995, 2005 and 2010, respectively. The growth in GDP was mostly driven by the agricultural sector, which forms the mainstay of Nigerian economy. Averagely, the sector contributed 56.4, 28.9, 35.8, 32.9 and 36.5 per cent for the period, 1960-70, 1971-80, 1981-90, 1991-2000, 2001-2010, respectively. In addition, while it may be argued that the export sector has increased over the past decades, the sector is dominated by the crude oil. As observed by Gbayesola and Uga (1995), oil has consistently accounted for over 80.0 per cent of total government revenue and over 90.0 per cent of foreign exchange earnings over the past two decades. The oil contributed 22.6, 88.9, 95.3, 97.5 and 97.3 per cent to the export, while the non-oil contribution was 77.4, 11.1, 4.7, 2.5 and 2.7 per cent, respectively, during the period.

Similarly, capital flows has been growing in Nigeria. Nigeria's foreign capital flows involve mostly the Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI).The FPI is not a very prominent component of capital flows in Nigeria. Until 1986, it was not a component of the capital account of Balance of Payment (BOP) account. On the other hand, FDI forms a small percent of the Nigeria's nominal GDP. In 1970, it was 2.44 per cent and twenty years later, it declined to 1.75 per cent. However, in 2010, it rose to 3.11 per cent. In average, during the period, 1970-2010, the FDI/GDP ratio was 2.38 per cent. According to CBN (2001:64), the low level of FDI in Nigeria was attributed to a number of factors, among which include; macroeconomic instability, as evidenced by rising inflation, interest and exchange rates volatility, owing to fiscal dominance. Obadan (2004) noted other constraints as poor infrastructural facilities, frequent disruption of power supply, inadequate water supply and poorly maintained network of roads. Nonetheless, it has grown tremendously over time. It was

₦128.60 million (US$180.04 million) in 1970 and rose to ₦253.00 million (US$410.78 million) in 1975. By 1985, it has jumped to ₦434.10 million (US$485.68 million) and further ₦75,940.60 million (US$937.27 million) in 1995. Between 2005 and 2010, FDI increased from ₦654,193.15 million (US$5,009.07 million) to ₦905,730.80 million (US$6,011.63 million), respectively.

Meanwhile, as the economy was experiencing large inflows of FDI, it also witnessed some outflows. Figure 1 underscores the inflow and outflow of FDI[4] into the Nigerian economy during the study period. The inflow of FDI into the economy was ₦251 million (US$351.39 million) in 1970, while the outflow was ₦129.4 million (US$181.16 million) for the same period. During this period, the net flow was ₦121.6 million (US$170.24 million) and its proportion to GDP was 2.3 per cent. By 1990, the FDI inflow and outflow were ₦10,450.2 million (US$1,300.13 million) and ₦10,914.5 million (US$1,357.90 million) compared to ₦786.4 million (US$1,439.24) million) and ₦319.4 million (US$584.55 million) in 1980, respectively. Nevertheless, between 2000 and 2009, the FDI inflow increased to ₦43,334.7 million (US$291.07 million) from ₦16,453.6 million (US$163.23 million), while the outflow dropped to ₦1,905.3 million (US$12.80 million) from ₦13,106.6 million (US$130.02 million). The net inflow/GDP ratio increased from 0.07 to 0.17 per cent in the same period, perhaps indicating more investors' confidence in a more stable political landscape as well as robust macroeconomic environment. Throughout the period, 1970-2009, the average net flow to GDP was 1.06 per cent.

Figure 1



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

(4.0) METHOD OF ANALYSIS AND MODEL SPECIFICATION

(4.1) Data

The series used in the analysis are annual observation expressed in natural logarithms with sample period, from 1970-2010. 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 (NGDP), Foreign Direct Investment (FDI), nominal Foreign Exchange (EXCH), Export (EXPT) and Trade Openness (TRPE).

(4.2) Model Specification

In analyzing the long-run static and short-run dynamics relationships among nominal Gross Domestic Product (NGDP), Foreign Direct Investment (FDI), Foreign Exchange (EXCH) Export (EXPT) and Trade Openness (TRPE), we used the Johansen Cointegration and Granger causality Test in the following Unrestricted VAR model form: U (VAR) = (NGDP, FDI, EXCH, EXPT, TRPE). Unrestricted VAR allows 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, as it is the case in this paper. The primary model is specified below:

ngdp = f(fdi, exch, expt, trpe) ---------- (1)

[4]Foreign Direct Investment flows fall into two categories; foreign direct investment for the establishment of new enterprises and foreign investment inflow through the existing enterprises (Odozi 1995:8). It is mostly flows of non-oil foreign private capital

The function can also be represented in a log-linear econometric form:

$$\text{logngdp}_t = \alpha_0 + \alpha_1 \text{logfdi}_t + \alpha_2 \text{logexch}_t + \alpha_3 \text{logexpt}_t + \alpha_4 \text{logtrpe}_t + \epsilon_t \text{----------(2)}$$

Where:
ngdp is Nominal Gross Domestic Product (Proxy for Economic Growth);
exch is Nominal Foreign Exchange Rate;
fdi is Foreign Direct Investment and a form of capital flows
expt is Export;
trpe is Trade Openness (Export and Import/Nominal Gross Domestic Product); and
α_0 is the constant term, 't' is the time trend, and 'ϵ' is the random error term.

(4.3) Estimation Techniques

The study took 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, while the OLS technique is applied to the long-run static and short-run dynamic models.

(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 is 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:

$$y_t = \alpha^0 + \alpha^1 y^{t-1} + \sum_{i=1}^{n} \alpha \Delta y_i + \epsilon^t \text{---------- (3)}$$

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{n=1}^{n} \alpha_1 \Delta y_i + \delta_t + \epsilon^t \text{---------- (4)}$$

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: $\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{n=1}^{n} \alpha_1 \Delta y_i + \delta_t + \epsilon^t$ ---------- (5)

(4.3.2) Cointegration Rank Test

For the cointegration test, the maximum likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991) was used. In the test, if y_t is a vector of n stochastic variables, then there exists a p-lag vector auto regression with Gaussian errors. Johansen's methodology takes its starting point in the vector auto regression (VAR) of order P given by

$$y_t = \mu + \Delta y_{t-1} - - - + \Delta P y_{t-p} + \epsilon_t \text{----------(6)}$$

Where y_t is an (nx1) vector of variables that are integrated of order commonly denoted (1) and is an ϵ_t(nx1) vector of innovations. In order to determine the number of co-integration vectors, Johansen(1988, 1989) and Johansen and Juselius (1990) suggested two statistic tests, the first one is the trace test (λ trace). It tests the null hypothesis that the number of distinct cointegrating vector is less than or equal to q against a general unrestricted alternatives q = r. the test calculated as follows:

$$\lambda \text{ trace (r)} = T \sum_{i=r+1} \left[In\, 1 - \hat{\lambda}_t \right] \text{---------- (7)}$$

T is the number of usable observations, and the λ_i isthe estimated eigenvalue from the matrix. The second statistical test is the maximum eigenvalue test (λ max) that is, calculated according to the following formula; λ max(r, r +1) = T In(1- λ_r +1). The test concerns a test of the null hypothesis that there is r of co-integrating vectors against the alternative that r + 1 co-integrating vector.

(4.3.3) Error Correction Model (ECM)

Where cointegration exists among series, then the next step is to construct an error correction mechanism to model dynamic relationship. The essence of the error correction model is to show the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The greater the co-efficient of the parameter, the higher the speed of adjustment of the model from the short-run to the long-run. We represent equation (2) with an error correction form that allows for inclusion of long-run information thus, the error correction model (ECM) can be formulated as follows:

$$\text{logngdp}_t = \alpha_0 + \sum_{t=1}^{n} \alpha_{1t}\log\Delta\text{fdi}_{t-1} + \sum_{i-1}^{n-1} \alpha_{2t}\log\Delta\text{exch}_{t-1} + \sum_{i-2}^{n-2} \alpha_{3t}\log\Delta\text{expt}_{t-1+} \lambda\ \text{ECM}_{t-1} + \epsilon_t \text{---------- (8)}$$

Δ is the first difference operator and λ is the error correction coefficient and the remaining variables are as defined above.

(4.3.4) VAR and Granger Causality Test

The test of cointegration ignores the effect of the past values of one variable on the current value of the other variable. So, we tried the Granger causality test to examine such possibilities. Granger causality tests whether lagged values of one variable predict changes in another, or whether one variable in the system explains the time path of the other variables. The test for Granger causality is performed by estimating equations of the following form.

$$\Delta y_t + \alpha_{0+} \sum_{i=1}^{m} \alpha_{1,i}\Delta y_{t-i} + \sum_{i=0}^{m} \alpha_{2,i}\Delta x_{t-i} + \delta\text{ECM}_{t-1} + \epsilon_t \text{ ---------- (9)}$$

$$\Delta x_t + \beta_{0+} \sum_{i=1}^{m} \beta_{1,i}\Delta x_{t-i} + \sum_{i=0}^{m} \beta_{2,i}\Delta y_{t-i} + \lambda\ \text{ECM}_{t-1} + \mu_t \text{ ---------- (10)}$$

Where ϵ_t and μ_t are white noise disturbance terms (normally and independently distributed), *m* is the number of lags necessary to induce white noise in the residuals, and $\text{ECM}_{t-1}$is the error correction term from the long-run relationship. x_t is said to Granger-cause $y_{t,,}$ if one or more $\alpha_{2,i}$*(i = 1,…m)* and δ are statistically different from zero. Similarly, y_t is said to Granger-cause $x_{t,}$ if one or more $\beta_{2,i}$ *(i = 1,…m)* and λ are statistically different from zero. A feedback or bi-directional causality is said to exist if at least $\alpha_{2,I}$ and $\beta_{2,i}$*(i = 1,…m)* or δ and λ are significantly different from zero. If on the other hand, $\alpha_{2,0}$ or $\beta_{2,0}$ are statistically significant, then we have an instantaneous causality between y_t and x_t (M'Amanja and Morrissey, 2005). However, the unrestricted VAR in first difference is estimated in the following form:

$$\Delta\text{ngdp}_t = \sum_{i=1}^{n} b_{1t}\Delta\text{ngdp}_{t-1} + \sum_{i=1}^{n} c_{1t}\Delta\text{fdi}_{t-1} + \sum_{i=1}^{n} d_{1t}\Delta\text{exch}_{t-1} + \sum_{i=1}^{n} e_{1t}\Delta\text{expt}_{t-1} + \sum_{i=1}^{n} f_{1t}\Delta\text{trpe}_{t-1} + \epsilon_{1t} \text{---- (11)}$$

$$\Delta\text{fdi}_t = \sum_{i=1}^{n} b_{2t}\Delta\text{ngdp}_{t-1} + \sum_{i=1}^{n} c_{2t}\Delta\text{fdi}_{t-1} + \sum_{i=1}^{n} d_{2t}\Delta\text{exch}_{t-1} + \sum_{i=1}^{n} e_{2t}\Delta\text{expt}_{t-1} + \sum_{i=1}^{n} f_{2t}\Delta\text{trpe}_{t-1} + \epsilon_{2t} \text{ --------- (12)}$$

$$\Delta\text{exch}_t = \sum_{i=1}^{n} b_{3t}\Delta\text{ngdp}_{t-1} + \sum_{i=1}^{n} c_{3t}\Delta\text{fdi}_{t-1} + \sum_{i=1}^{n} d_{3t}\Delta\text{exch}_{t-1} + \sum_{i=1}^{n} e_{3t}\Delta\text{expt}_{t-1} + \sum_{i=1}^{n} f_{3t}\Delta\text{trpe}_{t-1} + \epsilon_{3t} \text{----- (13)}$$

$$\Delta\text{expt}_t = \sum_{i=1}^{n} b_{4t}\Delta\text{ngdp}_{t-1} + \sum_{i=1}^{n} c_{4t}\Delta\text{fdi}_{t-1} + \sum_{i=1}^{n} d_{4t}\Delta\text{exch}_{t-1} + \sum_{i=1}^{n} e_{4t}\Delta\text{expt}_{t-1} + \sum_{i=1}^{n} f_{4t}\Delta\text{trpe}_{t-1} + \epsilon_{4t} \text{----- (14)}$$

$$\Delta\text{trpe}_t = \sum_{i=1}^{n} b_{5t}\Delta\text{ngdp}_{t-1} + \sum_{i=1}^{n} c_{5t}\Delta\text{fdi}_{t-1} + \sum_{i=1}^{n} d_{5t}\Delta\text{exch}_{t-1} + \sum_{i=1}^{n} e_{5t}\Delta\text{expt}_{t-1} + \sum_{i=1}^{n} f_{5t}\Delta\text{trpe}_{t-1} + \epsilon_{4t} \text{-------(15)}$$

Where Δ is the first difference operator, ϵ_{1t} ,$\epsilon_{2t,}$ $\epsilon_{3t,}\epsilon_{4t}$and $\epsilon_{5t}$are random disturbances and n is the number of optimum lag length, which is determined empirically by Schwarz criterion (SC) and others. For Δngdp_t to be

unaffected by $\Delta fdi_{t,}$ $\Delta excht_{,}$ $\Delta expt_{t}$, and $\Delta trpe_{t,}\sum$ $c_{1t,}$ $\sum$ $d_{1t,}\sum$ $e_{1t}$and$\sum$ f_{1t}, respectively, and must not be significantly different from zero. Similar logic applies to $\Delta fdi_{t,}$ $\Delta exch_{t}$ $\Delta expt_{t}$, and $\Delta trpe_{t.}$

(5.0) EMPIRICAL RESULT AND ANALYSIS

The result of the unit root test shows that all the series are not stationary at level, thereby indicating the presence of unit root (Appendix 2). However, following the differencing of all the variables once, both the ADF and PP test suggested the absence of unit root (Appendix 3). We therefore concluded that the variables are stationary at first difference. This implies that the variables are integrated of order one, i.e. 1(1). With a maximum lag length of p – 2, the Schwarz criterion (SC), the Hannan-Quinn (HQ), the Akaike criterion (AIC) and Final Prediction Error (FPE), all indicates a VAR order of p=1 (Appendix 4). The Johansen cointegration test was used to examine the presence or non-presence of cointegration among the variables. When a cointegration relationship is present, it means that nominal Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Export (EXPT), Exchange Rate (EXCH) and Trade Openness (TRPE) share a common trend and long-run equilibrium. The result indicates the trace statistics having at least one (1) cointegrating vector and maximum Eigenvalue statistic indicates one (1) cointegrating vector at the 5 per cent level of significance, suggesting that there is cointegrating (long-run) relations between the variables tested (Appendices 5 & 6).

Following the above results, Engle-Granger 2-Step procedure was applied and an error correction model (ECM) was developed from long-run static model[5], using the residual which was found to be stationary at levels. The error correction term in the short-run dynamic model has a statistically significant coefficient with the appropriate negative sign and this is a requirement for dynamic stability of the model. It provides evidence that FDI, EXPT, EXCH and TRPE accounts for a large share of the explained variation in NGDP. The estimated coefficient indicates that about 40 per cent of the errors in the short-run are corrected in the long-run.

From the short-run dynamic model, all the variables appear to be statistically significant, except the Foreign Direct Investment (FDI), that is, statistically not significant. Furthermore, the model's R-squared and Adjusted R-squared are 0.882 and 0.865, respectively, thus, indicating that over 85 per cent of the variation in the dependent variable is explained by changes in the explanatory variables. The F-statistic (51.0), which measures the overall significant of the model, was equally high, while the Durbin-Watson statistic is 1.7 (Appendix 7). Considering that FDI is not statistically significant in the model, we conducted exogeneity test by using a less direct root (estimating a marginal model of the variable) through a dynamic short-run equation. The result indicated that the ecm(-1) is not appropriately signed and statistically not significant. Therefore, we concluded that FDI has weak exogeneity in the model (Appendix 8a).

In addition, the Granger causality test was conducted and its decision rule requires that, for a high F-statistic value and low probability value, we reject null hypothesis and accept the alternative hypothesis. However, given a low F-statistic and high probability value, we accept the null and reject the alternative hypothesis. The outcome of the causality test indicates that foreign direct investment does not granger cause nominal gross domestic product. However, nominal gross domestic product granger causes foreign direct investment, indicating uni-directional causality. Causality runs from nominal gross domestic product to export, while exchange rate granger causes nominal gross domestic product, foreign direct investment and export. Also, trade openness predicts export, while bi-directional causality runs between trade openness and exchange rate (Appendix 8b).

(6.0) CONCLUSION AND POLICY RECOMMENDATION

(6.1) Conclusion

We attempts to offer evidence on the relationship among nominal gross domestic product (ngdp), foreign direct investment (fdi), export (expt), exchange rate (exch) and trade openness (trpe) in Nigeria. The series used in the analysis was tested for stationarity, using Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP). The result indicted that the variables are not stationary at level, though stationary at first difference. On the Johansen Cointegration test, it shows the presence of long-run relationship among the cointegrating variables. Furthermore, an Engle-Granger 2-Step procedure was applied and an error correction model (ECM) was developed from long-run static model. The error correction term in the short-run dynamic model has a statistically significant coefficient with the appropriate negative sign and this is a requirement for dynamic stability of the model. The model indicated that all the variables are statistically significant, except the FDI and

[5]For the case of one (1) cointegrating vector, it is probably best to estimate such cointegrating vector by OLS as it should yield super-consistent estimate (Engel and Granger, 1987)

this was confirmed by the exogeneity test. The granger causality test indicates both the existence of uni-directional and bi-directional causality among some of the variables.

(6.2) Policy Recommendation

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 and external sectors 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 as well as 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 recommended that government should continue to pursue trade and foreign exchange policies that would ensure competitiveness of the export sector viability and economic growth, while foreign direct investment should be encouraged amidst thriving business environment that would engender economic growth.

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Appendices

Appendix 1: Foreign Direct Investment Flows, 1970 – 2009 (₦'Million and Percentage Shares (%))

Year	GDP at Current Market Price (N'Million)	Inflow of FDI (N'Million)	Outflow of FDI (N'Million)	Net Flow of FDI (N'Million)	Net Flow As Proportion of GDP (%)
1970	5,281.10	251.00	129.40	121.60	2.30
1971	6,650.90	489.60	170.00	319.60	4.81
1972	7,187.50	432.80	184.50	248.30	3.45
1973	8,630.50	577.80	385.20	192.60	2.23
1974	18,823.10	507.10	458.80	48.30	0.26
1975	21,475.20	757.40	282.00	475.40	2.21
1976	26,655.80	521.10	474.80	46.30	0.17
1977	31,520.30	717.30	519.70	197.60	0.63
1978	34,540.10	664.70	332.90	331.80	0.96
1979	41,974.70	704.00	414.10	289.90	0.69
1980	49,632.30	786.40	319.40	467.00	0.94
1981	47,619.70	584.90	447.10	137.80	0.29
1982	49,069.30	2,193.40	568.50	1,624.90	3.31
1983	53,107.40	1,673.60	1,116.90	556.70	1.05
1984	59,622.50	1,385.30	850.50	534.80	0.90
1985	67,908.60	1,423.50	1,093.80	329.70	0.49
1986	69,147.00	4,024.00	1,524.40	2,499.60	3.61
1987	105,222.80	5,110.80	4,430.80	680.00	0.65
1988	139,085.30	6,236.70	4,891.10	1,345.60	0.97
1989	216,797.50	4,692.70	5,132.10	(439.40)	-0.20
1990	267,550.00	10,450.20	10,914.50	(464.30)	-0.17
1991	312,139.70	5,610.20	3,802.22	1,807.98	0.58
1992	532,613.80	11,730.70	3,461.50	8,269.20	1.55
1993	683,869.80	42,624.90	9,630.50	32,994.40	4.82
1994	899,863.20	7,825.50	3,918.30	3,907.20	0.43
1995	1,933,211.60	55,999.30	7,322.30	48,677.00	2.52
1996	2,702,719.10	5,672.90	2,941.90	2,731.00	0.10
1997	2,801,972.60	10,004.00	4,273.00	5,731.00	0.20
1998	2,708,430.90	32,434.50	8,355.60	24,078.90	0.89
1999	3,194,015.00	4,035.50	2,256.40	1,779.10	0.06
2000	4,582,127.30	16,453.60	13,106.60	3,347.00	0.07
2001	4,725,086.00	4,937.00	1,560.00	3,377.00	0.07
2002	6,912,381.30	8,988.50	781.70	8,206.80	0.12
2003	8,487,031.60	13,531.20	475.10	13,056.10	0.15
2004	11,411,066.90	20,064.40	155.70	19,908.70	0.17
2005	14,572,239.10	26,983.70	202.40	26,781.30	0.18
2006	18,564,594.70	41,734.00	263.10	41,470.90	0.22
2007	20,657,317.70	54,254.20	328.80	53,925.40	0.26
2008	24,296,329.30	37,977.70	4,362.50	33,615.20	0.14
2009	24,712,669.90	43,334.70	1,905.30	41,429.40	0.17

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

Appendix2: Unit Root test for Stationarity at Levels

S/No	Variable	ADF (Intercept)	ADF (Trend and Intercept	PP (Intercept)	PP (Trend and Intercept
1	lngdp	-0.2336 (-3.6056)	-1.5824 (-4.2050)	-0.2479 (- 3.6056)	-1.8238 (- 4.2050)
2	logfdi	-0,4016 (-3.6105)	-3.0232 (-4.2050)	-0.2003 (-3.6056)	-2.8405 (-4.2050)
3	logexch	-0.1021 (-3.6056)	-1.5642 (-4.2050)	-0.2814 (-3.6056)	-1.8529 (-4.2050)
4	logexpt	-0.5889 (-3.6056)	-2.3038 (-4.2050)	-0.5542 (-3.6056)	-2.2823 (-4.2050)
5	logtrpe	-2.6440 (-3.6056)	-3.4927 (-4.2050)	-2.4477 (-3.6056)	-3.4946 (-4.2050)

Note: Significance at 1% 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.

Appendix3: Unit Root test for Stationarity at First Difference

S/No	Variable	ADF (Intercept)	ADF (Trend and Intercept	PP (Intercept)	PP (Trend and Intercept
1	lngdp	-5.4411 (-3.6105)	-5.3668 (-4.2119)	-5.4359 (-3.6105)	-5.3611 (-4.2119)
2	Logfdi	-5.7250 (-3.6156)	-5.9253 (-4.2191)	-10.1851 (-3.6105)	-10.3381 (-4.2119)
3	logexch	-5.1948 (-3.6105)	-5.1204 (-4.2119)	-5.3436 (-3.6105)	-5.2835 (-4.2119)
4	logexpt	-6.9207 (-3.6105)	-6.8271 (-4.2119)	-7.0197 (-3.6105)	-6.9155 (-4.2119)
5	logtrpe	-9.2403 (-3.6105)	-9.1092 (-4.2119)	-9.6948 (-3.6105)	-9.5504 (-4.2119)

Note: Significance at 1% 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 4: Lag Order Selection

VAR Lag Order Selection Criteria
Endogenous variables: LOGNGDP LOGFDI LOGEXPT LOGEXCH LOGTRPE
Exogenous variables: C
Date: 08/27/11 Time: 05:51
Sample: 1970 2010
Included observations: 39

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-123.6445	NA	0.000504	6.597152	6.810429	6.673674
1	50.84017	295.2817*	2.39e-07*	-1.068727*	0.210936*	-0.609595*
2	70.33277	27.98937	3.39e-07	-0.786296	1.559752	0.055446

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 5: Unrestricted Cointegration Rank Test (Trace)

Date: 08/27/11 Time: 06:48
Sample (adjusted): 1972 2010
Included observations: 39 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGNGDP LOGFDI LOGEXPT LOGEXCH LOGTRPE
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.623273	72.99610	69.81889	0.0273
At most 1	0.389936	34.92300	47.85613	0.4521
At most 2	0.235624	15.64955	29.79707	0.7366
At most 3	0.108132	5.170456	15.49471	0.7905
At most 4	0.017975	0.707390	3.841466	0.4003

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 6: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.623273	38.07311	33.87687	0.0149
At most 1	0.389936	19.27344	27.58434	0.3937
At most 2	0.235624	10.47910	21.13162	0.6988
At most 3	0.108132	4.463067	14.26460	0.8075
At most 4	0.017975	0.707390	3.841466	0.4003

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 7: Summary of Regression Results for the Error Correction Model

Dependent Variable: DLOGNGDP
Method: Least Squares
Date: 08/27/11 Time: 05:27
Sample (adjusted): 1971 2010
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.064976	0.014640	4.438296	0.0001
DLOGFDI	0.015220	0.018463	0.824355	0.4155
DLOGEXPT	0.606560	0.044279	13.69845	0.0000
DLOGEXCH	0.116792	0.050537	2.310996	0.0270
DLOGTRPE	-0.628217	0.076821	-8.177660	0.0000
ECM(-1)	-0.396618	0.091210	-4.348422	0.0001

R-squared	0.882363	Mean dependent var	0.215366
Adjusted R-squared	0.865063	S.D. dependent var	0.183253
S.E. of regression	0.067316	Akaike info criterion	-2.421370
Sum squared resid	0.154067	Schwarz criterion	-2.168038
Log likelihood	54.42740	Hannan-Quinn criter.	-2.329773
F-statistic	51.00492	Durbin-Watson stat	1.672023
Prob(F-statistic)	0.000000		

Appendix 8: Exogeneity Tests and VAR Granger Causality

Appendix 8a: Exogeneity Test of Foreign Direct Investment

Dependent Variable: DLOGFDI
Method: Least Squares
Date: 08/27/11 Time: 05:24
Sample (adjusted): 1975 2010
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.288222	0.150782	1.911509	0.0655
DLOGFDI(-1)	-0.545988	0.181255	-3.012268	0.0052
DLOGFDI(-2)	-0.111722	0.205341	-0.544081	0.5904
DLOGFDI(-3)	0.089109	0.205327	0.433985	0.6674
DLOGFDI(-4)	0.154618	0.183096	0.844464	0.4051
ECM(-1)	0.172114	0.880163	0.195548	0.8463

R-squared	0.257897	Mean dependent var	0.199795
Adjusted R-squared	0.134213	S.D. dependent var	0.699948
S.E. of regression	0.651285	Akaike info criterion	2.131274
Sum squared resid	12.72518	Schwarz criterion	2.395194
Log likelihood	-32.36293	Hannan-Quinn criter.	2.223389
F-statistic	2.085128	Durbin-Watson stat	1.960770
Prob(F-statistic)	0.094974		

Appendix 8b: Pairwise Granger Causality

Pairwise Granger Causality Tests
Date: 08/27/11 Time: 20:46
Sample: 1970 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGFDI does not Granger Cause LOGNGDP	39	0.88554	0.4218
LOGNGDP does not Granger Cause LOGFDI		3.09421	0.0583
LOGEXPT does not Granger Cause LOGNGDP	39	0.06955	0.9329
LOGNGDP does not Granger Cause LOGEXPT		3.14446	0.0558
LOGEXCH does not Granger Cause LOGNGDP	39	3.58351	0.0387
LOGNGDP does not Granger Cause LOGEXCH		0.45419	0.6388
LOGTRPE does not Granger Cause LOGNGDP	39	0.10696	0.8989
LOGNGDP does not Granger Cause LOGTRPE		2.22204	0.1239
LOGEXPT does not Granger Cause LOGFDI	39	2.17350	0.1293
LOGFDI does not Granger Cause LOGEXPT		2.27710	0.1180
LOGEXCH does not Granger Cause LOGFDI	39	4.76589	0.0150
LOGFDI does not Granger Cause LOGEXCH		1.35577	0.2713
LOGTRPE does not Granger Cause LOGFDI	39	0.05675	0.9449
LOGFDI does not Granger Cause LOGTRPE		2.16765	0.1300
LOGEXCH does not Granger Cause LOGEXPT	39	4.96435	0.0128
LOGEXPT does not Granger Cause LOGEXCH		1.95656	0.1569
LOGTRPE does not Granger Cause LOGEXPT	39	2.57885	0.0906
LOGEXPT does not Granger Cause LOGTRPE		2.06190	0.1428
LOGTRPE does not Granger Cause LOGEXCH	39	4.11243	0.0251
LOGEXCH does not Granger Cause LOGTRPE		2.85269	0.0716