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Full Length Research

Effect of stock market performance on industrial productivity of Nigeria: An empirical analysis

Sebastian O. Uremadu*, Kingsley O. Onyele and Florence O. Ariwa

Department of Banking & Finance, College of Management Sciences (COLMAS), Michael Okpara University of Agriculture, Umudike, Umuahia, Abia State, Nigeria.

*Corresponding author. Email address: sebauremadu@yahoo.com. Tel: +234-8037876614.

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ABSTRACT: This study investigated the effect of stock market performance on industrial productivity in Nigeria from 1985 to 2016. In particular, the study examined Nigerian stock market performance indices such as market capitalization, all share index, value of shares traded and number of deals to ascertain how they affect industrial sector contribution to Gross domestic product. The study used unit root test, Johansen co-integration test and vector error correction mechanism to carry out its tests and analysis. The unit root test results revealed that the variables used in the study were integrated at their first differences, while the Johansen co-integration test results suggested a long run relationship between industrial sector productivity and stock market performance indicators. It was also discovered that market capitalization though negative led industrial productivity in Nigeria. Hence, the study recommends policies aimed at accelerating the stock market development and efficiency in order to engender industrial productivity of Nigeria in the years to come.

Key words: All share index, co-integration, gross domestic product, market capitalization, number of deals, value of share traded.

JEL Classification: O16; G14; G15

INTRODUCTION

The industrial sector of every economy is known for its capacity in terms of manufacturing through effective and efficient transformation of raw materials into finished goods. Consequently, it has been widely acknowledged by several authors (Kawode, 2015, Levine and Zervos, 1996, Udoh and Ogbuagu, 2012) that the industrial sector is indeed the bedrock of economic prosperity given its potentials of accelerating domestic consumption and foreign exchange earnings. According to Kawode (2015) and Oteh (2010), sustained development and growth of the industrial sector strengthen the entire economy by way of increased productivity, employment, urbanization and favourable cost of living. Based on this premise, the potentials of the industrial sector in facilitating the well-being of the global economy have been frequently emphasized in the literature.

Nigeria therefore should focus on developing a vibrant industrial sector that functions at full capacity. Such a dynamic sector will generate massive employment, fight poverty, create wealth, and enhance exports and diversify foreign exchange earnings. Ironically, the benefits attributed to the industrial sector are yet to manifest in Nigeria. This is because the Nigerian economy has been operating under tight economic conditions marked by paucity of financial resources. Hence, many of the firms in Nigeria have not been able to function as expected (Onuoha, 2012; Udoh and Ogbuagu, 2012). Unfortunately, this has marred long term developmental plans of Nigeria. Bearing in mind the state of the Nigerian industrial sector, it has been acknowledged that lack of fund supply is a major problem faced by the sector (Kawode, 2015; Adenuga, 2010; Yusuf, 2009).

Generally, industrial productivity cannot be talked about without due consideration of proper mechanism of funds

flow from the surplus economic units to deficit economic units (Adefeso et al., 2013). The Nigerian economy in general, and the industrial sector, in particular, have fallen short of adequate investable funds for productive activities. In support of the finance-growth nexus, Osuala et al. (2013), acknowledged that the positive effects on growth through financial development are credited, particularly, to the mechanisms of mobilization and allocation of funds needed to facilitate and undertake productive investment activities by various economic agents. As such, an important factor towards growth acceleration is a sound and efficient financial system which ensures free flow of resources (Ofori-Abebrese et al., 2016). One of such elements of the financial system is the stock market.

The nexus between stock markets and growth among nations have been frequently debated by researchers and financial experts in recent times. Literature abound that a well-functioning and efficient stock market spurs the overall productivity of the economy (Ofori-Abebrese et al., 2016; Ariwa et al., 2016; Ifionu and Omojefe, 2013; Osuala et al., 2013; Sylvester and Enabulu, 2011; Levine and Zervos, 1998). These studies have established that a strong correlation existed between a well-functioning stock market activities and economic productivity. The stock market connotes all arrangements geared towards facilitating the buying and selling of securities which ensures that firms raise adequate capital through equity issues (Dalvi and Bahgi, 2014). Consequently, the stock market in a country is expected to foster economic growth by being vibrant and functional enough to encourage both domestic and international industrialists (and other investors) to raise lump sums of money through various available financial instruments (Oteh, 2010).

Indeed, Nigeria is a veritable case for investigating the link between stock market performance and industrial sector productivity. The Nigerian stock market was barely recovering from the global economic meltdown before the economy was hit by recession in the second quarter of 2016. These crises suffered by the stock market arising from periods of economic upheavals over the years have cast doubt on the confidence both the shareholders and investors have in the Nigerian stock market. Hence, based on the role expected of the Nigerian stock market, this study is poised to empirically investigate impact of stock market performance on industrial productivity in Nigeria from 1985 to 2016.

Statement of the problem

Nigeria with a population of over 140 million people, obviously is the biggest market in Africa, and it ought to have a strong market for its industrial sector (Yusuf, 2009; Oteh, 2010). When the West African Sub-regions and other African markets are added, then there is a huge existing market for whatever quality products and services from Nigeria. Unfortunately, this great opportunity is yet to be utilized as the Nigerian industries are still underperforming due to lack of funds emanating from weak financial markets. Even with the series of reforms undergone by the Nigerian stock market, the opportunity for greater funds mobilization, improved efficiency in resources allocation and provision of relevant information are still low. Consequently, the expectation that the stock market can provide variety of financial instruments for resources mobilization has been dashed, resulting to low productivity and slow economic growth.

A large number of empirical works such as Ofori-Abebrese et al. (2016), Ariwa et al. *(*2016), Kwode (2015); Emeh and Chigbu (2014), Adefeso et al. (2013), Osuala et al. (2013), Kolapo and Adaramola (2012), Alajekwu and Achugbu (2012), Sylvester and Enabulu (2011), Oluwatoyin and Ocheja (2009), have also tested the stock market-growth relationship using different methodological techniques as well as applying different indicators of stock market performance in time series studies of Nigeria. However, these studies were based on the growth of the entire Nigerian economy, while only a few past studies focused on the industrial sector despite the fact that it is the most productive of all economic sectors in Nigeria. Besides, the empirical findings of these studies, mostly in the developed markets of Western Europe and America, are generally in consensus that a well - functioning and efficient financial system has beneficial effects on economic growth (Ofori-Abebrese et al., 2016; Islam and Osman, 2005). Again, another motivation for embarking on this study is to ascertain if policies aimed at accelerating stock market development and efficiency would engender industrial productivity growth that could rise economic growth of Nigeria. In particular, to know if a well-funded industrial sector via efficient mobilization of adequate financial resources as a complementary role of the stock market would raise industrial output needed to boost growth of domestic economy. This also forms the basis for embarking on the present study. These problems inform the need to evaluate the effects of stock market performance on industrial productivity in Nigeria in the times. By the time the study is completed the researchers shall be in a position to ascertain if stock market performance has influenced industrial productivity of Nigeria.

Objectives of the study

The main objective of this study is to ascertain the effect of stock market performance on industrial productivity of Nigeria. The specific objectives are as follows:

1. To investigate the long run relationship between stock market performance indices and industrial sector's contribution to the domestic economy.
2. To examine the effects of stock market performance indices on industrial sector's contribution to growth of the Nigerian economy.

Research questions

Based on these above stated objectives, the following research questions are raised to guide the study present thus:

1. What is the nature of the long-run relationship between stock market performance indices and industrial sector's contribution to growth of the domestic economy?
2. To what extent do stock market performance indices affect industrial sector's contribution to growth of the Nigerian economy?

Hypotheses

In line with the above stated research questions the following hypotheses are formulated to be tested by the study thus:

H_{o1}: There is no long run relationship between stock market performance indices and industrial sector's contribution to the growth of the Nigerian economy.
H_{o2}: Stock market performance indices have no significant effect on industrial sector's contribution to growth of the Nigerian economy

LITERATURE REVIEW

Nature and Meaning of the Stock Market

Generally, the stock market connotes a platform where business enterprises (companies) and government raise long-term funds for various investment plans (Ifionu and Omojefe, 2013). In this wise, the stock market is an integral part of the financial system that provides an efficient delivery mechanism for mobilization and allocation, management and distribution of long term funds for investment project (Alile and Anao, 1990). Its functions are evident through the interplay of individuals, institutions and various instruments. Similarly, Sule and Momoh (2009) said that the stock market connotes a network of specialized financial institutions, series of mechanisms, processes and infrastructure that, in different ways, ensure coming together of suppliers and users of medium to long term capital for investment in socio-economic developmental projects. Stock market is a segment of the financial system that accommodates certain institutions for the creation, custodianship, distribution and exchange of financial assets and management of long-term liabilities and gross fixed capital formation (Osaze, 2007).

The stock market has two segments namely, the primary and secondary markets. The primary market creates the platform through which governments and corporate organizations raise fresh funds through the issuance of securities (Sa'adu, 2014). Otherwise, the primary market is known as the new issues market. These new issues include public offers, right issues and private placements. On the other hand, the secondary market provides the avenue for investors to buy or sell securities that were earlier issued in the primary market. According to Al-Faki (2006), the secondary market can be organized or unorganized. An organized market refers to a stock market with physical location, trading in designated (quoted) securities (example, Nigerian Stock Exchange). An unorganized market has no physical trading location but transactions are conducted mainly through telephone calls and the computer. It is called an Over-the-Counter-Market (OTC). The OTC trades mainly in unquoted securities. The distinguishing factor between the two segments is that in the primary markets, the funds raised from investors go to the issuing entity, while in the secondary market; the proceeds from the transaction go to investors (Sa'adu, 2014).

Stock market performance indices

Formal capital market activities are representatively measured by the performance of the stock market such as market capitalization, all shares index (ASI), volume and value of transactions (VAT), number of deals and new issue of securities (NIS) of the Nigerian stock exchange.

Market capitalization is the total value of all shares of a publicly-traded company. Market capitalization is calculated by multiplying the total number of shares by the market price per share. Market capitalization is one of the basic measures of the worth of a publicly-traded company; it is a way of determining the actual value of a company. Also, the investment community uses this figure to determine a company's size or worth, as opposed to sales or total assets figures (Ekezie, 2002). Generally speaking, a higher market capitalization indicates a more valuable company. Consequently, it is the sum of the current market value of all securities traded on a financial market.

New issues market is the market where companies can raise finances by issuing shares or by floatation of securities. In other words, it is when a company attempts to raise funds by issuing additional shares or initial public offer (IPO) to the general public who would wish to invest in the shares of the company. An initial public offering (IPO) is a first-time offering of shares by a specific firm to the public (Agarwal, 2001).

Volume of transaction refers to the total amount of securities traded in the capital market regardless of what type of security instrument. The volume of transaction often determines the level of transactional activities or the performance of the capital market as far as the business transaction of the market is concerned and this in turn could have an effect on the growth of an economy which could either be positive or negative outcome of the transaction volume (Adewoyin, 2004).

Figure 1. Trend of Market Capitalization in Nigeria.
Source: CBN Statistical Bulletin (2016) various.

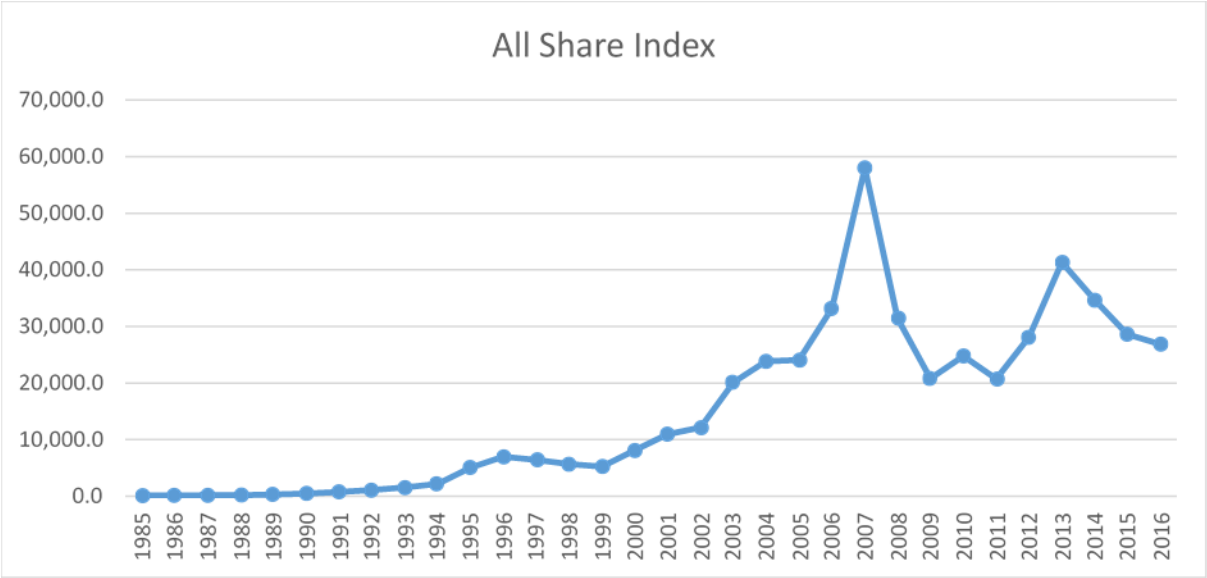

Figure 2. Trend of All Share Index in Nigeria.
Source: CBN Statistical Bulletin (2016) various.

Trend of stock market activities in Nigeria

The Nigerian stock market activities have been growing at a healthy rate in relation to its role in stimulating economic growth through financial intermediation. However, the trend showed that there have been some fluctuations due to unpalatable economic situations it had suffered over the years. The trend of the stock market indices has been captured in Figures 1 and 2.

From Figure 1, it was deduced that stock market capitalization had an increasing trend from 1985 to 1996 such that its value increased from ₦6.60 billion to ₦285.80 billion. A slight decrease of ₦281.90 billion was recorded in 1997 and it further decreased to ₦262.6 billion in 1998 probably due to the political tension within the period of 1997 and 1998 due to the demise of General Sani Abacha coupled with the frequent agitation for a democratic government in Nigeria. In 1999, the year that marked the

Table 1. Summary of Nigerian industrial sector activities.

No.	Industries	Sub-Industries
1	Crude Petroleum and Natural Gas	
2	Solid Minerals	Coal mining Metal ores Quarrying and other mining
3	Manufacturing	Oil refining Cement Food, beverage and tobacco Textile apparel and footwear Wood and wood products Pulp, paper and paper products Chemical and Pharmaceutical products Non-metallic products Plastic and rubber products Electrical and electronics Basic metal, iron and steel Motor vehicles and assembly Other manufacturing

Source: Central Bank of Nigeria Statistical Bulletin (2016) various.

successful transition from military to democratic government witnessed an appreciable increase from ₦262.6 billion in 1998 to ₦300.00 billion in 1999. The stock market capitalization persistently increased up to a record breaking value of ₦13,181.70 billion in 2007. Unfortunately, following the global financial crisis, the Nigerian stock market capitalization declined significantly from ₦13,181.70 billion earlier recorded in 2007 to ₦9,563.00 billion in 2008 and further decreased to ₦7,030.80 billion in 2009. However, in 2010, the stock market capital began to show signs of recuperation from the global financial crisis as market capitalization accelerated to ₦9,918.20 billion in 2010 and ₦19,077.40billion by 2013. From 2014, the market capitalization began to show a slow pace of growth as the value began to decrease to ₦16,185.70 billion in 2016 due to economic recession the nation started experiencing at the second quarter of 2016.

The All Share Index which shows the movement of stock market prices was plotted in Figure 2. The trend revealed that from 1985 to 1991 the movement of stock prices was moderate, increasing from 127.30 point to 783.0 point with a sharp increase to 6,992.10 points in 1996. By 1999, the trend of All Share Index had reached 5,266.40 points and further increased to 57,990.20 points in 2007. The effect of the global financial crisis was also seen in this case as All Share Index declined from the 57,990.20 points in 2007 to 31,450.80 points in 2008, 20,817.20 points in 2009 and 20,730.60 points in 2011. By 2012, the stock market seemed to be recovering from the global financial crisis as All Share Index peaked at 28,078.80 points accompanied with further increase of 41,329.20 point in 2013. By 2015, the trend of All Share Index had declined to 28,642.3 points probably due to tight economic policy of the newly elected Buhari government. However, as an economic theory rightly asserts that any economic downturn is usually accompanied by poor performance of key macroeconomic variables, as it has been evident in the value of All Share Index of 26,874.6 point (Adewoyin, 2004).

Trend of industrial sector activities in Nigeria

In everyday usage the word “industry” and “manufacturing” are often used interchangeably. This is because the bulk of the industrial sector activities lies on manufacturing activities. Hence, manufacturing processes which could be extractive, analytical, synthetic or fabricating contribute a very large proportion of the total industrial output. The activities that characterized the Nigerian industrial sector have been summarized in Table 1.

The Table 1 above clearly showed that manufacturing activities dominated the Nigerian industrial sector, followed by mining of solid and then crude petroleum and Natural gas. It is the reason why manufacturing activities tend to contribute more to the overall productivity of the industry than others. The Figures 3 to 6 show the trend for contributions of the major industrial activities to the overall output of the industry from 1985 to 2016, and then the

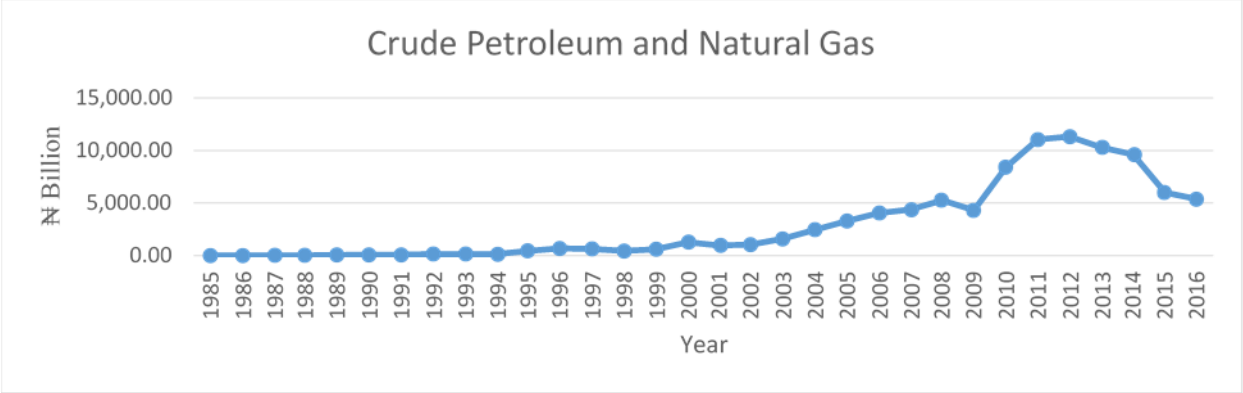

Figure 3. Trend of Crude Petroleum and Natural Gas Contribution to the Nigerian Industrial Sector.
Source: CBN Statistical Bulletin (2016) various.

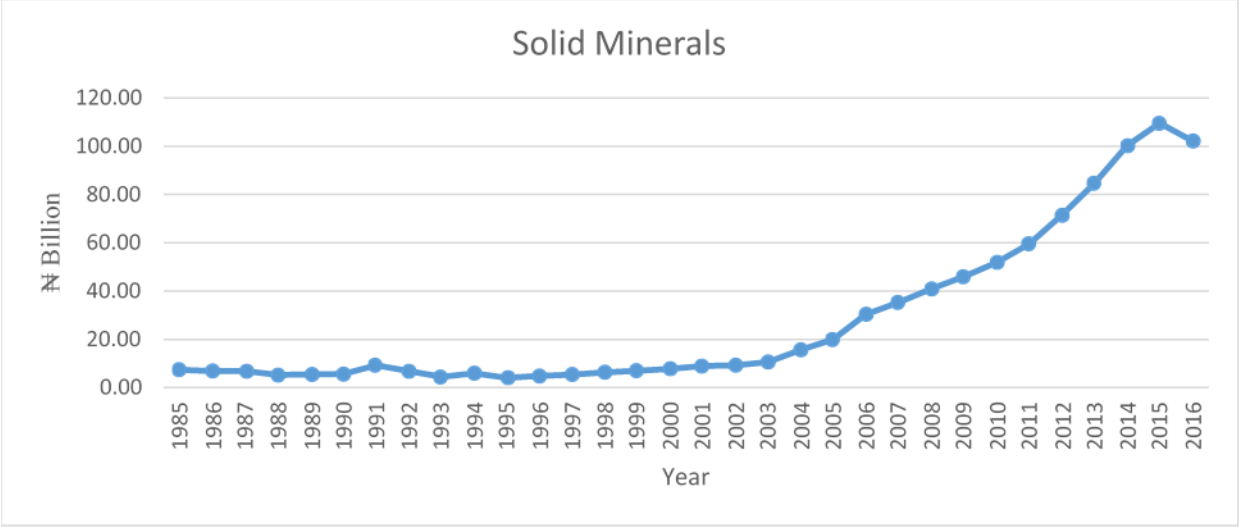

Figure 4. Trend of Solid Minerals Contribution to the Nigerian Industrial Sector.
Source: CBN Statistical Bulletin (2016) various.

contributions of overall industrial productivity to gross domestic production.

Figure 3 showed that the contribution of crude petroleum and natural gas to the overall industrial output was below ₦2,000.00 billion from 1985 to 2003. By 2004, 2005, 2006, 2007 and 2008, crude petroleum and natural gas contributions accelerated to ₦2,460.55 billion, ₦3,281.47 billion, ₦4,044.97 billion, ₦4,363.63 billion and ₦5,270.01 billion, respectively. In 2009, there was a slight decline in crude petroleum and natural gas productivity to the tune of ₦4,297.07 billion probably due to the aftermath effect of the global economic crisis. By 2010, petroleum and natural gas production increased to ₦8,402.68 billion with further increases of ₦11,039.41 billion in 2011 and ₦11,315.03 billion in 2012. However, there was a sharp decline in crude petroleum and natural gas production in 2013, 2014, 2015 and 2016. By 2016, the total value of crude petroleum and natural gas nosedived to ₦5,367.32 billion, all time low which aggravated economic recession in Nigeria.

From Figure 4, it could be seen that there were slight fluctuations in solid minerals production as the solid minerals contribution to industrial output increased from ₦7.41 billion in 1985 to ₦9.28 billion in 1991. By 1993, solid minerals productivity decreased to ₦4.45 billion and ₦4.10 billion in 1995. By 1996, it accelerated to ₦4.85 billion with persistent increases up to ₦109.59 billion. As it has been expected, by 2016, the effect of economic recession manifested once again as the value of solid minerals production decreased to ₦102.22 billion.

Going by the trend of manufacturing sector contribution to the industrial sector, there was persistent increases from 1985 to 2015 as revealed by the graph in Figure 5. The actual value of manufactured goods over the period

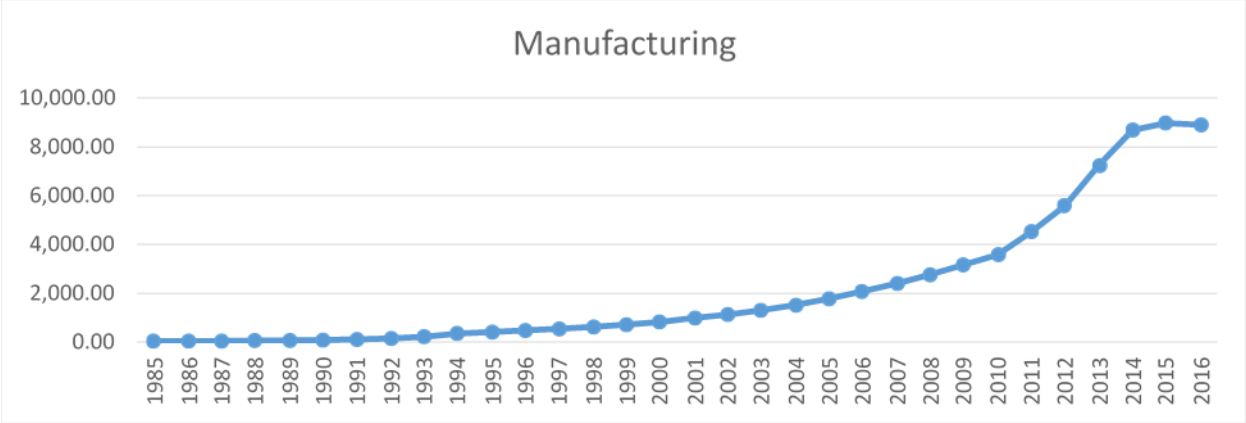

Figure 5. Trend of Manufacturing Contribution to the Nigerian Industrial Sector.
Source: CBN Statistical Bulletin (2016) various.

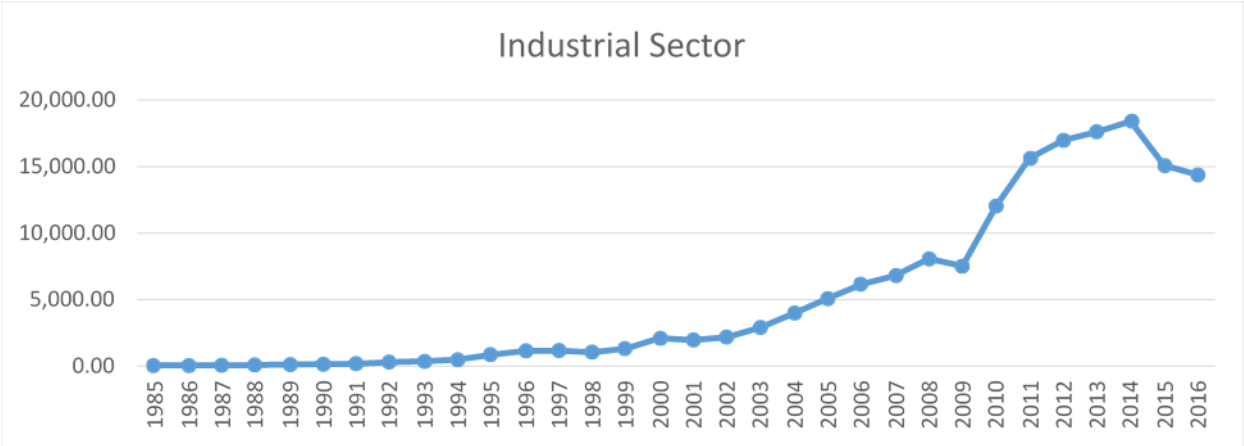

Figure 6. Trend of Industrial Sector Contribution to Gross Domestic Product**.**
Source: CBN Statistical Bulletin (2016) various.

increased from ₦37.14 billion to ₦8,973.77 billion which indicated that there has been some measure of stability in manufacturing activities in the Nigerian economy. Also, following the fact that none of the other industrial activities (crude petroleum and natural gas and solid minerals production) exceeded the values obtained for the manufacturing activities was an indication that manufacturing has been the engine room of the industrial sector. However, the value of manufacturing output decreased from ₦8,973.77 billion in 2015 to ₦8,903.24 billion in 2016 due to persistent economic downturn.

The Figure 6 indicated the trend of total industrial productivity over the period (1985 – 2016). Here, total industrial productivity comprised the sum of crude petroleum and natural gas, solid minerals and manufacturing outputs. Following the trend, total industrial output recorded steady increases with slight fluctuations from 1985 to 2014. But there were decreases in 2009, 2015 and 2016. Looking at these years, it could be deduced that they covered the years of global financial crisis (2009) and economic failures (2015 – 2016, with particular emphasis in 2016).

Theoretical concept of stock market, capital formation and productivity

Conceptually, it has been established in financial theory that there is a relationship between the functions of the stock market and fixed capital formation. This is because the functions of the stock market which include provision of long-term debt and equity financing through the issuance of bonds, debentures and shares for investment in long-term productive assets, the efficient allocation of capital through competitive price mechanism, encouragement of a broader ownership of productive

assets, and the mobilization of savings and channeling them to productive investments; are aimed at promoting capital formation. The present study will centered on the above stated theoretical conceptual framework to conduct its investigations and analysis.

Empirical literature

Ofori-Abebrese et al. (2016), used auto regressive distributed lag (ARDL)model coupled with granger causality test to investigate the relationship between stock market development and economic growth in Ghana for the period, 1991 to 2011. The study revealed that stock market development had a negative impact on economic growth in the long-run and this the causality test showed that there did not exist any relationship between stock market development and economic growth in Ghana for the study period.

Ariwa et al. (2016), investigated the impact of stock market liquidity and efficiency on performance of the manufacturing sector in Nigeria using time series data spanning from 1985-2014. In the course of data analysis, the study used unit root test and ARDL bounds test approach to co-integration. The ARDL bounds test results revealed that the variables in the specified model were bound together in the long-run. The associated equilibrium correction was also significant attesting to the existence of long-run relationship. The findings of their study also indicated that stock market efficiency and number of deals were significant variables that explained the changes in the Nigerian manufacturing sector.

Ngerebo-A and Torbira (2014), examined the issue of the magnitude and direction of relationship between capital market performance indicators and gross fixed capital formation in Nigeria from 1980 to 2011. They found existence of positive and significant long run relationship between capital market activities and gross fixed capital formation in Nigeria. The Granger Causality Test results also revealed that there was a unidirectional causality flowing from gross fixed capital formation (GFCF) to market capitalization. This meant that growth in GFCF could raise the value of listed securities, boost the value of the firms, increase the prices of listed equities and enlarge the size of the country's capital market.

Sam and Salami (2014), were motivated by the fact that some studies had reported negative effects of capital markets on economic growth in some developing nations, despite their expected positive effect on growth and development. The study was a multiple linear regression based on quarterly time series data spanning from 1991:1 to 2011:4. Exploratory data analysis was used to ensure that the basic assumptions of regression analysis were verified and resolved. Structural Equation Modeling (SEM) through Path Analysis (i.e. Layered Regression Technique) was used to identify the possible causal relationship between GDP growth and capital market development, as well as other causal effects in the model. The study discovered that GDP growth was linearly related to the independent variables in the model. There was also a positive bi-directional relationship between economic growth and capital market development. However, the stronger effect was from capital market development to economic growth.

Okunlola (2012), regressed gross domestic product against yearly stock market performance variables adopting a multi-linear approach on Nigerian data. The data sourced from the CBN statistical bulletin were analyzed using multiple regression analysis. The results showed a positive and significant relationship between total market capitalization, total stock exchange and economic growth indicator, respectively.

Sylvester and Enabulu (2011), examined the effect of stock market on economic growth in Nigeria. Ordinary least squares regression (OLS) was to analyze the data from 1989 to 2008. The results revealed that there was a positive relationship between economic growth and all the stock market development variables used. With 99 percent R-squared and 98 percent adjusted R-squared, the result showed that economic growth in Nigeria was adequately explained by the model for the period between 1989 and 2008. By implications 98 percent of the variation in the growth of economic activities was explained by the independent variables. The study affirmed positive links between the stock market and economic growth;

Ezeoha et al. (2009), examined the nature of the relationship that existed between stock market development and the level of investment with regards to both domestic private investment and foreign private investment flows in Nigeria. They observed that stock market development promoted domestic private investment flows thus enhancing the economy's production capacity as well as promoting national output. However, the results of their study showed that stock market development has not been able to encourage the flow of foreign private investment into Nigeria.

Sule and Momoh (2009), studied the influence of stock market earnings on per capital income in Nigeria. Applying the co-integration technique and error correction mechanism they found that stock market earnings positively and significantly impacted on per capita income both from the primary and secondary markets.

RESEARCH METHODOLOGY

The research design adopted for this study is ex-post facto. The researchers also adopted the multiple regression analysis based on the classical linear regression model, otherwise known as ordinary least square (OLS) technique for tests and analysis. The researchers' choice of technique was based not only on its computational simplicity but also as a result of its optimal properties such as linearity, unbiasedness, minimum

variance, zero mean value of the random terms (Gujarati 2004).

Nature and sources of data

The data for this study was collected from secondary sources from (CBN) Statistical Bulletin. Statistical Bulletin of various issues and reports and statement of accounts (various), Nigerian Stock Exchange Fact Book (various) as well as Nigerian Annual Abstract of Statistical (various) published by the Federal Office of Statistics (FOS), Abuja.

Data analysis

First, in order to avoid spurious regression, it was necessary to carry out pretesting for stationarity of variables using Augmented Dickey-Fuller (ADF) test. The next step was to test for numbers of co-integration equations that exist among the variables, that is, whether a long run co-integrating relationship exists among the variables in I(1). Co-integration tests will be undertaken based on the Johansen (1988) maximum likelihood framework. The final step is to carry out the vector error correction (VECM) tests proper. The significance of error correction term in the model is to indicate how disequilibrium in the dependent variable could be adjusted in the long run.

Model specification and operational definition of variables

The model adopted from Kolapo and Adaramola (2012) is shown in equation (3.1). Specifically, the model for this study is specified thus:

$$\Delta INDPROD_t = \beta_0 + \beta_1 \Delta MCAP_t + \beta_2 \Delta ASI_t + \beta_3 \Delta VLSTRD_t + \beta_4 \Delta NODLS_t + ECT_{t-i} \quad equ.\ (3.1)$$

Where: ∆INDPROD = Change in industrial productivity, ∆MCAP = Change in market capitalization, ∆ASI = Change in all share index, ∆VLSTRD = Change in value of shares traded, ∆NODLS = Change in number of deals, ECT = Error correction term, β_0 = Constant and $\beta_1, \beta_2, \beta_3$ and β_4 = Population parameters.

Brief explanations of variables

The variables “industrial productivity” (INDPROD) was measured using the aggregate industrial sector contribution to gross domestic product in Nigeria for the period 1985 to 2016.On the other hand, stock market performance was measured using the market capitalization (MCAP), all share index (ASI), number of deals (NODLS) and value of shares traded (VLSTRD). These variables have been briefly described below as follows:

All share index (ASI): is a series of numbers which shows the changing average value of the share prices of all companies on a stock exchange, and which is used as a measure of how well a market is performing.

Market capitalization (MCP): is the total valuation of a company based on its current share price and the total number of outstanding stocks. It is calculated by multiplying the current market price of the company's share with the total outstanding shares of the company.

Value of shares traded (VST): is the total number of shares traded multiplied by their respective matching prices.

Number of deals (NODLS): This is a measure of stock market performance defined in terms of the total number of deals recorded by the Stock Exchange market during a day’s operation. It is the number of times deals or dealings (i.e. buying and selling of shares) in a Stock Exchange market (Uremadu, 2005; Collin, 2000).

RESULTS AND DISCUSSION

Presentation of data

The data used for this study are presented in Table 2.

Analysis of data and discussion of results

The time series data were analyzed using Augmented Dickey-Fuller (ADF) unit root test, Johansen cointegration tests and vector error correction mechanism (VECM) as shown below:

Unit Root Test

The result of the unit root test presented in Table 3 indicated that all the variables were integrated of order one I(1) since their p-values at level are greater than 0.05 (5%) while the p-values at first difference are less than 0.05 (5%). Since the variables have been integrated at their first difference, any attempt to specify the dynamic function of the variables in the level of the series will be inappropriate and will lead to spurious regression (Gujarati, 2004). Based on this premise, it became necessary to use the Johansen approach to co-integration and the vector error correction (VECM) methods for the analysis.

Co-integration Test

Co-integration is said to exist if the Trace Statistic and Max-Eigen Statistic are significant at 1% and 5% levels. Alternatively, under the Johansen co-integration test, co-

Table 2. Aggregate Data 1985 to 2016.

Year	Industrial Sector Productivity (₦ Billion)	Market Capitalization (₦ Billion)	All Share Index	Value of Shares Traded (₦ Billion)	Number of Deals
1985	51.14	6.6	127.3	0.26	17,444
1986	51.08	6.8	163.8	0.32	23,571
1987	65.50	8.2	190.9	0.59	27,718
1988	86.08	10.0	233.6	0.38	20,525
1989	122.73	12.8	325.3	0.85	21,560
1990	147.96	16.3	513.8	0.61	33,444
1991	187.38	23.1	783.0	0.23	39,270
1992	303.28	31.2	1,107.6	0.24	41,770
1993	365.92	47.5	1,543.8	0.49	49,029
1994	487.57	66.3	2,205.0	0.80	40,398
1995	862.24	180.4	5,092.2	0.98	42,074
1996	1,153.53	285.8	6,992.1	1.84	49,564
1997	1,171.35	281.9	6,440.5	6.98	49,515
1998	1,053.41	262.6	5,672.7	10.33	78,089
1999	1,314.29	300.0	5,266.4	13.57	84,935
2000	2,100.51	472.3	8,111.0	14.07	123,509
2001	1,964.89	662.5	10,963.1	28.15	256,523
2002	2,178.51	764.9	12,137.7	57.68	426,163
2003	2,902.81	1,359.3	20,128.9	59.41	451,850
2004	3,992.28	2,112.5	23,844.5	120.40	621,717
2005	5,080.16	2,900.1	24,085.8	225.82	973,526
2006	6,157.84	5,120.9	33,189.3	262.94	1,021,967
2007	6,800.15	13,181.7	57,990.2	470.25	1,367,954
2008	8,072.50	9,563.0	31,450.8	1076.02	2,615,020
2009	7,513.88	7,030.8	20,827.2	1679.14	3,535,631
2010	12,033.20	9,918.2	24,770.5	685.72	1,739,365
2011	15,626.42	10,275.3	20,730.6	799.91	1,925,314
2012	16,975.34	14,800.9	28,078.8	638.93	1,235,467
2013	17,614.29	19,077.4	41,329.2	808.99	1,147,174
2014	18,402.19	16,875.1	34,657.2	2350.88	3,224,639
2015	15,073.78	17,003.4	28,642.3	1334.78	1,211,269
2016	14,372.78	16,185.7	26,874.6	961.22	955,650

Source: Central Bank of Nigeria Statistical Bulletin 2016 various, Nigeria Stock Exchange FactBook 2016 various.

Table 3. Augmented Dickey-Fuller unit root test.

Variable	Level	First Difference	Order of Integration
INDPROD	-1.642045 {0.7524}	-3.589919 {0.0409}	I(1)
MCAP	-1.949540 {0.6049}	-5.501136 {0.0005}	I(1)
ASI	-2.982930 {0.1527}	-5.291174 {0.0010}	I(1)
VLSTRD	-3.494709 {0.0576}	-5.546098{0.0005}	I(1)
NODLS	-3.257536 {0.0922}	-6.967021 {0.0000}	I(1)

Figures in bracket denote { } p-values.
Source: Authors compilation (2017) using EViews 9.0.

integration exists when the Trace Statistic and Max-Eigen values are greater than the 0.05 critical values. Hence, the existence of co-integration implies long run relationship, and vice versa. The results obtained from the Johansen approach to co-integration have been captured in Table 4.

Table 4 showed the Trace and the Maximum Eigenvalue

Table 3. Augmented Dickey-Fuller unit root test.

Variable	Level	First Difference	Order of Integration
INDPROD	-1.642045 {0.7524}	-3.589919 {0.0409}	I(1)
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Figures in bracket denote { } p-values.
Source: Authors compilation (2017) using EViews 9.0.

Table 5. Lag selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1520.359	NA	1.00e+38	101.6906	101.9241	101.7653
1	-1365.821	247.2601	1.83e+34	93.05474	94.45594	93.50299
2	-1255.545	139.6826*	7.24e+31*	87.36969*	89.93855*	88.19149*

*indicated 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.

statistics for the cointegration test. The results revealed that the null hypothesis of no co-integrating relationship does not hold. The Trace statistic (Panel A) indicated that there are at least five (5) co-integrating equations while the Maximum Eigenvalue statistic (Panel B) also indicated five (5) co-integrating equations. The existence of co-integration is indicative of a long-run relationship between stock market performance indices and industrial sector productivity in Nigeria which is consistent with the finance-growth led theories (Sa'adu, 2014). Consequently, it was concluded that stock market performance had a long-run relationship with industrial productivity in Nigeria.

Optimal lag selection

Once co-integration is tested and confirmed, then the optimal lag order of the variables is selected by using either Likelihood Ratio (LR) test or Final Prediction Error (FPE) or Akaike Information Criterion (AIC) or Hannan and Quinn Information Criterion (HQIC). The decision for this study was made based on SC and AIC tests. Consequently, the results of the optimal lag selection are presented in Table 5.

From Table 5, the lag order selection was based on the Schwarz information criterion (SC) and Akaike information criterion (AIC). Hence, the optimal lag length of two (2) was used for the analysis as advised by the AIC and SC (Johansen, 1988).

Regression results

The regression results have been relayed in Table 6 based on the vector error correction mechanism (VECM). Table 6 showed that the error correction term (ECT) is negatively signed with a probability value (p-value) of 0.0228 which suggests that it is significant at 5% level. The significance of error correction term (ECT) has indicated the velocity of adjustment to the long-run equilibrium after a short-run shock. The coefficient -0.331210of the error correction term showed that about 33.12% of the discrepancies in industrial sector productivity was corrected in each period. This implied that industrial sector productivity adjusted rapidly to changes in stock market performance indices in the long run.

The estimated coefficients of the variables indicated that at lag 2, industrial sector productivity (INPROD) of two years ago caused current years productivity to reduce by -0.444862 units with a p-value (0.0079) which was significance at 1% level. Also, the coefficient of market capitalization (MCAP) revealed that previous years change in stock market capitalization accounted for -1.395765 unit decrease in industrial productivity at 1% significant level based on the p-value (0.0008). That both INPROD and MCAP assumed a negative and significant outcome instead of their expected positive posture on the productivity of the Nigerian industrial sector could only be explained as a result of distortions in both the Nigerian economy and the Nigerian stock market operations due to its underdeveloped nature and low industrial output of the Nigerian economy caused by several factors such as lack of raw materials, power or electricity supply that resulted in closed down of several industrial outfits, lack of investible funds in the industrial sector, high risk of doing business in the Nigerian business environment, among other high risk factors. All share index (ASI) with a positive

Table 6. Regression Results based on Vector Error Correction Technique.

Parameters	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.331210	0.129539	-2.556845	0.0228*
D (INDPROD(-1))	0.161758	0.291904	0.554148	0.5882
D (INDPROD(-2))	-0.444862	0.143672	-3.096364	0.0079**
D (MCAP(-1))	-1.043617	0.322514	-3.235884	0.0060**
D (MCAP(-2))	-1.395765	0.326275	-4.277874	0.0008**
D (ASI(-1))	-0.028723	0.021936	-1.309386	0.2115
D (ASI(-2))	0.014096	0.028527	0.494120	0.6289
D (VLSTRD(-1))	4.509807	2.766064	1.630406	0.1253
D (VLSTRD(-2))	3.367896	3.666778	0.918489	0.3739
D (NODLS(-1))	-0.001355	0.002068	-0.655057	0.5230
D (NODLS(-2))	-0.003468	0.002007	-1.727908	0.1060
C	2084.583	321.4557	6.484823	0.0000**
R-squared	0.988507 ≈ 98.85%			
Adjusted R-squared	0.977013 ≈ 97.70%			
F-statistic	86.00632			
Prob(F-statistic)	0.000000**			
Durbin-Watson stat	2.619605 ≈ 2.62			

**Significant at 1% level, *Significant at 5% level.
Source: Authors compilation 2017 using EViews 9.0.

coefficient implies that industrial productivity accelerated by 0.014096 units given a unit change in ASI. Similarly, changes in value of shares traded (VLSTRD) caused industrial productivity to increase by 3.367896 units, while the effect of number of deals (NODLS) was negative and insignificant.

The goodness of fit of the model as indicated by the adjusted R-squared value 0.977013 or 97.70% showed that the model fits the data well, the total variation in the observed behavior of industrial productivity was jointly explained by the variation in stock market performance indices (MCAP, ASI, VLSTRD and NODLS) up to 97.70%. The remaining 2.30% was accounted for the error term. The overall significance of the model was also tested using the F-statistic. Here, the high significance of the F-statistic value of 86.00632 showed that the model adopted was good, it actually confirmed that the model fitted the data well. Hence, it was concluded that stock market performance indices had a significant effect on industrial productivity in Nigeria following the p-value of the F-statistic (0.00000) which was less than 0.05.

Summary of findings

This study developed multiple regression model for the purpose of empirically explaining and analyzing impact of stock market performance on industrial productivity in Nigeria. Using multiple regression analysis to model productivity, the study estimated the effect of four explanatory variables; viz market capitalization, all share index, value of shares traded and number of deals on industrial productivity, by means of vector error correction model due to the outcome of the unit root test and Johansen co-integration test.

Based on the co-integration test, it was found that a long-run relationship existed between stock market performance indices (market capitalization, all share index, value of shares traded and number of deals) and industrial productivity in the long-run. It was also revealed that industrial productivity responded rapidly to stock market performance indices in the long-run. The adjusted R-squared and F-statistic of the VECM indicated that stock market performance indices jointly accounted for significant changes in industrial productivity in Nigeria.

The results also revealed that market capitalization led industrial productivity in Nigeria, though negative in parameter. Even with no significant effect both all share index and value of shares traded had positive signs while number of deals had a positive and negative effect on industrial productivity. Again, the two period lags of industrial productivity had a negative and significant effect on current year's productivity of the Nigerian industry depicting existence of an unstable industrial productivity growth outlook in Nigeria. By these findings it then implies that if the stock market is well regulated to serve the purpose of an efficient financial intermediation, industrial productivity would rise adequately or commensurately for both domestic consumption and exports to earn foreign exchange.

Conclusion

Based on the findings of this study, it is evident that

Nigeria's stock market has performed below expectation judging from results of regression analysis conducted, since both lagged industrial productivity and market capitalization had a negative and significant effect on industrial sector output. A lot therefore need to be done to strengthen the link between the stock market performance and industrial sector in Nigeria. As an emerging stock market of 21st century, the Nigerian stock market has been faced with numerous challenges such as low investments due to volatile stock prices, high inflationary pressure, high exchange rate volatility, unfavourable investment climate, just to mention a few. Hence, policy makers and captains of industry should work out strategies to overcome these challenges in the times. The study discovered that the effect of stock market performance on the Nigerian industrial sector was strong but negative during the period covered by the study. In particular, study discovered that stock market performance has not positively and significantly influenced industrial productivity in Nigeria. Hence, the study identified a number of policies to stimulate output and promote the development of an active, dynamic and vibrant stock market that would rise industrial productivity in Nigeria. The success of a stock market that could engender growth lies on the government and the organized private sector.

Recommendations

Based on the findings of the study, the following recommendations have been suggested for adoption to action policy:

1. Given the present political dispensation, all tiers of government should be encouraged to fund their priority development programmes and projects via the stock market; this will serve as a leeway to freeing the resources that could be used in the industrial sector and other sectors of the economy. An efficient and well developed stock market can engender growth of industrial output of Nigeria.
2. Government should adopt policies aimed at creating a conducive, stable and unrestricted macro-economic environment that would stimulate entrepreneurial activity and demand in the stock market.
3. Market participation and regulatory agencies should work as one to protect the integrity of the market; all fraudulent practices should be exposed and dealt with appropriately; this would boost market reputation and stimulate international confidence in the market.
4. Finally, government, market operators and captains of industry should work harmoniously to eliminate all forms of distortions such as lack of ease of doing business, lack of investible funds, lack of power supply to industrial sector, lack of raw materials, etc., bedeviling the market, in a bid to enable the industrial sector optimize its output or productivity to lead to growth of the economy.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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