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FOREIGN PRIVATE INVESTMENT AS A SOURCE OF ECONOMIC GROWTH IN NIGERIA USING COINTEGRATION (VAR MODEL)

[1]Bakari H. R, [1] Samaila. Y. J and [2]Nasir Magaji
[1]University of Maiduguri, Department of Mathematics and Statistics. [2]Samaru College of Agric, DAC ABU Zaria.

ABSTRACTS
Foreign private investment is a determinant of economic growth in a developing country such as Nigeria, FPI enhances job creation, transfer of technology, managerial skills, all these contributes to economic growth and development. Nigeria has tried various reforms to attract foreign investors, such as deregulation of the economy, Nigeria Investment Promotion Commission (NIPC) in the early 1990's, establishment of economic and financial crime commission (EFCC). However, the FPI inflow to Nigeria still remains low. This paper investigates the impact of FPI as a source of economic growth in Nigeria. A secondary data for the period of 1960-2008 was used. Due to the reason of non stationary of the series we use the Johansen cointegration test to determine the number of cointegrating equation by using the maximum cointegrating rank in the model. From the result we obtain about the minimum of four cointegrating equation present in the model with maximum eigenvalue of 0.314059 and the eingenvalue statistic of 17.71732 with p-value of <0.001 at 5% level of significance. Further we study the short term and the long-run dynamics of the combination of the variables where found a long run equilibrium relationship between the variables and the error correction model was established.

KEYWORDS*: Foreign Private Investment, Export, Co integration and Vector Error Correction Model (Vecm)*

INTRODUCTION

The benefits of foreign private investment include transfer of technology, higher productivity, higher incomes, more revenue for government through taxes, enhancement of balance of payment ability, employment generation, diversification of the industrial base and expansion, modernization and development of related industries. According to Feldstein (2000), first international flows of capital reduce the risk faced by owners of capital by allowing them to diversify their lending and investment. Second, the global integration of capital markets can contribute to the spread of best practices in corporate governance, accounting rules, and legal traditions. Third, the global mobility of capital limits the ability of government to pursue bad policies. Four, Foreign investment through FDI allows for the transfer of technology-particularly in the form of new varieties of capital inputs –that cannot be achieved through financial investments or trade in goods and services Foreign investment through FDI can also promote competition in the domestic input market. Five, recipients of FDI often gain employee training in the course of operating the new businesses, which contributes to human development in the host country. Lastly, profits generated by Foreign Investments contribute to corporate tax revenues in the host country.

However, the arguments against foreign private investment are that it may cause capital flight which may lead to net capital outflow and thus create balance of payment difficulties; it also creates income distribution problems when it competes with home investment. Foreign Private investments may also actually be capital intensive, which may not fit in the factor proportions of the recipient country. Since the 1980s, flows of investment have increased dramatically the world over. Despite the increased flow of investment to developing countries in particular, Sub-Sahara African (SSA) countries are still characterized by low per capita income, high unemployment rates and low and falling growth rates of GDP, problems which foreign private investment are theoretically supposed to solve. Nigeria, being one of the top three countries that consistently received FDI in the last decade (Ayanwale, 2007) is not exempted from this category. The Nigerian Government is putting so much effort into attracting foreign investors and yet the economy is still dwindling. Against this background, this study is focused on analyzing the direction and significance of the effect of foreign private investment on the GDP of Nigeria.

AIM AND OBJECTIVES OF THE RESEARCH

The study is aimed at determining the impact of foreign private investment as a source of economic growth in Nigeria with a view to achieve the following the following objectives:

To determine the influence of foreign private investment to economic growth of Nigeria.

To establish a model that will be used to control the economic growth level via foreign investment.

To determine the stable economic equilibrium (long-run equilibrium) relationship between the policy variables.

SOURCE OF DATA

The data for this study ran from 1960 to 2010, the data for this study is a secondary source such as Central Bank of Nigeria (CBN) publications and statistical bulletin 2010

LITERATURE REVIEW

In most economies, however, domestic private investment has proven to be insufficient in giving the economy the required boost to enable it to meet its growth target because of the mismatch between their capital requirements and savings.

In the developing countries, foreign private investment Is agreed to play a positive and vital role in the economy, though it varies depending on the country and country characteristics, policy environment and economic sectors.

A review of the evidence by the Overseas Development Institute Odi (1997), briefing paper reviewed that foreign direct investment is viewed as a major stimulus to economic growth in developing countries. The investigation shows that recent evidence on the scale of foreign investment to low income countries over the period of 1970 to 1996 are major factors determining foreign companies' decision to invest in a particular country. Also it stated that Nigeria is the second largest FDI recipient. Traditionally FDI has been concentrated in the extractive industries, but there has been a recent diversification into the manufacturing sector which had 47% of the FDI stock in 1992. Blooström and Kokko (1997) reviewed the empirical evidence on host country effects of foreign direct investment. They conclude that the impact of foreign private investment to economic growth varies between industries and countries depending on country characteristics and the policy environment.

Alfaro (2003) in an empirical analysis using cross-country data for the period of 1981-1999 suggests that foreign direct investment exerts an ambiguous effect on growth. From the results, foreign direct investments in the primary sector tend to have a negative effect on growth, while investment manufacturing a positive one. Evidence from the services sector is ambiguous.

Ewe-Ghee Lim (2001) summarizes recent arguments and findings on FDI and its correlation with economic growth focusing on literature regarding spillovers from FDI and finds that while substantial support exists for positive spillovers from FDI, there is no consensus on casualty.

Mishara and Mody (2001) observed that the foreign private investment has a strong relationship with economic growth in some advance countries.

Borensztein et al (1998) in the study using panel data of 69 developing countries over two periods 1970 to 1979 and 1980 to 1989 investigates the impact of FDI on economic growth. They use a basic estimating equation of growth in real GDP as a dependent variable, and FDI, measure of schooling and initial GDP as their independent variable. They find that FDI has positive impact on growth but this is only realized when their measure of schooling is above some critical level (estimated as 0.52); at law levels of their measure of schooling, FDI has a negative impact on growth confirming the complementarity of FDI and human capital in the process of diffusion.

In the case of Nigeria, Ayashagba and Abachi (2002) caries out empirical investigation on the effects of foreign direct investment on economic growth in Nigeria from 1980 to 1997. The result presented shows that foreign direct investment had significant impact on economic growth in Nigeria. They therefore conclude the presence of foreign direct investment in the low developing countries particularly in Nigeria is not totally useful.

Akinlo (2004) also investigated the impact of foreign direct investment on economic growth in Nigeria for the period of 1970 to 2001. The error correction model results showed that both private capital and lagged foreign capital have small and not statistically significant effect on the economic growth. The result seems to support argument that attractive FDI might not be growth enhancing as much as manufacturing FDI.

Obadan (2004) addressed to various issues associated with capital flows in both conceptual and empirical contexts. He posits that the desirability or otherwise of foreign capital is to put foreign capital, if channeled into productive uses, as against consumption which can be highly desirable.

METHODOLOGY

The methodology for this study was adopted with some modifications from Obwana (2001), and Tokunbo, *et al*. (2010). The equation proposed by Obwana (2001) was derived from the aggregate production function which comprises of exports. The equation is stated as follows:

$$\hat{G} = \beta_1 + \beta_2 FDI + \beta_3 GDS + \beta_4 OCF + \beta_5 EXGR + \beta_6 AID + \mu$$

Where

$\hat{G}$ =Annual rate of growth of nominal GDP
FDI= foreign direct investment
GDS= gross domestic savings as proportion of GDP
OCF=other capital inflows
EXGR= rate of growth of real export
AID= Net current transfers of government plus official long term borrowing
μ = white noise

A modification was made from this model by Tokunbo *et. al*, (2010) the modification includes that the FDI, AID and OCF variables will be summed up to give foreign private investment which is the subject of the study; the GDS variable will be replaced by Gross Fixed Capital Formation, since it is a better measure of domestic investment rather than GDS he use GFCF; and export growth for better result. The model for this study is stated bellow:

$$\hat{Y} = \beta_1 + \beta_2 FPI + \beta_3 INV + \beta_4 NETX + \mu$$

Where
Y= income growth measured by GDP growth rate

FPI= foreign private investment
Where: *Y* = Income growth measured by GDP growth rate.
FPI = Foreign Private Investment
INV = Domestic Investment Growth rate
NETX = Growth rate of net exports.
μ = white noise

In this study, some modifications where done. The modifications include that volatility of exchange rate is a risk factor on the economic growth; decrease in the exchange of naira to dollar has a positive impact to the GDP. The impact of FPI to Economic growth were GDP is a linear function of the FDI and export

MODEL SPECIFICATIONS FOR THIS STUDY IS STATED BELLOW:

$$\hat{GDP} = \beta_1 + \beta_2 (fpi) + \beta_3 (import) + \beta_4 (EXCHrate) + \mu_{gdp} \qquad (1)$$

Where GDP=Gross domestic product
FPI= Foreign private investment
EMP=Import
EXCHrate= Exchange rate
μ_f =white noise

COINTEGRATING EQUATION

$$D(GDP)_t = B_1 + B_2(d(FPi))_t + B_3(d(Import))_t + B_4(d(EXCHrate))_t + e_t$$

The above equation was estimated using the co integrating regression. Some diagnostic test where done on the series which include the ADF test (unit root test), Johansen test for co integration. The software used was E-views 5.1. Secondary data for the period 1960-2010 was used for the study and this was sourced through the publications of the central bank of Nigeria, such as the Statistical Bulletin.

Vector Autoregression and Error Correction Models

The structural approach to time series modeling uses economic theory to model the relationship among the variables of interest. Unfortunately, economic theory is often not rich enough to provide a dynamic specification that identifies all of these relationships. Furthermore,

Estimation and inference are complicated by the fact that endogenous variables may appear on both the left and right sides of equations. These problems lead to alternative, non-structural approaches to modeling the relationship among several variables. This chapter describes the estimation and analysis of vector autoregression (VAR) and the vector error correction (VEC) models. We also describe tools for testing the presence of cointegrating relationships among several non-stationary variables.

Vector Autoregression (VARs)

The vector autoregression (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system. The mathematical representation of a VAR is

$$Y_t = A_1 Y_{t-1} + \cdots + A_p Y_{t-p} + BX_t + e_t \qquad (2.1)$$

Where Y_t is a k vector of endogenous variables, X_t is a d vector of exogenous variables, $A_1, \cdots, A_p$

And B are matrices of coefficients to be estimated, and e_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. Since only lagged values of the endogenous variables appear on the right-hand side of the equations, simultaneity is not an issue and OLS yields consistent estimates. Moreover, even though the innovations may be contemporaneously correlated, OLS is efficient and equivalent to GLS since all equations have identical regressors.

Impulse Responses

A shock to the ith variable not only directly affects the ith variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VAR. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables.

If the innovations e_t are contemporaneously uncorrelated, interpretation of the impulse response is straightforward. The i-th innovation $e_{i,t}$ is simply a shock to the i-th endogenous variable $Y_{i,t}$. Innovations, however, are usually correlated, and may be viewed as having a common component which cannot be associated with a specific variable. In order to interpret the impulses, it is common to apply a transformation to the innovations so that they become uncorrelated:

$$v_t = p_{e_t} \square (0, D)$$

Where D is a *diagonal* covariance matrix

Variance Decomposition

While impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, *variance decomposition* separates the variation in an endogenous variable into the component shocks to the VAR. Thus, the variance decomposition provides information about the relative

importance of each random innovation in affecting the variables in the VAR. Note that since non-orthogonal factorization will yield decompositions that do not

Satisfy an adding up property, your choice of factorization is limited to orthogonal factorizations. The table format displays separate variance decomposition for each endogenous variable. The second column, labeled "S.E.", contains the forecast error of the variable at the given forecast horizon. The source of this forecast error is the variation in the current and future values of the innovations to each endogenous variable in the VAR. The remaining columns give the percentage of the forecast variance due to each innovation, with each row adding up to 100. As with the impulse responses, the variance decomposition based on the Cholesky factor can change dramatically if you alter the ordering of the variables in the VAR. For example, the first period decomposition for the first variable in the VAR ordering is completely due to its own innovation. Factorization based on structural orthogonalization is available only if you have estimated the structural factorization matrices as explained. Note that the forecast standard errors should be identical to those from the Cholesky factorization *if the structural VAR is just identified*. For over-identified structural VARs, the forecast standard errors may differ in order to maintain the adding up property.

Structural (Identified) VARs

The main purpose of structural VAR (SVAR) estimation is to obtain non-recursive orthogonalization of the error terms for impulse response analysis. This alternative to the recursive Cholesky orthogonalization requires the user to impose enough restrictions to identify the orthogonal (structural) components of the error terms.

Cointegration Test

The finding that many macro time series may contain a unit root has spurred the development of the theory of non-stationary time series analysis. Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be *cointegrated*. The stationary linear combination is called the *cointegrating equation* and may be interpreted as a long-run equilibrium relationship among the variables. The purpose of the cointegration test is to determine whether groups of non-stationary Series are cointegrated or not. As explained below, the presence of a cointegrating relation forms the basis of the VEC specification.VAR-based cointegration tests is employed using the methodology developed in Johansen (1991, 1995a).

Vector Error Correction (VEC) Models

A vector error correction (VEC) model is a restricted VAR designed for use with no stationary series that are known to be cointegrated. The VEC has cointegration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the *error correction* term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. To take the simplest possible example, consider a two variable system with one cointegrating equation and no lagged difference terms. The cointegrating equation is:

$$y_{2,t} = By_{1,t} \tag{2.2}$$

The corresponding VECM model is:

$$y_{1,t} = \alpha_1(y_{2,t-1} - By_{1,t-1}) + e_{1,t} \tag{2.3}$$
$$y_{2,t} = \alpha_2(y_{2,t-1} - By_{1,t-1}) + e_{2,t}$$

In this simple model, the only right-hand side variable is the error correction term. In long run equilibrium, this term is zero. However, if and deviate from the long run equilibrium, the error correction term will be nonzero and each variable adjusts to partially restore the equilibrium relation. The coefficient measures the speed of adjustment of the i-th endogenous variable towards the equilibrium.

RESULTS AND DISCUSSION

TABLE 1. ADF TEST FOR STATIONARITY

VARIABLE	CO-EFFICIENT	T-VALUE	P-VALUE	ORDER OF INTEGRATION
GDP	-0.563869	-0.866139	0.3938	I(0)
FDI	-0.45778	-0.084465	0.9332	I(1)
EXCHRATE	0.028073	0.884674	0.3807	I(0)
IMPORT	-0.127737	-0.431813	0.6682	I(1)

Table 1 shows the ADF test for testing the stationarity of the series, from the result we found that the GDP is stationary at the level, as such it is integrated of order zero at lag one. The foreign direct investment (FDI) is stationary at the first difference showing that the series is integrated of order one, and at lag one. Exchange rate (EXCHRATE), is stationary at level showing the level of integration of zero and at lag one, finally the import is stationary at first difference and at lag two.

TABLE 2: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.913501	115.0382	27.58434	0.0000
At most 1 *	0.670584	52.19045	21.13162	0.0000
At most 2 *	0.340799	19.58615	14.26460	0.0065
At most 3 *	0.314059	17.71732	3.841466	0.0000

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

TABLE 3

1 Cointegrating Equation(s):	Log likelihood	-2128.128

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	IMPORT	EXCHRATE
1.000000	3.289350	-1.246269	-2240.011
	(1.45522)	(0.04341)	(2128.10)

Adjustment coefficients (standard error in parentheses)

D(GDP)	0.380484
	(0.09435)
D(FDI)	0.660466
	(0.05743)
D(IMPORT)	0.394248
	(0.09594)
D(EXCHRATE)	1.74E-06
	(2.6E-06)

Table 2 shows the cointegrating rank test, to test for the number of cointegrating equation present in the variables used in the model. The eingenvalues determine the number of cointegrating equations where the p-value shows the significance of the number of the cointegrating equation as hypothesized. The result shows that the maximum eingenvalue test indicates 4 cointegrating equations at the 0.05 level of significance.

TABLE 4. Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDP	FDI	IMPORT	EXCHRATE
-1.70E-06	-5.58E-06	2.11E-06	0.003798
4.23E-06	2.44E-05	-7.87E-06	-0.034172
-2.44E-07	-6.05E-06	-4.11E-08	0.067673
6.86E-07	5.53E-05	-2.32E-06	-0.040895

Unrestricted Adjustment Coefficients (alpha):

D(GDP)	-224383.4	-51271.40	196063.1	-41418.70
D(FDI)	-389497.2	66741.41	-91642.10	-20783.68
D(IMPORT)	-232500.0	250645.7	99929.21	-31447.97
D(EXCHRATE)	-1.025825	-1.632847	2.271256	4.986286

Table 3 shows the unrestricted cointegrating relation of the cointegrating vector and the adjustment parameters. The cointegrating vector was not identified as such we impose some arbitrary normalization to obtain the estimates of cointegrating vector and the adjustment parameters. The first row under restricted cointegrating co-efficients shows the first cointegrating vector, the second row shows the second cointegrating vector and lastly up to the last row.

Table 4 shows the estimates from a different normalization for each possible number of cointegrating relations 1, 2, 3, and 4 where the asymptotic standard errors are expressed in the parenthesis for the parameters that are identified.

Normalized first cointegrating equation

GDPt = 3.289350 FDIt - 1.246269IMPt -2240.011EXCHt

(1.45522) (0.04341) (2128.10)

VECTOR ERROR CORRECTION ESTIMATES

One of the functions of the method is to determine the long run equilibrium relationship between GDP, FDI, IMPORT, and EXCRATE the results shows that for any cointegrating relation there is at least a vector error correction estimates. The result for the vector error correction is given in the equation below:

MODEL

D(GDP) = - 1 * (GDP(-1) - 1.944765977e-013 * FDI(-1) + 1.059724081e-013 * IMPORT(-1) - 3.491115905e-010 * EXCHRATE(-1) - 2326779.839) - 6.712477069e-014 * D(GDP(-1)) - 4.428318486e-014 * D(GDP(-2)) - 2.814208983e-013 * D(FDI(-1)) + 4.255808423e-013 * D(FDI(-2)) + 1.128623063e-013 * D(IMPORT(-1)) + 4.564602517e-014 * D(IMPORT(-2)) + 7.111307163e-011 * D(EXCHRATE(-1)) - 9.555594046e-010 * D(EXCHRATE(-2)) - 2326779.839 + 1 * GDP

SUMMARY AND CONCLUSION

FDI allows for the transfer of technology-particularly in the form of new varieties of capital inputs that cannot be achieved through financial investments or trade in goods and services foreign investment through FDI can also promote competition in the domestic input market. Five, recipients of FDI often gain employee training in the course of operating the new businesses, which contributes to human development in the host country. Lastly,

profits generated by Foreign Investments contribute to corporate tax revenues in the host country. Foreign private investment, exchange rate, import are one of the factors that bring about economic growth, as such some of the variables are integrated of order one which makes them not stationary by taking difference of the variables we obtain stationary point for the variables. Due to the reason of non stationarity of the series we use the johansen cointegration test to determine the number of cointegrating equation by using the maximum cointegrating rank in the model. From the result we obtain about the minimum of four cointegrating equation present in the model with maximum eingenvalue of 0.314059 and the eingenvalue statistic of 17.71732 with p-value of <0.001 at 5% level of significance. The cointegrating vector was not identified as such we impose some arbitrary normalization to obtain the estimates of cointegrating vector and the adjustment parameters. Any present of cointegrating relationship there is at least a vector error correction representation.

CONCLUSION

The result shows there is a long run equilibrium relationship between the variables as such the co-efficient for first cointegrating equation is given by GDP is 1, FDI is 3.29, import is -1.25, and exchange rate is -2240.011. From the result obtained the lower the import the higher the economic growth whereas lower exchange rate of naira to dollar the higher the growth of the economy. Finally the foreign private investment which is termed as the engine of economic growth has a positive impact on the growth level of the Nigerian economy.

REFERENCES

Akinlo, A. E. (2003) “Globalization, International Investment and Stock Market in Sub-Saharan Africa” *Institute of Developing Economics, Jetro, Japan*.

Alfaro C, A. Chanda, S.Kalemi-Ozean and S.Sayek(2003)”FDI and economic growth: The role of local and financial markets” *Journal of International Economics* forth coming

Ayashagba, G.I., and P.I. Abachi (2002) "The Impact of Foreign Direct Investment (FDI) On Economic Growth of the Less Developed Countries (LDCs): A Case of Nigeria (1980-1997)". *Journal of Economic and Social Research*, **1**: 108-125.

Anyanwu, J. C. (1998) “An econometric Investigation of Determinants of FDI in Nigeria” Nigeria .Economic Society Annual Conference Publication

Ayanwale, A.B (2007) “FDI and Economic Growth: Evidence from Nigeria” AERC Research Paper 165, African Economic Research Consortium, Nairobi

Blomström and Kokko (1997) “ how foreign investment affects host countries” *World Bank Policy Research Working Paper”*. No 1745

Bomgboye,(2004) “ the impact of foreign direct investment on economic growth in Nigeria” Department of Economics, Obafemi Awolowo University, lle Ife, Nigeria.

Direct Investment in Nigeria: Evidence from Time Series Data,’’ *CBN Economic and Financial Review*, Vol.35, No.1, pp.59-78.

Borensztein *et al*., (1998)” how does foreign direct investment affect economic growth?”, *Journal of International Economics*, 45:115-135

Engle, R.F and Granger, C.W.J.(1987) cointegration and error correction: Representation, Estimation and Testing *Econometrica* 55:251-276

Ewe-Ghee Lim (2001)” correlation with economic growth”determinant of, and the relation between foreign direct investment and economic growth” *IMF Working paper.* No: 01/175

Feldstein, M. (2000). “Aspects of Global Economic Integration: Outlook for the Future” Working Paper, No. 7899.

Mishira, D.A. and A.P. Mody (2001)"Private Capital Flows and Growth Finance" *Development, 2:35.*

Obadan, M.I. (1982), ‘‘Direct Investment in Nigeria: An Empirical Analysis,’’ *African Studies Review*, vol. XXV, No.1.

Obida Gobna Wafure Abu, Nurudeen (2010) Determinants of Foreign Direct Investment in Nigeria: An Empirical Analysis

Obwana, Morios B.(2001), “Determinants of FDI and their impact on economic growth in Uganda” . African Development Review 2001, Blackwell Publishers Oxford. Uk.46-80.

Overseas Development Institute ODI (1997)”Review of evidence

Ragazzi, G. (1973), ‘‘Theories of The Determinants of Foreign Direct Investment,’’ *The IMF Staff Papers*, 20, pp. 471-498

Tokunbo S. *et-al* (2010). Review of economic and business studies”, volume3, issues, pp.105-127.

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Corresponding author
Bakari H. R
University of Maiduguri, Department of Mathematics and Statistics
Email: harunbakari@gmail.com