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## **An analysis of causal nexus between foreign direct investment, exchange rate and financial market development in Nigeria (1970 to 2009)**

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**Abstract:** The study investigated the causal relationship between FDI, exchange rate and financial market development using quarterly data from Nigeria. This was with a view to determine whether there existed any significant causal nexus was from FDI exchange rate to financial market development or the other way round in Nigeria. The study adopted vector error correction mechanism. Exchange rate was included with a view to determining whether macroeconomic instability adversely affected financial market development in Nigeria. The results show that FDI had no significant causal effect on financial market development while there are bidirectional causality between financial market development and exchange rate. In addition, a further analysis of effects of FDI and exchange rate on financial market development showed that both FDI and exchange rate had negative effects on financial market development; thus implying that FDI and macroeconomic instability adversely affect the development and provision of financial services in Nigeria.

**Keywords:** financial market development; FDI; exchange rate; VEC and causality; Nigeria.

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**Biographical notes:** M. Olufemi Saibu is presently a Senior Lecturer in the Department of Economics at University of Lagos. He teaches intermediate and advanced economic theory as well as development, urban and transport economics, public finance, and energy and petroleum economics at undergraduate and postgraduate levels. His research interest is on macroeconomic policy and growth, finance, resource mobilisation and energy issues.

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### **1 Introduction**

The focus of this paper is to examine the causal relationship between FDI and financial market development with a view to examining the factor affecting the supply of financial services and development in Nigeria in particular and Africa in general. This examination

is important because the provision of financial services depend heavily on the development of the financial sector. The financial sectors in Africa are on the average shallow and less developed. Their ability to respond to external and internal macroeconomic shocks is also weak. Therefore, it is imperative to understand the linkage between the inflow of financial resources into African economies as a first step in appreciating the depth and extent of financial service provision in Nigeria and Africa in general.

Moreso, the debate on the direction of causality between FDI and financial development is not settled in the literature. Existing studies consider either the relationship between FDI and economic growth (Adelegan, 2000; Ayanwale and Bamire, 2001; Jerome and Ogunkola, 2004) or the relationship between financial market development and economic growth (Yartey, 2008; Yartey and Adjasi, 2007). Less attention has been paid to the possible causal nexus between FDI and stock market development in Nigeria. There has been a considerable research on determinants of financial sector development lately especially in developed economies and using cross-country and international evidence. They have linked the development of financial market to the inflow of FDI. It was perceived that stock market and the financial sector in general is demand following. Increase in FDI induces the demand for domestic financial resources and hence promoting the development of local markets. It is also imperative to carry out country specific studies especially on developing countries like Nigeria in particular. The main objective of this study is to establish the causal relationship between FDI and financial market development in Nigeria and then determine the relative contribution of FDI on financial market development. To this end, the paper is organised as follows: Apart from this introductory section. Section 2 provides a review of related studies while Section 3 presents methodology and Section 4 presents the empirical results. The paper is concluded with policy implication in Section 5.

## **2 Review of literature**

Adam and George (2008) opined that the positive response of structural changes in attracting FDI and its consequences on its financial markets especially stock market is obvious. The paper confirmed that FDI to developing economies in West Africa for example increased from \$1.9 billion in 1995 to about \$15.8 billion in 2006. The market capitalisation of emerging market countries almost tripled from about \$2 trillion to about \$5 trillion over the same period. Yartey (2008) argued that foreign investment is associated with institutional and regulatory reform, adequate disclosure and listing requirements and fair trading practices which inspire increase, inspire greater confidence in domestic markets. This increases the investor's base and participation and leads to more capital flows. Liu et al. (2001) find that FDI promotes the manufactured exports of recipient countries, while Athukorala and Chand (2000) provide some evidence that the growth enhancing effect of FDI would be significant and strong in countries with open trade policies and better trade regimes with export promoting FDI. While many developing countries are competing for FDI inflow, recent studies attempt to identify conditions, which would lead to more beneficial utilisation of FDI (Hausmann and Fernandez-Arias, 2000a, 2000b). To support this, Narula and Dunning (2000) point out that the increased competition of FDI is more for the 'right' kind of investment and less developed countries increasingly need to provide unique, non-replicable created assets to

maintain a successful FDI-assisted development strategy. De-Mello (1999) finds that the extent to which FDI is growth-enhancing depends on the degree of complementarity of substitution between FDI and domestic investment. Furthermore, Zhang (2001) reports that the extent to which FDI is growth-enhancing appears to depend on country-specific characteristics.

The determinants of financial sector development generally have become a much researched area lately. Beck et al. (1999), Henry (2000), Bekaert et al. (2001), Demirguc-Kunt and Levine (1996) and a number of others have analysed the legal foundations of financial markets, the relationship of financial market development with macroeconomic variables, financial reform, and other country factors, and the relationships among the development of the various parts of a financial system. Also, the determinants of stock market capitalisation have been analysed for specific groups of countries in some studies. Catalan et al. (2000) examine the determinants of stock market development (MKT) for OECD and some emerging markets, studying 27 countries in total. They find, apart from macro stability and legal rights, that the size of the institutional investor bases positively affects MKT, and report evidence of a causal times series relation between institutional investors and MKT. Claessens et al. (2006) investigate the development of stock markets in a panel of transition economies and highlight the role of privatisation for MKT in this sample of countries. Perotti and van Oijen (2000), also study privatisation and find an indirect positive relation of a programme of privatisation through political risk reduction on MKT in a sample of 31 emerging economies.

The nature and economic significance of the relationship between MKT and growth vary according to a country's level of economic development with a larger impact in less developed economies (Filler et al., 1999). The proponents of positive relationships between MKT and economic growth hinged their argument on the fact that the stock market aids economic growth and development through the mobilisation and allocation of savings, risk diversification, liquidity creating ability and corporate governance improvement among others. Jerome and Ogunkola (2004) assessed the magnitude, direction and prospects of FDI in Nigeria. They 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. The brief review showed therefore that there is paucity of studies on the relationship between FDI and MKT in Nigeria, hence this study

### **3 Empirical methodology**

Following Adam and George (2008) approach, the paper employs a three-variable VAR model. The model incorporates exchange rate (EXR) in addition to market capitalisation as a proportion of GDP (which was used to capture financial market development) and foreign direct investment (FDI). The EXR is included to capture the macroeconomic stability, which may be an important factor for the development of the financial market and FDI attraction. The more stable the macro economy the more incentive firms and foreign investors have to participate in the stock market. Thus, it is expected that a stable macroeconomic environment to enhance MKT and attract more foreign investors. In

order to capture the causality relationship between FDI and MKT and to account for possible feedback effects from the short run fluctuations to the long run steady state of the relationship between the two key variables, the model is expressed in the form that allows for the testing of both unit root and co-integration. Therefore, the granger causality test is done in the error correction method (ECM).

$$\Delta FDI_t = \sum_{j=1}^p \delta_{1j} \Delta FDI_{t-1} + \sum_{j=1}^p \beta_{1j} \Delta MKT_{t-1} + \sum_{j=1}^p \alpha_{1j} \Delta EXR_{t-1} + \phi_1 ECM_{1,t-1} + u_t \quad (1)$$

$$\Delta MKT_t = \sum_{j=1}^p \delta_{2j} \Delta FDI_{t-1} + \sum_{j=1}^p \beta_{2j} \Delta MKT_{t-1} + \sum_{j=1}^p \alpha_{2j} \Delta EXR_{t-1} + \phi_2 ECM_{2,t-1} + u_t \quad (2)$$

$$\Delta EXR_t = \sum_{j=1}^p \delta_{3j} \Delta FDI_{t-1} + \sum_{j=1}^p \beta_{3j} \Delta MKT_{t-1} + \sum_{j=1}^p \alpha_{3j} \Delta EXR_{t-1} + \phi_3 ECM_{3,t-1} + u_t \quad (3)$$

where MKT = stock market development, FDI= Foreign Direct Investment, EXR= Exchange rate and  $ECM_1 \dots ECM_3$  are the lagged values of the error correction term from the co-integration equations for each variable.

The augmented dickey-fuller (ADF) is used to pre-test the order of integration for all time series variables. The model lag length selection was determined by both Schwarz (SIC) and Akaike (AIC) Information Criterion. In similar manner with Jerome and Ogunkola (2004) which used macroeconomic time series the co-integration analysis of Johansen (1995, 1991) and vector error correction model (VECM) are employed to investigate the linkages between FDI and MKT in Nigeria.

The three variables used in the paper were sourced from the Central Bank of Nigeria's Statistical Bulletin 2008 and 2009 editions. The MKT is measured by the value of market capitalisation as a proportion of GDP. Market capitalisation as a proportion of GDP measure equals the total market value of listed shares divided by GDP. The assumption behind this measure is that it is less arbitrary than any other measure of MKT. Exchange rate: The Nigerian naira-Dollar EXR is used as measure of macroeconomic stability because of importance of currency risk to foreign investors. In addition, the dollar is the foreign traded currency in Nigeria.

Net FDI (FDI) inflow: According to IMF (1993), FDI refers to an investment made to acquire lasting interest in enterprises operating outside of the economy of the investor. The net FDI use in this paper is the difference between inward and outward FDI in million US dollars (Inward FDI-outward FDI). The net FDI best represent the country's share of the FDI inflow.

#### 4 Empirical results

The results of the unit roots test carried out on the three variables are presented in Panel A of the table shows that all the series are non-stationary at level. Taking the variables in their first difference, results show that all are I(1) at 5% for ADF and 1% for PP level of significance. For consistency, therefore, all the series were considered as I(1) and taken at their first difference in the analysis.

Panel B presents the results of pairwise Granger causality among the MKT, FDI and EXR. The results show that the two null hypotheses that FDI does not Granger MKT could not be safely rejected—a non-directional causality emanates from FDI in Nigeria. This is inconsistency with the expectation that FDI could result in improvement in MKT in Nigeria. But bidirectional causality runs from EXR to MKT and vice versa. This is conformity with the expectation and with the realities in the Nigerian economy, that is, just as EXR appreciation could result in improvement in the MKT, a rise in the MKT could also leads to an appreciation in the level of the EXR. Having established the order of integration of the series, the number of long-run equilibrium relationships or co-integrating vectors between the variables is then determined. Since the variables are found to be integrated of the same order, such as I(1) as shown above, it implies that an equilibrium relationship exists among the variables. Panel C presents the test results for the number of co-integrating vectors. The results show that both the maximum eigen value and likelihood statistic suggest the presence of two co-integrating equations among the three variables in the Nigerian economy at 5% level in line with the Osterwald-Lenum critical values. This unveils the existence of a long-run equilibrium relationship between MKT and the variables used in the model. In addition, we apply the Johansen procedure to obtain the long-run coefficients of the model as shown.

**Table 1** The summary of the results for the model estimation

<i>Panel A: unit root test results</i>				
<i>Variable</i>	<i>Level</i>		<i>First difference</i>	
	<i>ADF</i>	<i>PP</i>	<i>ADF</i>	<i>PP</i>
<i>Log(FDI)</i>	Table 1.5392	-1.3439	-3.3339**	-6.0946*
<i>Log(MKT)</i>	1.1938	0.2786	-3.1671**	-5.5327*
<i>Log(exr)</i>	-1.4896	-1.4016	-3.3272**	-4.4837*

Note (\*\*)\* denotes rejection of null hypothesis at the (5%) 1% levels

<i>Panel B: pairwise Granger causality tests</i>				
<i>Null hypothesis</i>	<i>Obs</i>	<i>F-statistic</i>	<i>Probability</i>	
LOG(MKT) does not Granger Cause LOG(FDI)	27	1.83622	0.18411	
LOG(FDI) does not Granger Cause LOG(MKT)		1.66937	0.21241	
LOG(EXR) does not Granger Cause LOG(FDI)	27	0.26503	0.76960	
LOG(FDI) does not Granger Cause LOG(EXR)		0.72248	0.49671	
LOG(EXR) does not Granger Cause LOG(MKT)	27	3.63886	0.04397	
LOG(MKT) does not Granger Cause LOG(EXR)		4.13118	0.03777	

<i>Panel C: Johansen co-integration test</i>				
<i>Hypothesised no. of CE(s)</i>	<i>Max-eigen statistic</i>	<i>Likelihood ratio</i>	<i>Critical values</i>	
			<i>1%</i>	<i>5%</i>
None**	0.8700	90.7036	35.65	29.68
At most 1**	0.7234	35.6125	20.04	15.41
At most 2	0.0333	0.9148	6.65	3.76

Notes: max-eigen and likelihood ratio statistic tests indicate two co-integrating equations at 5% level. \*\* denotes rejection of the hypothesis at the 5% level.

**Table 1** The summary of the results for the model estimation (continued)

<i>Panel D: normalised co-integrating eigenvector (<math>\beta</math>)*</i>				
<i>One co-integrating equation</i>	<i>Log likelihood</i>		<i>-483.2546</i>	
Log(MKT)	Log(FDI)		Log(EXR)	
1.0000	0.0002		-0.2007	
(0.0000)	(3.2E-05)		(0.0531)	

Note: \*extracted from regression output using E-views, standard errors in parenthesis

<i>Panel E: short run VECM</i>				
<i>Variable</i>	<i>Coefficient</i>	<i>Standard error</i>	<i>t-ratio</i>	<i>Probability</i>
ECM(-1)	-0.3576	0.1263	-2.8307*	0.0097
D(log(exr(-1)))	-0.2898	0.1432	-2.0223**	0.0554
D(log(fdi(-2)))	-0.1444	0.0573	-2.5186**	0.0196
R <sup>2</sup>	0.36	D.W	2.31	
Adjusted R <sup>2</sup>	0.27	F-Statistic	4.07	0.0193**

Note: (\*\*)\* indicate significance at (5%)1%.

All the coefficients were correctly signed and statistically significant at 5% level. FDI depicts positive relationship with log of MKT while the real EXR depicts negative relationship. This is consistent with the expectation for country involving in trade openness like Nigeria. Thus, we can derive the co-integrating equation from the above result- with log of MKT as regress and while log of FDI and log of real EXR as regressors, as follows:

$$\log(mkt) = -13.0287 + 0.0002 * \log(fdi) - 0.2007 * \log(exr)$$

Looking critically at the numerical values of the coefficients and their respective signs, the equation above is saying that 10% permanent increase in FDI will cause the stock market to increase by 0.002%, while the same 10% appreciation in the level of real EXR only increase the MKT by 2.01%. This shows that Nigeria's MKT increase more by EXR appreciation than increase in the FDI and this is consistent with the expectation.

The above empirical result was analysed with the use of the two-step Engle and Granger (1987) model, which suggests that any set of co-integrated time series has an error-correction representation, which reflects the short-run adjustment mechanism. The motive of the analysis is to discover whether the short-run dynamics are influenced by the estimated long-run equilibrium condition that is the co-integrating vectors.

A crucial parameter in the estimation of the short-run dynamic model is the coefficient of the error-correction term, which measures the speed of adjustment of MKT to its equilibrium level. The estimation using two-lag specification and by incorporating the error term (ECM), yield the result above. The results show that the parameter of the error-correction terms in the model is statistically significant and correctly signed. This confirms that MKT in Nigeria has an automatic adjustment mechanism and that the economy responds to deviations from equilibrium in a balancing manner. The value of -0.3576 for the coefficient of error correction term suggests that the Nigerian stock market will converge towards its long-run equilibrium level in a moderate speed after the

fluctuation in FDI and EXR. Eliminating, for instance, 95% of a fluctuation in FDI or EXR would take a little less than two years or precisely 6.43 quarters.

## 5 Conclusions

The results indicated that the null hypotheses that FDI does not granger caused MKT could not be rejected implying that non-directional causality emanated from FDI in Nigeria but bi-directional causality ran from EXR to MKT and vice-versa. Hence, appreciation in EXR in Nigeria resulted in improvement in the financial market development, which could also enhance the flow of FDI to the Nigerian economy. The findings from co-integration test showed that both the maximum eigen value and likelihood statistic suggested the presence of two co-integrating equations among the three variables in the Nigerian economy at 5% level in line with the Osterwald-Lenum critical values. The co-integration analysis reveals existence of long-run relationship between FDI and financial market development. In addition, the coefficients were correctly signed and statistically significant at 5% level. FDI depicted positive relationship with financial market development while the real EXR depicts negative relationship with MKT. This was in contrast with earlier results (like Ayanwale and Bamire, 2001; Akinlo, 2004) which found a negative relationship between FDI and economic growth in Nigeria.

In sharp contrast with the long run causal nexus, the findings also showed that both FDI and EXR had negative effects on MKT in Nigeria. The concentration of FDI in the mining sector, which does not generate direct growth impacts on the wider economy, has been cited as the reason for negative effect of FDI on economic growth and similar argument could explain the adverse effects of FDI on MKT. The negative impact of EXR implies macroeconomic instability worsens the stock market volatility and development.

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