

# Relevance of Financial Sector Development on Real Sector Productivity: 21<sup>st</sup> Century Evidence from Nigerian Industrial Sector

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**DOI Link:** <http://dx.doi.org/10.6007/IJARBSS/v5-i6/1661>

**Published Date:** 08 June 2015

## Abstract

This study focuses on the Nigerian industrial sector to examine the relevance of financial sector development on real sector productivity in the 21<sup>st</sup> century. The model adapts the financial sector development measures used in King and Levine (1993) as predictors of industrial sector production output. Estimating the model with Ordinary Least Square (OLS) method, the study reveals that there is a strong linear relationship between the financial sector and real sector because the coefficient of multiple determinations is relatively high; thus suggesting that financial sector development is crucial for real sector productivity.

**Keywords:** Financial Sector, Real Sector, Real Sector Productivity, Financial Sector Development, Nigerian Industrial Sector

**JEL Classification Code:** E44, O40, O14, L69

## 1. Introduction

The real sector is a major segment of the economy because activities in the sector influence economic productivity. It is constituted by economic agents that contribute to a nation's Gross Domestic Product (GDP). The sector is crucial for economic sustainability due to its productive capacity to meet aggregate demand in the economy. Anyanwu (2010) is of the opinion that the real sector plays an important role in capacity building and employment generation. The real sector performs better in the presence of a developed financial sector; hence, financial sector development is a catalyst for growth in the real sector. The exigency for financial sector development for growth in the real sector arises from the notion that a

well-developed financial sector can optimally allocate funds to the real sector to exploit investment opportunities.

Financial sector development connotes an improvement in the ability of financial institutions to provide financial services. Innovation and development of new financial services paves way for both investors and savers to take advantage of new opportunities (Calderón & Liu, 2002). Schumpeter (1911) states that services provided by financial institutions are required by entrepreneurs to promote technological innovation and economic growth. There are two schools of thought on the nexus between the financial and real sectors of an economy. The first school of thought (supply-leading hypothesis) founded on the view of Schumpeter (1911) suggests that financial services are created in expectation for demand for them by the real sector while the second school of thought (demand-following hypothesis) pioneered by Robinson (1952) argues that the demand for financial services by the real sector prompts financial institutions to create them. In other words, the former argues that financial sector development precedes real sector growth while the latter says reverse is the case.

The Central Bank of Nigeria (CBN) classifies the real (activity) sector in Nigeria into agricultural, industrial, building and construction, wholesale and retail trade and services sectors. The aggregation of production output from these sectors reflects the growth level in the Nigerian economy and can be used as a yardstick to judge economic performance. Investors in these sectors often seek financial succour from the financial sector to boost production and increase yields. Studies in Nigeria such as Odediran and Udejaja (2010); Onwumere, Ibe, Ozoh and Mounanu (2012); Oriavwote and Eshenake (2014) have concentrated on the impact of financial development on overall growth in the economy without serious attention given to its direct impact on the real sector. It is worthy of note that financial development can only promote economic growth if it has boosted productivity in the real sector. It is therefore germane to provide empirical evidence on how financial sector development influences the productivity of the real sector.

The rationale behind the restriction of the study to the industrial sector is because the sector encompasses the oil sector which is the major source of revenue for Nigeria. According to Agbaeze, Udeh and Onwuka (2015), oil accounts for 90% of the country's export and 80% of government total revenue. Therefore, a study on the impact of financial development on the industrial sector is essential. Another criterion for this selection is that the sector is the most productive because it accounts for a substantial proportion of total production in the economy yearly.

## **2. Literature Review**

### **2.1.1 The Financial Sector**

The financial sector is the largest in the world in terms of earnings (Sutton & Jenkins, 2007). It is the most regulated due to its economic relevance and acts as a backbone for other sectors in the economy. The primary role of this sector is to move funds from the surplus units or idle users of funds to the deficit units. The financial sector transforms savings mobilised into credit. It ensures that savings are allocated optimally for investment. Aderibigbe (2004) argues that the financial sector facilitates business transactions and economic development. The financial sector comprises of the money and capital markets. The money market otherwise called the banking sector and it is an avenue to seek funds on a short-term basis. The capital market on the other hand is a market where investment securities are being traded and funds are allocated on long-term basis. Nzotta (2004) observes the banking sector

in Nigeria is dominant and the most vibrant sector of the financial sector and difficulties experienced in the sector affects the economy at large.

The view of Schumpeter (1911) is that an economy would not develop if development is not experienced in the financial sector. The development of the financial sector affects growth in the real economy. An efficient financial sector minimises information asymmetry and reduces monitoring and transaction costs (Mckinnon, 1973; Shaw, 1973).

### 2.1.2 The Real Sector

The real sector is a constituent of the economy which consists of individuals and corporate entities that engage in activities aimed at producing goods and services to satisfy public demand. According to Sanusi (2011), the real sector is where production of goods and services take place through the combined use of raw materials and factors of production and it is the driving force of the economy. The output of the real sector indicates the level of productivity in the economy. When the production capacity of the real sector increases, the economy experiences growth. In order to ensure that the real sector operates at its full potential, there must be an efficient financial sector to support it (Sanusi, 2011). The performance of the real sector is a gauge to compare progress between nations.

### 2.1.3 Brief Overview of the Nigerian Industrial Sector

The Nigerian industrial sector basically comprises the manufacturing and mining sectors. The mining sector is the largest segment of the industrial sector and has become a vital sector in the Nigeria due to the fact that it accounts for oil production in the economy. The period of oil boom witnessed in the 1970s led to the neglect of the agriculture and other non-oil tax revenue sectors (Agbaeze, Udeh & Onwuka, 2015). Since the beginning of the 21<sup>st</sup> century, the industrial sector took centre stage and has been contributing more than 15% to GDP. The oil sector which is a prominent component of the industrial sector has accounted for more than 50% of total exports in the last decade. The industrial sector is a major driver of the Nigerian economy. Table 2.1 shows the value of Industrial Sector Production Output (IPO) and its relation to economic productivity (i.e. GDP at Current Basic Prices) in the 21<sup>st</sup> century.

Table 2.1:

Value of Industrial Sector Production Output and GDP at Current Basic Prices (2000-2013)

Year	Industrial Production Output (IPO) ₦' Billion	GDP at Current Basic Prices ₦' Billion	IPO/GDP (%)	Annual Change in IPO (%)
2000	3,757.1	6,713.6	55.96	---
2001	3,044.9	6,895.2	44.16	-18.96
2002	3,212.4	7,795.8	41.21	5.50
2003	4,589.7	9,913.5	46.30	42.87
2004	4,610.1	11,411.1	40.40	0.44
2005	6,090.5	14,610.9	41.68	32.11
2006	7,488.7	18,564.6	40.34	22.96
2007	8,085.4	20,657.3	39.14	7.97
2008	9,719.5	24,296.3	40.00	20.21

2009	8,071.1	24,794.2	32.55	-16.96
2010	15,194.6	54,204.8	28.03	88.26
2011	16,032.3	63,258.6	25.34	5.51
2012	15,825.5	71,186.5	22.23	-1.29
2013	14,642.8	80,222.1	18.25	-7.47

Source: CBN Statistical Bulletin (2013) & Authors' computation

From Table 2.1, it can be observed that the industrial sector had a negative growth rate of 18.96% in 2001 but the sector contributed 44.16% to GDP. The highest contribution made by the sector to total productivity in the economy was recorded in 2000 when 55.96% of GDP was accounted for by the sector. In 2009, there was an annual change of -16.96 in IPO. This was as result of the 2008 global financial crisis which hit the real sector hard. Since 2009, the contribution of the industrial sector to GDP has declined from 32.55% to 18.25% in 2013. The figures below show the graphical illustration of the information in Table 2.1. The statistics are plotted on the vertical axis and the years are plotted on the horizontal axis starting from 2000 to 2013 (i.e. 00 – 13)

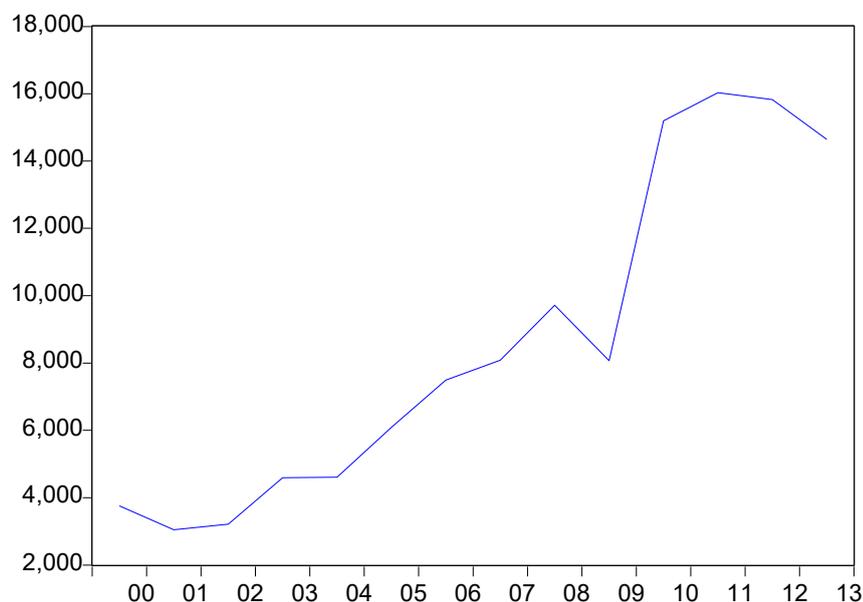


Figure 2.1: Trend of IPO

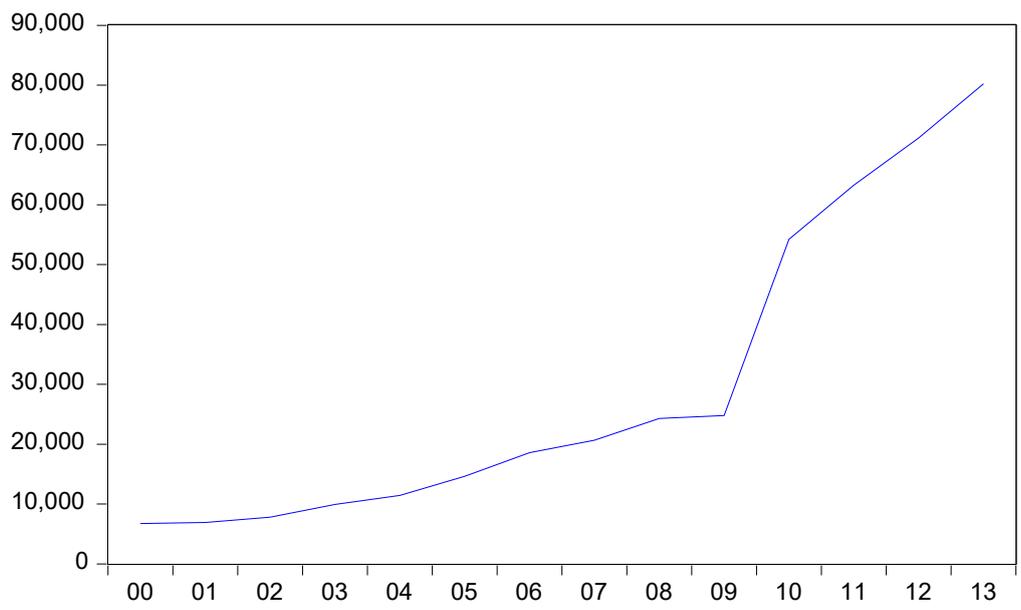


Figure 2.2: Trend of GDP



Figure 2.3: Trend of IPO in relation to GDP

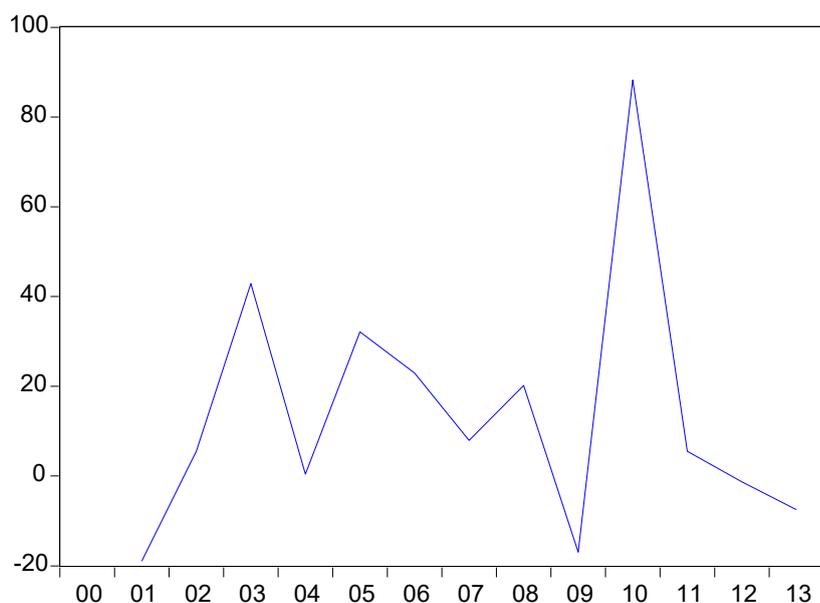


Figure 2.4: Trend of Annual Change in IPO

## 2.2 Theoretical Literature

The linkage between the financial sector and the real sector can be explained with two contrasting views namely supply-leading response and demand-following response. The supply-leading response suggests that financial sector development drives the real sector of the economy (Odhiambo, 2008). The supply of financial services creates the impetus for enterprises in the real sector to demand for them which resultantly causes growth in the real sector. Productivity in the real sector can be enhanced through the creation of an efficient financial market which is the consequence of financial sector development (Shan & Jianhong, 2006). According to Patrick (1966), financial sector leads the real sector and promote real sector growth by transferring limited financial resources from small savers to large investors with respect to relative rate of return.

The demand-following response argues that the real sector drives the financial sector. Financial sector development arises from growth in the real sector (Arestis & Demitriades, 1997). This indicates that causation flows from the real sector to the financial sector. According to Odhiambo (2009), real sector development encourages the demand for financial services, which are passively met by the establishment of new financial institutions.

The Cobb-Douglas production function shows how two or more production inputs; particularly capital and labour interact to produce certain amount of output. It originated from the research of Cobb and Douglas (1928) on the U.S. manufacturing sector between 1899 and 1922. According to Felipe and Adams (2005), the production function is the most pervasive form in theoretical and empirical analyses of growth and productivity. It is expressed as:

$$Y = AK^{\alpha}L^{1-\alpha}$$

Where: Y = real value of output (i.e. total production); A = Total factor productivity; K = Capital; L = Labour;  $\alpha$  = output elasticity of capital;  $1-\alpha$  = output elasticity of labour

The output elasticity of capital and labour measure the degree of responsiveness of total production to variations in the either labour or capital used respectively; the sum is always equal to 1.

Solow-Swan model popularly referred to as Solow growth model was developed in 1956 from the independent works of Robert Solow and Trevor Swan and it explains economic growth via capital accumulation, labour, and increases in productivity. Solow (1956) suggests that economic growth can be examined by assuming a standard neoclassical production function with decreasing returns to capital. The model argues that the financial sector is vested with the responsibility to intermediate funds from savers to entrepreneurs for investment purposes and the absence of the financial sector impede economic productivity.

### **2.3 Related Empirical Evidence**

The aggregation of value of production output in the real sector of an economy is equivalent to gross domestic production. The gross domestic production is widely used in empirical research to measure economic growth; hence, studies showing evidence on the interaction of financial sector development with economic growth are also considered.

Oriavwote and Eshenake (2014) observed that financial sector development has not caused remarkable improvement in the private sector because of the statistical irrelevance of credit to the private sector on economic growth. Aliyu and Yusuf (2013) revealed with the aid of Ordinary Least Square (OLS) technique that financial sector development has remarkable impact on real sector growth. However, credit allocated to the private sector wields a significant impact while liquid liabilities and the size of financial intermediaries exert significant positive influence.

Aizenman, Pinto and Sushko (2013) examined how the cycles of financial contraction and expansion influence the economy through their effect on 8 real economic sectors in 28 countries from 1960 to 2005. The study reported that financial contractions have a higher tendency to follow periods of accelerated growth and many of the real sectors are negatively affected by financial contractions but not improved by financial expansions. Gounder (2012) appraised the impact of financial sector development on Fiji economy over the period 1970 – 2005 and put forward that financial sector development does not have substantial impact on economic output.

Udoh and Ogbuagu (2012) using an autoregressive distributed lag (ARDL) approach examined the relationship between financial sector development and industrial production between 1970 and 2009. The study discovered that financial sector development have significant adverse effect on industrial production. Samsi, Yusof and Cheong (2012) investigated how the financial and real sectors interact in Malaysia during the period 1986Q1 to 2011Q4. The findings show that real sector output has strong association with the banking sector and the banking sector is the major contributor to output growth.

Onwumere, Ibe, Ozoh and Mounanu (2012) assessed the impact of financial deepening on economic growth in Nigeria between 1992 and 2008. The study found that broad money velocity and stock market liquidity foster economic growth while money stock diversification, economic volatility and market capitalisation failed to promote growth. Dehkordi, Sameti and Dehkordi (2012) found weak evidence in support of supply-leading response in Iran between 1981 and 2010 and suggested that no causality exist between the financial and real sectors.

Monnin and Jokipii (2010) found in a sample of 18 Organisation and Economic Cooperation Development (OECD) countries that there is a positive link between banking sector stability and real output growth. It was also discovered through Fed forecast errors that banking sector stability (instability) results in a significant underestimation (overestimation) of GDP growth in the successive quarters. Odediran and Udejaja (2010) revealed that financial and economic growth relate interdependently with each other. Odhiambo (2008) suggested that the causal

link between financial sector development and economic growth is responsive to the choice of financial sector development index and the demand-following response tends to prevail in Kenya.

Sendeniz-Yüncü, Akdeniz and Aydoğan (2006) evaluated whether credit-view hypothesis holds in 11 OECD countries from 1987Q1 to 2003Q3. The co-integration tests revealed that the banking sector and real sector are related in the long-run in all countries. The Granger causality tests provide strong evidence of the credit-view hypothesis (i.e. banking sector lead real sector) in some countries while no causality between both sectors in other countries. Calderón and Liu (2002) showed that financial deepening drives growth of 109 economies comprising both developing and industrial via two channels namely rapid capital accumulation rate and productivity growth, with the channel of productivity growth being the strongest.

### 3. Methodological Framework

#### 3.1 Sample, Data Source and Sample Period

This study evaluates the relevance of financial sector development on real sector productivity in Nigeria, with special focus on the industrial sector in the 21<sup>st</sup> century. Annual time-series data are retrieved from the 2013 edition of the CBN) *Statistical Bulletin*. The period under review is between 2000 and 2013.

#### 3.2 Model Specification, Theoretical Expectations and Estimation Method

This study employs the four measures of financial sector development in King and Levine (1993) and they include DEPTH, BANK, PRIVATE and PRIVY. The proxy for industrial sector productivity is the value of industrial sector production output (IPO). Hence, the model specifies IPO as a function of financial sector development measures in King and Levine (1993). The functional expression of the model is:

$$IPO = f(DEPTH, BANK, PRIVATE, PRIVY)$$

The econometric form of the model expressed in equation is:

$$IPO = \beta_0 + \beta_1 DEPTH + \beta_2 BANK + \beta_3 PRIVATE + \beta_4 PRIVY + \mu \dots \dots (1)$$

$\beta_0$  is the Model Intercept;  $\beta_1 - \beta_4$  are Estimates/Coefficients of the financial sector development measures; and  $\mu$  is the error term.

In order to bring IPO and financial sector development measures to a similar base (i.e. comparative level), the logarithm of each variable is derived. The logarithm form of equation 1 becomes:

$$\log IPO = \beta_0 + \beta_1 \log DEPTH + \beta_2 \log BANK + \beta_3 \log PRIVATE + \beta_4 \log PRIVY + \mu \dots \dots \dots (2)$$

In economic principle, each measure of financial sector development is expected to be positively related to IPO. This means the coefficients of the measures should be greater than zero.

On the basis of period under review, the choice of estimation method is made. The estimation method to be adopted is the Ordinary Least Square (OLS) method. This method is a regression analytical method which is capable of showing the individual effect of each measure of financial sector development as well as their joint effect on IPO. It has the tendency to produce spurious regression results due to the non-stationary property of time-series data; however, it best suits this study because of the review period of 14 years. Therefore, this study cannot apply a superior technique like Johansen co-integration test, error correction modelling, and vector error correction mechanism among others.

### 3.3 Data Description

- i. IPO: This is the value of contribution of the industrial sector to total economic productivity which is measured with GDP.
- ii. DEPTH: It is calculated as the ratio of broad money or liquid liabilities ( $M_2$ ) to GDP.
- iii. BANK: It is the quotient of deposit money banks' (DMBs) domestic credit and aggregate of domestic credit by DMBs and the central bank.
- iv. PRIVATE: It is the ratio of credit extended to the private sector (CPS) to domestic credit by DMBs.
- v. PRIVY: This is derived by dividing CPS by GDP.

## 4. Empirical Findings

### 4.1 Presentation of OLS Regression Results

Variable	Estimate	p-value
C	9426.634	0.4494
DEPTH	-1189.283	0.1169
BANK	11.28914	0.2265
PRIVATE	43.36104	0.6570
PRIVY	1149.942	0.0861
$R^2 = 0.729825$ F-statistic = 6.077936		

Source: Appendix II

The linear regression equation is presented as:

$$IPO = 9426.634 - 1189.283DEPTH + 11.28914BANK + 43.36104PRIVATE + 1149.942PRIVY + \mu$$

The regression results show that the intercept of the model is 9426.634. This implies that when the measures of financial sector development are fixed or held constant, IPO declines by 9426.634units. DEPTH has an estimated value of -1189.634 and this indicates it is negatively related to IPO and a unit increase leads to decrease in IPO by 1189.634units. In contrast, BANK, PRIVATE and PRIVY are positively related to IPO and a unit increase in them causes IPO to rise by 11.28914, 43.36104 and 1149.942units respectively. PRIVY produces a more favourable influence on IPO than other measures. All measures conform to the theoretical expectation except DEPTH. The coefficient of multiple determinations ( $R^2$ ) is  $0.729825 \approx 0.73$ ; thus indicating 73% of changes in IPO is accounted for by the combined impact of the financial sector development measures while the remainder of 27% is accounted for by factors not specified in the model (i.e. error term).

### 4.2 Test for Individual Significance (P-value test)

This test is performed using the p-value attached to the estimate of each financial sector development measure. To confirm statistical significance at 5% or 10% significance level ( $\alpha = 0.05$  or  $0.1$ ), p-value must be less than or equal to 0.05 or 0.1 (i.e.  $p\text{-value} \leq 0.05$  or  $0.1$ ).

It can be obtained from Table 4.1 that none of the measures has its p-value  $\leq 0.05$ ; hence suggesting that the measures do not exert statistical significance on IPO at 5% significance level. However, only PRIVY can be said to be statistically significant at 10% significance because its p-value  $< 0.1$ . This further suggests that PRIVY is a significant predictor of productivity in the Nigerian industrial sector in the 21<sup>st</sup> century.

### 4.3 Test for Significance of Model (F-test)

The F-test checks for the statistical significance of the model built for this study. It is performed on a tail test and at 5% significance level. The null hypothesis ( $H_0$ ) for the test is stated as:

$H_0$ : The model is not statistically significant.

To reject the hypothesis, F-statistic (F-cal) must exceed F-tabulated (F-tab).

Degree of Freedom (df) for F-tab = ( $V_1, V_2$ )

$V_1 = k-1$  and  $V_2 = n - k$

k is the number of variables, n is the number of observations/years

k = 5, n = 14

Therefore,  $V_1 = 5 - 1 = 4$  and  $V_2 = 14 - 5 = 9$

F-tab at (4, 9) df is 3.63 (*obtained from statistical table*) and F-cal is 6.077936  $\approx$  6.08. It is therefore deduced that F-cal > F-tab; thus  $H_0$  is rejected. This implies that the model is statistically significant and it adequately captures the relevance of financial sector development on real sector productivity.

## 5. Conclusion

The real sector is strategic to the growth of any economy. A vibrant real sector guarantees increase in the pace of economic growth. For the real sector to be vibrant, a developed financial sector must exist. The industrial sector is a key segment of the real sector in Nigeria and has annually contributed more than 15% to her economy in the 21st century. This study examined how financial sector development affected the productivity of the real sector in Nigeria, providing the evidence from the industrial sector. The findings revealed that though all the financial sector development measures with the exemption of DEPTH had positive impact. They also do not significantly influence productivity in the industrial sector except PRIVY. Their insignificance may be attributed to the level of financial and economic development as well as the level of macroeconomic instability which increases the cost of production and capable of suppressing the significance of the financial sector. Another major factor is the currency depreciation which discourages foreign direct investment, increases the cost of importing raw materials and reduces the value of exports. The coefficient of multiple determinations is high; hence leading to the conclusion that there is a strong linear relationship between the financial sector and real sector and that financial sector development is a determining cause for real sector productivity in Nigeria. This study agrees with Schumpeter (1911) view that a developed financial sector is necessary for real sector growth. It is suggested that future studies in this area should expand their horizon by increasing the period of review and focus on other sector(s). Also, the measures of financial development used in this study are money market indicators; hence, this study recommends that future research should include capital market indicators to measure financial development.

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#### Appendix I: Presentation of Data

YEAR	IPO ₦ 'Billion	DEPTH (%)	BANK (%)	PRIVATE (%)	PRIVY (%)
2000	3,757.10	13.1	173	65	7.9
2001	3,044.90	18.4	124	73	11.1
2002	3,212.40	19.3	104	67	11.9
2003	4,589.70	19.7	84	72	11.1
2004	4,610.10	18.7	101	70	12.5
2005	6,090.50	18.1	111	72	12.6
2006	7,488.70	20.5	497	65	12.3
2007	8,085.40	24.8	246	56	17.8
2008	9,719.50	33.0	189	74	28.5
2009	8,071.10	38.0	144	80	36.7
2010	15,194.60	20.4	131	91	18.7
2011	16,032.30	19.2	96	85	16.9
2012	15,825.50	19.5	96	118	20.6
2013	14,642.80	18.9	92	127	19.7

Source: Computed from CBN Statistical Bulletin (2013)

#### Appendix II: Empirical Results

Dependent Variable: IPO

Method: Least Squares

Date: 05/19/15 Time: 19:57

Sample: 2000 2013

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9426.634	11921.15	0.790749	0.4494
DEPTH	-1189.283	685.8540	-1.734018	0.1169

BANK	11.28914	8.695395	1.298289	0.2265
PRIVATE	43.36104	94.42047	0.459233	0.6570
PRIVY	1149.942	596.7667	1.926955	0.0861
<hr/>				
R-squared	0.729825	Mean dependent var	8597.471	
Adjusted R-squared	0.609747	S.D. dependent var	4899.939	
S.E. of regression	3061.003	Akaike info criterion	19.16333	
Sum squared resid	84327637	Schwarz criterion	19.39156	
Log likelihood	-129.1433	Hannan-Quinn criter.	19.14220	
F-statistic	6.077936	Durbin-Watson stat	1.579158	
Prob(F-statistic)	0.011865			

*Source: EViews 7 Statistical Package*